FACILITY Association

QUARTERLY VALUATION HIGHLIGHTS

RISK SHARING POOLS

as at June 30, 2019

Ontario
Alberta Grid and Alberta Non-Grid
New Brunswick and Nova Scotia

FA Actuarial

11/19/2019

Should you require any further information, please call:

Shawn Doherty, FCIA, FCAS
SVP Actuarial & CFO
(416) 644-4968

Contents

A. Executive Summary

We have completed a valuation for all (Ontario, Alberta Grid, Alberta Non-Grid, New Brunswick, and Nova Scotia) Risk Sharing Pools (RSPs) as at June 30, 2019, with the results summarized in the table below[1]. The previous valuation was completed at March 31, 2019 and included all RSPs.

Valuation Summary (nominal basis)

Valuation Summary (Nominal Basis) unfavourable / (favourable)

Risk Sharing Pool	2018 & Prior Beginning Indemnity Unpaid (000s)	2018 & Prior Accident Year Indemnity Change (000s)	% of Beginning Unpaid	2019 Indemnity Loss Ratio	Change from Prior Valuation	Change against 2019 Projected Earned Premium (000s)	2020 Indemnity Loss Ratio	Change from Prior Valuation	Change against 2020 Projected Earned Premium (000s)	Selected Discount Rate at Jun/19	Change in Discount Rate from Prior Valuation	Estimated $ Effect from sensitivity analysis (000s)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Ontario	877,283	(59,364)	(6.8%)	123.0%	(4.6%)	(16,682)	125.2%	(4.8%)	(20,341)	1.40%	-3 bps	963
Alberta Grid	284,195	(13,718)	(4.8%)	86.8%	(2.9%)	(5,248)	89.5%	(1.8%)	(3,711)	1.41%	-3 bps	261
Alberta non-Grid	155,402	(14,298)	(9.2%)	104.8%	(3.9%)	(4,786)	106.7%	(3.7%)	(5,244)	1.43%	-3 bps	138
New Brunswick	18,919	(1,100)	(5.8%)	73.6%	(2.9%)	(459)	73.0%	(4.5%)	(902)	1.41%	-3 bps	20
Nova Scotia	40,398	(702)	(1.7%)	96.8%	(0.9%)	(269)	98.6%	(0.6%)	(197)	1.41%	-2 bps	29
Total	**1,376,197**	**(89,182)**	**(6.5%)**			**(27,444)**			**(30,395)**			**1,411**

"Unpaid", "Claims" and "Loss" include indemnity & allowed claims expense

In total, the **favourable prior accident year** change of **$89.2 million** (column [2] in the table above) represents **6.5%** (column [3]) of the $1,376.2 million beginning unpaid (column [1])[2].

The valuation quarters ending June 30 and December 31 reflect a full valuation update[3] of assumptions. Impacts of these updates tend to be more material since the impact of actual emerged experience from the last full valuation will be incorporated into the revised assumptions.

The current valuation for all RSPs incorporate updated trend assumptions and industry loss development factors using AIX Industry Private Passenger Vehicle (PPV) December 31, 2018 (2018-H2) data. Changes in selected loss ratios for **accident year 2019** (column [4] in the above table) were driven by a reduction in bodily injury and accident benefits a priori loss ratio in the Ontario RSP and a reduction in the comprehensive a priori loss ratio in the Alberta RSPs. The updated Alberta PPV bodily injury trends also incorporate an adjustment in relation to the Alberta Treasury Board and Finance Notice 04-2018 (Clarification of Minor Injury Regulation) impacting accident half 2018-H2 and later. The estimated impact of these changes, relative to *full year* 2019 earned premium, is favourable by $27.4 million (column [6]). Changes in selected loss ratios for **accident year 2020** (column [7] in the above table) were also driven by updated Ontario RSP and Alberta RSP a priori loss ratio selections as a result of using updated claims trend assumptions and updated industry premium rate levels. The impact of these changes has an anticipated *full year* 2020 favourable impact of $30.4 million (column [9] in the above table) in relation to the current projected *complete* accident year 2020 earned premium level. These accident year 2019 and accident year 2020 changes also collectively imply an immediate favourable impact in relation to policy liabilities with the valuation's implementation.

1The June 30, 2019 valuation result was implemented into the RSP Operational Results for the month of August 2019. The valuation implementation impact is discussed in the respective August 2019 Actuarial Highlights and associated Bulletins.

2The beginning unpaid is the sum of the case reserves and selected nominal IBNR as per the valuation completed as at March 31, 2019.

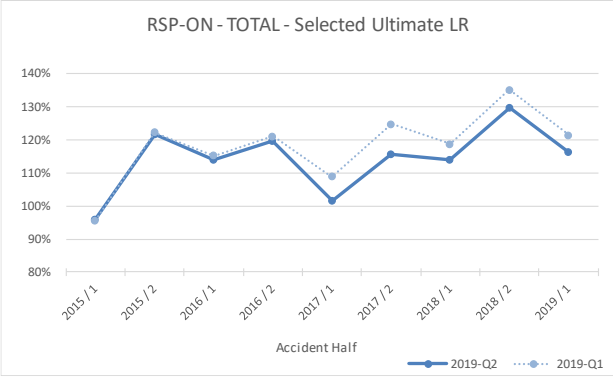
3Under the proposed schedule for fiscal year 2019, the "off-half" valuation quarters ending March 31, 2019 and September 30, 2019 would not reflect a full valuation update of assumptions, but would rather "roll-forward" key assumptions from the previous valuation. Loss development factors as brought forward through this process are interpolated assuming linear emergence.

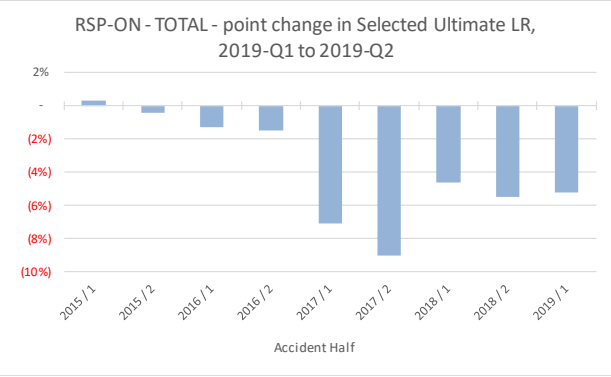
Claims payment emergence patterns were updated and, as indicated in columns [10] and [11] in the table on the previous page, **discount rates were decreased** to reflect June 2019 Government of Canada yields, generating an initial **estimated $1.4 million unfavourable** impact due to the discount rate selection change (column [12]). The selected **25 basis points investment income** margin for adverse development (**MfAD**) **was** reviewed and **unchanged** for all RSPs with the current valuation. The **claims** development **MfADs** for all RSPs **were** reviewed and **updated** with the current valuation resulting in an estimated **$15.3 million favourable** implementation impact.

In large part, the favourable changes reflect recognition of link ratio method ultimates that are holding up and that are generally lower than our a priori loss ratio method estimates. Examples of this are provided below, focused on more recent accident halfs (where the greater changes occurred).

For the Ontario RSP, the left chart below shows the reduction in the total (all coverages) loss ratio selected from the 2019-Q1 valuation (dotted line) to the 2019-Q2 valuation (solid blue line). We show the loss ratio point change in the chart on the right, varying from a decrease of 9.0 points (2017-H2) to an increase of 0.3 points (2015-H1).

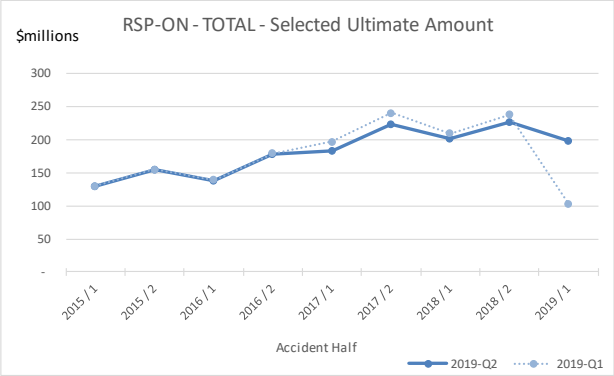
Ontario RSP – Selected ultimate loss ratios – level (left) and point change from prior valuation (right)

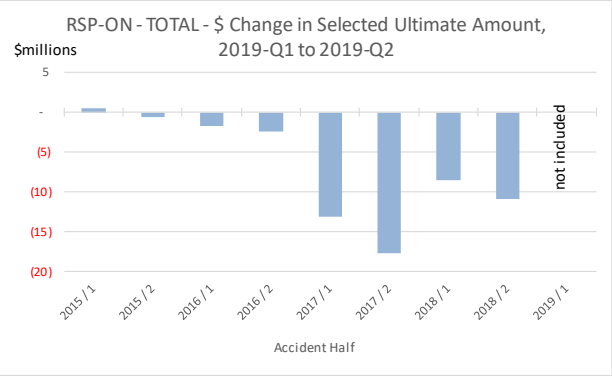




On average over the accident halfs shown, earned premium was approximately $160 million, so changes in several points of loss ratio translate to millions of dollars in ultimate estimate changes, as shown in the next charts. (Note that as 2019-H1 was only a partial half year at the 2019-Q1 valuation, the ultimate loss amount is not directly comparable to the amount selected at 2019-Q2 – hence, we do not include the associated change in the chart on the right). The total change shown in the chart on the right is a decrease of $54.5 million, accounting for over 90% of the $59.4 million total prior accident year changes during the quarter.

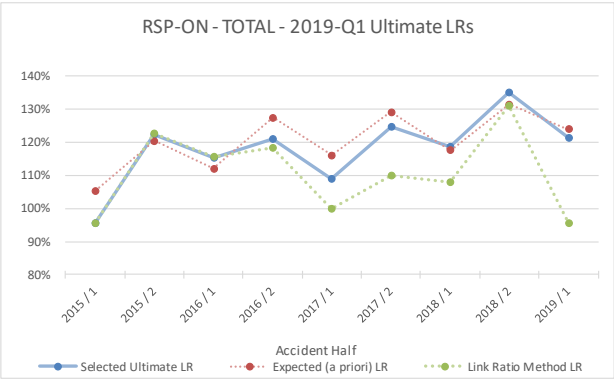
Ontario RSP – Selected ultimate amounts – level (left) and amount change from prior valuation (right)

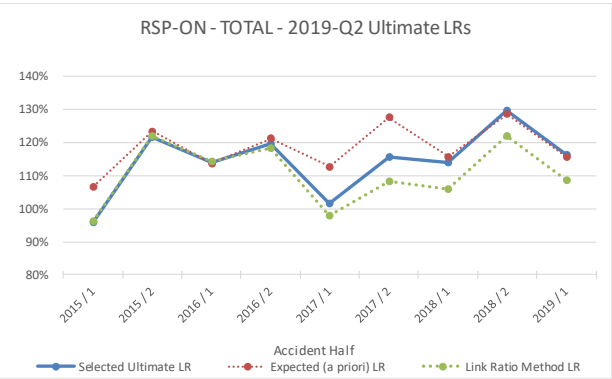




Our selected ultimates for more recent accident halfs are weighted averages estimates from the a priori loss ratio method (also referred to as expected loss ratio method) and the link ratio method. Discussed in more detail in later sections and focusing on coverage level changes, the two charts below show that while there were changes in a priori method estimates and link ratio method estimates (again, shown in more detail later), the changes within each method tended to be smaller – the real driver of changes in the selected ultimates are the relative weights given to the methods, where we have move toward more weight for the link ratio method. This is generally the case, as we tend to move weights toward the link ratio method over time as an accident half ages.

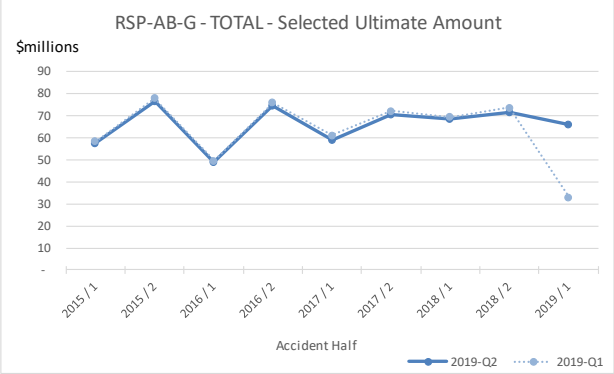
Ontario RSP – Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)

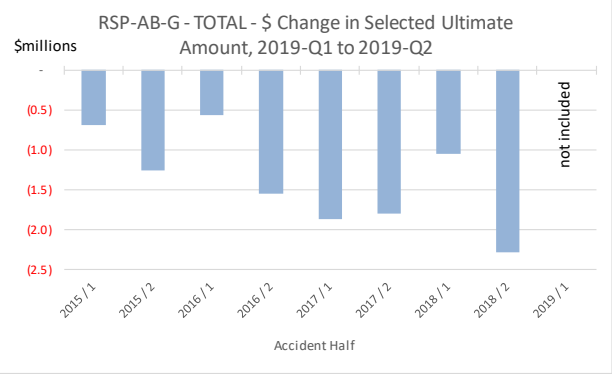




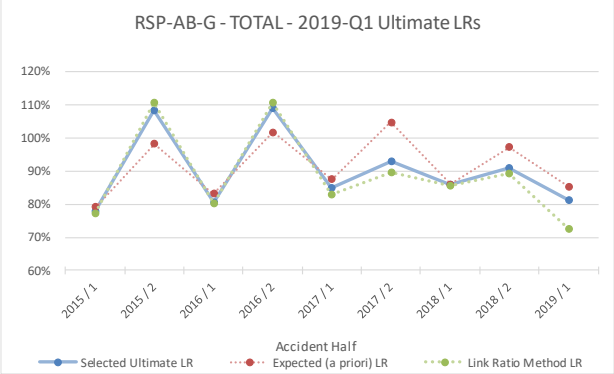
We see similar results for the Alberta RSPs, where again, it is not so much sudden changes in emergence that are generating the ultimate changes selected, but more so the weights we give the two primary valuation methods (see charts on the next page).

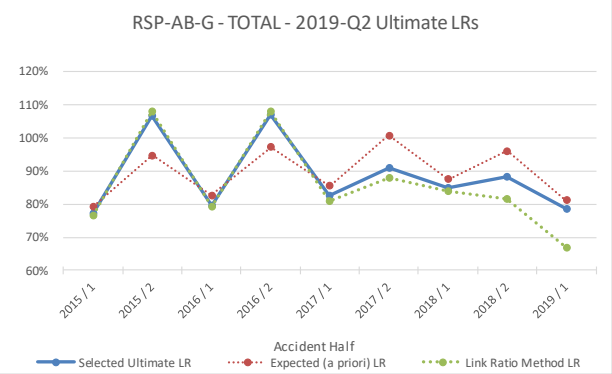
Alberta Grid RSP – Selected ultimate amounts – level (left) and amount change from prior valuation (right)



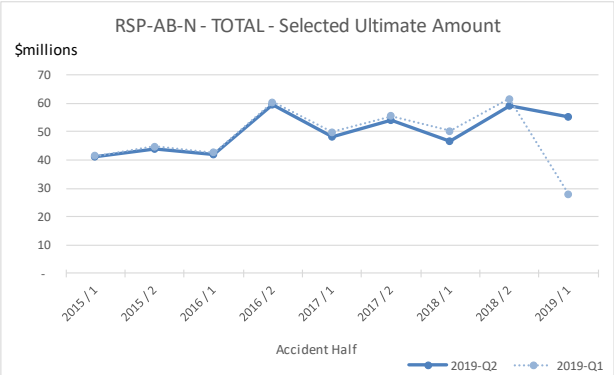


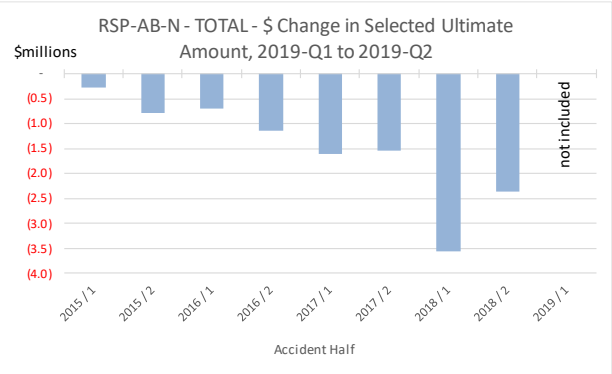
Alberta Grid RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)



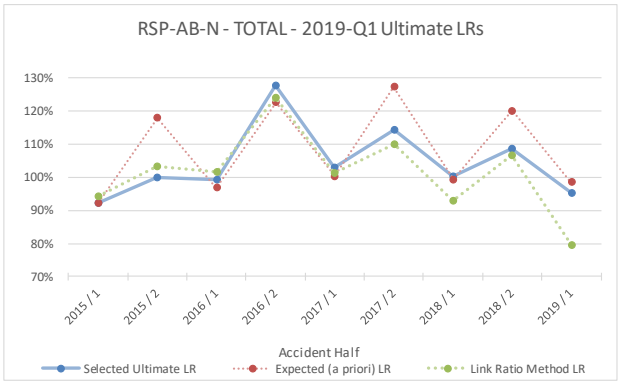


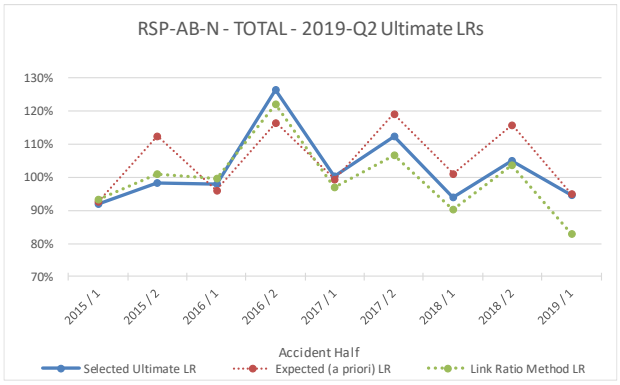
Alberta non-Grid RSP – Selected ultimate amounts – level (left) and amount change from prior valuation (right)





Alberta Grid RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)





The **Ontario RSP favourable** prior accident years (**PAYs**) **development**[4] was **$59.4 million**, and was driven by low levels of bodily injury (2011 to 2018 inclusive, except 2015) and accident benefits (2016 to 2018 inclusive) recorded claims activity, and reductions in selected a priori loss ratios for bodily injury and accident benefits to address the continuing favourable PAYs development in the Ontario RSP. The table below shows historical changes in valuation selected ultimates on an annual fiscal-accident year basis on the left with changes in the most recent quarterly valuations on a calendar-accident year basis[5] on the right. We have observed reductions in the overall magnitude of change despite having significant favourable experience in each of the 7 prior fiscal year-ends. The $71 million favourable nominal PAYs changes so far in the fiscal year puts the fiscal year on path to be higher than favourable levels experienced over the last 3 fiscal years.

Ontario RSP Changes in Prior Accident Year Selected Ultimates through time[6]

	Change in Selected Ultimates from prior Sept 30th							Change in Selected Ultimates from Prior Quarter End				
	Sep-12	Sep-13	Sep-14	Sep-15	Sep-16	Sep-17	Sep-18	Dec-18	Mar-19	Jun-19	Sep-19	Dec-19
AY2008 & Prior	(28,122)	10,552	(6,347)	(1,326)	(8,542)	7,408	599	554	(733)	(300)	-	-
AY2009	(12,325)	8,326	5,510	(2,767)	(6,439)	(5,775)	(2,626)	149	(248)	215		
AY2010	(25,024)	15,929	(7,623)	(2,753)	(7,409)	(6,094)	(7,359)	(550)	(608)	(533)		
AY2011	(24,649)	(46,425)	(37,295)	(22,216)	(7,733)	(1,322)	1,332	(2,487)	(454)	(644)		
AY2012		(73,806)	(19,118)	(43,289)	(10,135)	(5,257)	1,056	(3,151)	593	(2,509)		
AY2013			(24,834)	(46,961)	(2,493)	(4,982)	(8,739)	(2,010)	1,936	(795)		
AY2014				(20,591)	(21,779)	(17,319)	5,428	393	872	(321)		
AY2015					525	(12,028)	(6,671)	629	695	(216)		
AY2016						1,077	(2,602)	2,629	(2,062)	(4,138)		
AY2017							(748)	(10,674)	16	(30,706)		
AY2018								-	3,205	(19,416)		
Total	(90,120)	(85,424)	(89,707)	(139,903)	(64,005)	(44,293)	(20,331)	(14,516)	3,213	(59,364)	-	-

Similar summaries for the **Alberta Grid** and **Alberta Non-Grid RSPs PAYs development** are shown at the top of the next page, with the favourable development driven by continuing low levels of bodily injury recorded claims activity in recent PAYs (particularly 2014 to 2018 inclusive). The $27 million favourable Alberta Grid nominal PAYs changes and $20 million favourable Alberta non-Grid nominal PAYs changes so far in the fiscal year puts the fiscal year on path to be the most favourable levels

[4] *The term "development" throughout this document refers to claims activity during the period, and "favourable" or "unfavourable" development is in relation to projections or underlying assumptions per the previous valuation.*

[5] *Due to FA's October 31 year-end, the runoff table is shown on a fiscal accident year basis. However, valuations are treated on a calendar accident year basis. As a result, the "Change in Selected Ultimates from Prior Quarter End" will not necessarily sum to the annual view for the most recent "prior" accident year. The valuation change discussions focus on the calendar accident basis.*

[6] *The "Changes in Prior Accident Year Selected Ultimates through time" charts do not include the impact of balance sheet IBNR adjustments related to incorrect Member case reserve reporting included with the current and prior valuations (introduced with the December 31, 2017 valuation). The impact of the incorrect Member case reserve reporting flowed through these exhibits as the claims transactions were correctly reported to the FA RSP system.*

experienced over the fiscal years shown for each of those RSPs.

Alberta Grid RSP Changes in Prior Accident Year Selected Ultimates through time

	Change in Selected Ultimates from prior Sept 30th							Change in Selected Ultimates from Prior Quarter End				
	Sep-12	Sep-13	Sep-14	Sep-15	Sep-16	Sep-17	Sep-18	Dec-18	Mar-19	Jun-19	Sep-19	Dec-19
AY2008 & Prior	6,790	7,078	4,955	(2,794)	286	839	1,561	127	2,742	571	-	-
AY2009	2,593	4,054	(270)	(2,493)	(440)	(358)	(585)	249	(3)	(32)		
AY2010	(657)	3,485	2,791	(4,147)	2,137	681	(47)	(221)	(411)	(352)		
AY2011	(800)	5,495	2,075	(2,387)	788	(908)	995	(692)	(83)	15		
AY2012		3,051	9,558	(3,542)	3,669	(1,464)	(810)	(594)	(406)	(236)		
AY2013			11,011	857	5,339	(293)	(1,950)	(1,521)	(492)	7		
AY2014				13,601	9,649	(706)	(1,100)	(1,973)	(951)	(2,668)		
AY2015					21,128	5,832	1,434	(1,826)	(688)	(1,938)		
AY2016						18,965	1,537	(2,730)	(1,027)	(2,110)		
AY2017							3,284	(4,433)	2,174	(3,652)		
AY2018								-	(821)	(3,322)		
Total	7,925	23,163	30,121	(903)	42,556	22,589	4,319	(13,615)	34	(13,718)	-	-

Alberta Non-Grid RSP Changes in Prior Accident Year Selected Ultimates through time

	Change in Selected Ultimates from prior Sept 30th							Change in Selected Ultimates from Prior Quarter End				
	Sep-12	Sep-13	Sep-14	Sep-15	Sep-16	Sep-17	Sep-18	Dec-18	Mar-19	Jun-19	Sep-19	Dec-19
AY2008 & Prior	4,723	2,700	861	(1,102)	326	78	277	(232)	(30)	(370)	-	-
AY2009	1,795	2,414	(361)	(2,127)	200	352	369	122	(32)	(114)		
AY2010	438	6,029	(2,659)	(4,390)	(376)	(230)	(452)	210	(73)	(16)		
AY2011	(7,537)	(1,595)	2,299	(1,252)	(1,491)	161	(52)	204	545	(202)		
AY2012		4,519	1,329	(1,991)	1,231	(1,255)	819	134	(627)	(339)		
AY2013			4,462	317	(986)	(517)	(958)	239	259	(1,430)		
AY2014				5,966	3,532	(493)	(2,451)	(689)	(306)	123		
AY2015					1,167	2,349	(5,638)	(1,036)	(558)	(1,068)		
AY2016						5,391	(3,873)	(1,407)	(331)	(1,822)		
AY2017							(385)	(2,771)	779	(3,135)		
AY2018								-	88	(5,924)		
Total	(582)	14,067	5,932	(4,578)	3,603	5,836	(12,345)	(5,225)	(285)	(14,298)	-	-

Similar tables for the New Brunswick and Nova Scotia RSPs are included in their respective jurisdiction exhibits in Section L. Caution must be exercised in reviewing the variances in the New Brunswick and Nova Scotia special purpose RSPs as volumes are low and single claim transactions that are normal course for the business may look "unusual" and generate relatively "significant" variances that in nominal value terms are not that significant.

The remainder of this report consists of 11 sections. Sections C through G are the detailed sections related to each of the RSPs, including valuation highlights and a discussion of actual vs. projected activity. General information about this report can be found in section B. The final 5 sections are appendices: the valuation process is described in detail in Section K (Appendix 4); a summary of changes to the process during this fiscal year is provided in Section H (Appendix 1); a summary of regulatory changes is provided in Section I (Appendix 2) and recent applicable court decisions is provided in Section J (Appendix 3); and supporting exhibits are provided in Section L (Appendix 5).

B. General Information

This report summarizes the results of the valuation of the following Risk Sharing Pools (RSPs) as at June 30, 2019:

- Ontario;
- Alberta Grid;
- Alberta Non-Grid;
- New Brunswick; and
- Nova Scotia.

The results of this valuation were reflected for the first time in the August 2019 Operational Reports for the above RSPs.

The valuations have been prepared in accordance with Accepted Actuarial Practice and comply with the appropriate Standards of Practice of the Canadian Institute of Actuaries as well as applicable regulatory requirements. Accepted Actuarial Practice requires all policy liabilities recognize both the time value of money and provisions for adverse deviations.

Unless specifically noted in this document, no explicit provision has been made for causes of loss which are not already reflected in the historical data, nor for otherwise unforeseen changes to the legal or economic environment in which claims are settled, including changes in the interpretation of existing legislation or regulation on matters currently before the courts.

Automobile insurance product reforms occur from time to time and consideration is given to the associated impact, if any. Please see Section I for a discussion of recent product reforms and Section J for a discussion of recent court decisions considered for the purposes of this valuation.

For ease of reference, we will use the term claims amount in reference to the more proper and descriptive term indemnity & allowed claims expense and the terms loss ratio, claims ratio, or claims amount ratio in reference to the ratio of claims amount to earned premium.

General information regarding the Facility Association and on the Risk Sharing Pools in particular can be found on its website:

www.facilityassociation.com

B.1 Appointed Actuary and Hybrid Actuarial Services Model

Liam McFarlane of Ernst & Young LLP is Facility Association's Appointed Actuary (effective as of June 1, 2013).

Facility Association operates under a hybrid model in relation to the management and provision of actuarial services. Under this model, actuarial services are performed by both Facility Association's internal staff and its external actuarial consulting firm. The hybrid model approach maximizes the efficiency of resource allocation while providing access to additional expertise and capacity as needed.

B.2 Intended Audience and Use

This report is intended for the Member Companies of the Facility Association (Members) to provide additional information on the results of the most recent valuation of specific RSPs in relation to the results of prior such valuations. It is not intended, nor necessarily suitable, for any other purpose.

B.3 Data

Two primary data sets were used for the purposes of this valuation:

- RSP valuation data, which is aggregated premium and claim information primarily intended for valuation purposes; and
- industry AIX data, which is developed from detailed statistical records reported by insurers to the Insurance Bureau of Canada (IBC)[7] in accordance with the Automobile Statistical Plan.

B.3.1 RSP Valuation Data

Much of this analysis was based on RSP valuation data collected from Members and aggregated by IBC on behalf of Facility Association. The claims data excludes all loss adjustment expenses except certain specific reimbursed expenses (allowed claims adjustment expenses). The data is reconciled to information contained in Facility Association's Member Operational Reports, the results of which are reviewed by the Appointed Actuary for reasonableness. Procedures are in place to provide reasonable assurance that the data used is reliable and sufficient for the proper valuation of the liabilities.

The valuation data, for the purposes of the valuation, is aggregated to the level of:

- RSP
- kind-of-loss / coverage
- accident year and half-year
- development half-year[8]

Data elements captured include earned premium, claims[9] paid, case reserves, recorded claims (being the sum of claims paid and case reserves), and recorded claim counts.

For the purposes of the valuation described in this report, the valuation data is as at **June 30, 2019**.

B.3.2 Industry AIX Data

Although the RSP valuation data is the primary source of data for valuation purposes, the following Industry AIX data file prepared by IBC (on behalf of GISA) is used to supplement the RSP valuation data and is used in the determination of loss cost trend structures, being models describing changes in

[7] *IBC is the statistical agent of the General Insurance Statistical Agency (GISA), with responsibility of managing the Automobile Statistical Plan reporting. In addition, Facility Association outsources its IT to IBC.*

[8] *Development quarter is also available for purposes of performing "roll forward" valuations in relation to valuation periods ending March 31 and September 30.*

[9] *For purposes of this report, the terms "claims" or "loss" will refer to "indemnity and allowed claims adjustment expenses" unless otherwise indicated.*

loss costs (average claim amount per exposure unit) over time, including the impacts of product reforms:

- industry experience (indemnity only) as per the 2018-H2 AIX Development Exhibits for Private Passenger Vehicles in the applicable jurisdictions, compiled as at December 31, 2018.

IBC (on behalf of GISA) assembles Industry AIX data from the submissions made under the Automobile Statistical Plan by each of the insurers writing automobile business in the applicable jurisdiction. As there are many insurers providing this information and due to remoteness from the individual data elements, it is not practical for IBC to directly put in place audit or audit-like procedures. However, IBC does perform various data edit checks which are designed to promote data integrity.

Industry AIX data is relied upon without the benefit of any independent audit and has been used without modification. Nonetheless, the data is deemed to be reliable and appropriate for the purposes of this valuation and the trend analysis completed in relation to the data.

B.3.3 Other Data

Reliance has also been placed on other quantitative and qualitative information supplied by Facility Association without audit or independent verification. Wherever possible, such information was reviewed for reasonableness and internal consistency by the Appointed Actuary.

B.4 Actual vs Projected (AvsP)

With each valuation, we project, by accident year, future claim activity (recorded and paid). Both projected recorded claim activity and projected paid claim activity is used as a means of providing feedback on our prior selections of ultimate. In addition, the paid projections are used directly as projected cash flows for claims in the determination of the discount rate selection for the policy liabilities.

The challenge in interpreting actual versus projected (AvsP) variances as a feedback mechanism is how much of the variance is attributed to:

- process variance (i.e. randomness) inherent in the activities themselves (i.e. recorded and paid activity);
- model selection (i.e. that our emergence model is not a good representation or predictor of future emergence even if we've correctly estimated ultimate);
- parameter selection within the model (i.e. that our emergence model can be a good representation of emergence, but we selected the wrong emergence factors);
- our selection of ultimate (i.e. that our emergence model and emergence factors selections are good, but we're applying the model and factors to the wrong ultimate); and
- changes to our model (i.e. changes made with the goal of improving its predictive capability).

Nonetheless, the AvsP exercise is an important validation process for us. Our discussion in each RSP's AvsP section will focus on our interpretation of feedback the variances provide to our prior selections of ultimate, and how this provides information in relation to our current selections of ultimate.

B.5 **Uncertainty**

The establishment of provisions for the unpaid, unrecorded, and/or unreported claims is based on numerical data and the interpretation of current and anticipated circumstances. It is a complex and dynamic process influenced by a large variety of factors. These factors include the experience of the respective RSPs and the experience of the voluntary market in the associated jurisdiction, claim frequency and severity, indemnity and allowed claims expense payment patterns, case reserving practices, and lags between when the event giving rise to the claim occurred, when the claim is reported to a Member, when the Member records claim information on their own system, and when that information is transmitted to Facility Association to be recorded. The process of determining the provisions necessarily involves uncertainty such that the actual results will deviate, perhaps substantially, from the best estimates made through the valuation process.

C. ONTARIO RSP

C.1 Valuation Highlights

A summary of the valuation results through time is available in the A exhibit (see section L for all exhibits), with detail related to the current valuation provided in the B.1.1 and B.1.2 exhibits.

The **change** in selected nominal ultimate for prior accident years (**PAYs**) was **$59.4 million favourable** with this valuation (**6.8%** of the unpaid estimate as at last quarter-end), bringing the **calendar year-to-date total favourable** to **$56.2 million** (**6.4%** of the unpaid estimate as at last year-end). These changes by accident year and Government Line are presented in the tables below.

Ontario RSP - valuation changes in selected ultimate (favourable) / unfavourable **during Quarter**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(1,606)	(3,004)	(274)	(4,884)
2015	(112)	(81)	(23)	(216)
2016	(2,038)	(2,261)	160	(4,139)
2017	(7,161)	(22,518)	(1,026)	(30,705)
2018	(9,580)	(8,049)	(1,788)	(19,417)
TOTAL	**(20,497)**	**(35,913)**	**(2,951)**	**(59,361)**

Ontario RSP - valuation changes in selected ultimate (favourable) / unfavourable **YTD**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(1,754)	(1,420)	(354)	(3,528)
2015	(521)	1,032	(32)	479
2016	(2,353)	(4,093)	244	(6,202)
2017	(7,024)	(22,609)	(1,057)	(30,690)
2018	(8,081)	(8,327)	197	(16,211)
TOTAL	**(19,733)**	**(35,417)**	**(1,002)**	**(56,152)**

The current valuation incorporates updated trend assumptions and industry loss development factors selected using Ontario PPV AIX 2018-H2 data.

During the current valuation (as at June 30, 2019), the **favourable PAYs development** was driven by low recorded activity levels of bodily injury (2011 to 2018 inclusive, excluding 2015) and accident benefits (2016 to 2018 inclusive).

The **selected loss ratio** for current accident year (**CAY**) **2019** decreased by 4.6 points to 123.0% driven by favourable bodily injury and accident benefits recorded claims activity in the quarter, further impacted by reductions in a priori loss ratios, and the **selected loss ratio** for future accident year (**FAY**) **2020** decreased by 4.8 points to 125.2% with the changes impacted by updated a priori loss ratio selections as a result of using updated trend assumptions.

Summary descriptions of recent regulatory and legislative initiatives are available in section I.

The valuation process is described in more detail in section K, and a summary of changes to the process during this fiscal year is provided in section H.

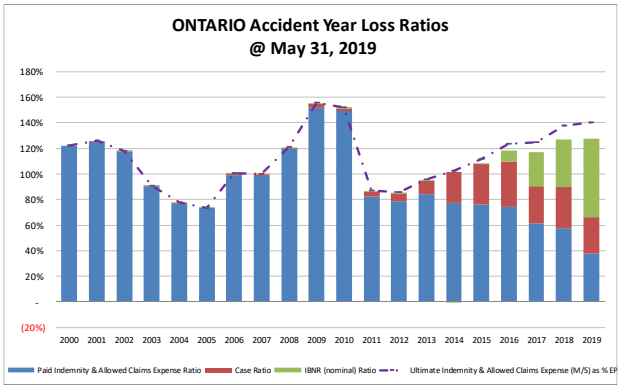
Policy liability projected cash flows and June 2019 Government of Canada bond yields were used to determine the applicable discount rate. The selected investment income margin for adverse deviation (MfAD) was maintained at 25 basis points with the current valuation.

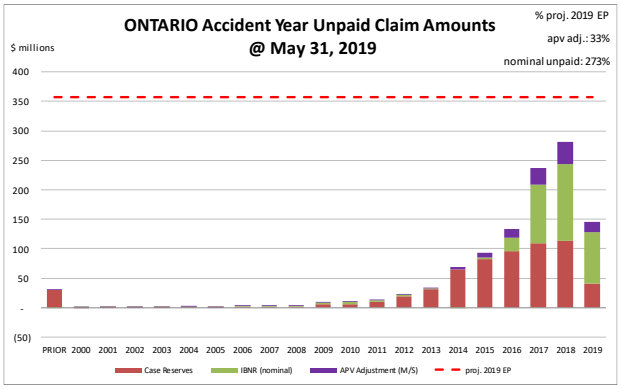
Selected claims development MfADs for all coverages and accident years were reviewed and **updated** with the current valuation (see Exhibit D in section L for claims development margins).

C.2 Booked results for the prior valuation implementation

It is helpful to consider how the portfolio looked after the **prior valuation** was implemented. In this case, the **May 2019 booked results** were **based on** assumptions derived from **the prior (March 31, 2019) valuation** and were discussed in the associated monthly Actuarial Highlights.

The charts below show the associated levels of claim liabilities[10] booked by accident year[11]. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the then-current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	616,910	56.7%
ibnr	355,631	32.7%
M/S apv adjust.	116,267	10.7%
M/S total	1,088,808	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	179,820	70.5%
prem def/(dpac)	50,848	19.9%
M/S apv adjust.	24,433	9.6%
M/S total	255,101	100.0%

policy liabilities ($000s)

	amt	%
claim	972,541	72.4%
premium	230,668	17.2%
M/S apv adjust.	140,700	10.5%
M/S total	1,343,909	100.0%

C.3 Booked results for the current valuation implementation

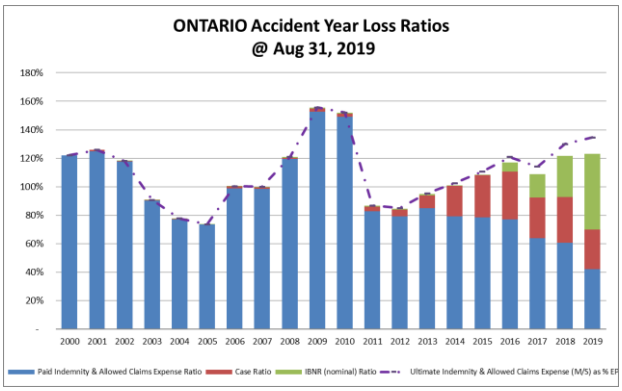
The **August 2019 booked results** were **based on** assumptions derived from **the current (June 30, 2019) valuation** and are discussed in the associated monthly Actuarial Highlights.

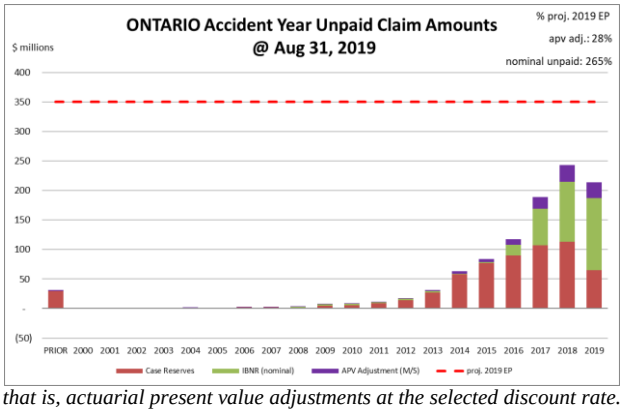
The charts at the top of the next page show the levels of claim liabilities booked by accident year on that basis. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the current projected amount of 2019 full

[10] *Claim liabilities refer to provision for unpaid indemnity and allowed claims expenses. Allowed claims expenses are first party legal and other expenses as listed in the RSP Claims Guide. Claims expenses paid through the Member company expense allowance are NOT included in this discussion.*

[11] *The loss ratio chart has been limited to show the most recent 20 accident years; the unpaid provision chart has been limited to show the most recent 20 accident years, and show all accident years older than 20 years collectively as "PRIOR".*

year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	608,093	59.2%
ibnr	320,371	31.2%
M/S apv adjust.	99,209	9.7%
M/S total	1,027,673	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	186,905	72.8%
prem def/(dpac)	45,316	17.6%
M/S apv adjust.	24,637	9.6%
M/S total	256,858	100.0%

policy liabilities ($000s)

	amt	%
claim	928,464	72.3%
premium	232,221	18.1%
M/S apv adjust.	123,846	9.6%
M/S total	1,284,531	100.0%

C.4 **Actual vs Projected (AvsP)**

Variances in projected recorded and paid emergence and the associated actual emergence is presented in the two following tables.

Recorded Emergence

Ontario RSP

	Third Party Liability			Accident Benefits			Other Coverages			Total		
	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected
Accident Year	[1]	[2]	[3] =[2]-[1]	[4]	[5]	[6] =[5]-[4]	[7]	[8]	[9] =[8]-[7]	[10] =[1]+[4]+[7]	[11] =[2]+[5]+[8]	[12] =[11]-[10]
2014 & Prior	(132)	(2,071)	(1,939)	878	1,274	396	(21)	(340)	(319)	725	(1,137)	(1,862)
2015	(81)	238	319	1,570	1,505	(65)	(4)	(33)	(29)	1,485	1,710	225
2016	2,403	1,091	(1,312)	5,384	2,507	(2,877)	(37)	129	166	7,750	3,727	(4,023)
2017	10,177	2,333	(7,844)	10,230	2,454	(7,776)	75	(697)	(772)	20,482	4,090	(16,392)
2018	10,331	1,724	(8,607)	12,220	9,721	(2,499)	394	117	(277)	22,945	11,562	(11,383)
2019	27,438	24,304	(3,134)	17,321	15,381	(1,940)	23,644	21,865	(1,779)	68,403	61,550	(6,853)
Total	**50,136**	**27,619**	**(22,517)**	**47,603**	**32,842**	**(14,761)**	**24,051**	**21,041**	**(3,010)**	**121,790**	**81,502**	**(40,288)**
2018 & prior	22,698	3,315	(19,383)	30,282	17,461	(12,821)	407	(824)	(1,231)	53,387	19,952	(33,435)

*projected recorded claims based on Recorded to Ultimate emergence model as at 2019-Q1

As indicated above, total recorded emergence at $81.5 million was $40.3 million (33.1%) less than the $121.8 million projected. The favourable overall experience was prevalent in all Government Lines.

Paid Emergence

Ontario RSP

Accident Year	Third Party Liability: Projected Paid Claims in 2019-Q2 [13]	Third Party Liability: Actual Paid Claims in 2019-Q2 [14]	Third Party Liability: Actual Less Projected [15] =[14]-[13]	Accident Benefits: Projected Paid Claims in 2019-Q2 [16]	Accident Benefits: Actual Paid Claims in 2019-Q2 [17]	Accident Benefits: Actual Less Projected [18] =[17]-[16]	Other Coverages: Projected Paid Claims in 2019-Q2 [19]	Other Coverages: Actual Paid Claims in 2019-Q2 [20]	Other Coverages: Actual Less Projected [21] =[20]-[19]	Total: Projected Paid Claims in 2019-Q2 [22] =[13]+[16]+[19]	Total: Actual Paid Claims in 2019-Q2 [23] =[14]+[17]+[20]	Total: Actual Less Projected [24] =[23]-[22]
2014 & Prior	6,509	6,774	265	13,803	5,285	(8,518)	166	225	59	20,478	12,284	(8,194)
2015	4,008	1,650	(2,358)	5,701	2,828	(2,873)	65	(3)	(68)	9,774	4,475	(5,299)
2016	4,746	3,997	(749)	4,969	6,923	1,954	76	(88)	(164)	9,791	10,832	1,041
2017	4,275	2,724	(1,551)	6,813	5,879	(934)	255	45	(210)	11,343	8,648	(2,695)
2018	2,520	1,295	(1,225)	9,215	8,330	(885)	2,248	1,119	(1,129)	13,983	10,744	(3,239)
2019	16,912	16,207	(705)	2,236	2,007	(229)	22,816	22,114	(702)	41,964	40,328	(1,636)
Total	**38,970**	**32,647**	**(6,323)**	**42,737**	**31,252**	**(11,485)**	**25,626**	**23,412**	**(2,214)**	**107,333**	**87,311**	**(20,022)**
2018 & prior	22,058	16,440	(5,618)	40,501	29,245	(11,256)	2,810	1,298	(1,512)	65,369	46,983	(18,386)

*projected paid claims based on Paid to Ultimate emergence model as at 2019-Q1

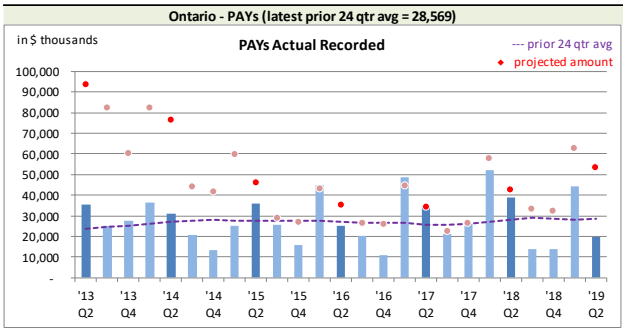
As indicated above, total paid emergence at $87.3 million was $20.0 million (18.7%) less than the $107.3 million projected. Similar to recorded activity (but to a lesser extent), the favourable overall experience was prevalent in all Government Lines.

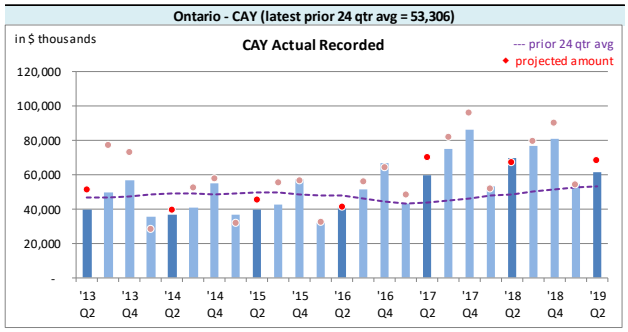
Additional detail and summary charts akin to those found in the monthly Actuarial Highlights are presented in the sections that follow.

C.4.1 AvsP: Recorded Indemnity & Allowed Claims Expense

Actual **recorded** activity (**paid** and case reserve changes) over the last 25-calendar quarters is shown in the charts below, including the prior 24 quarter average level.

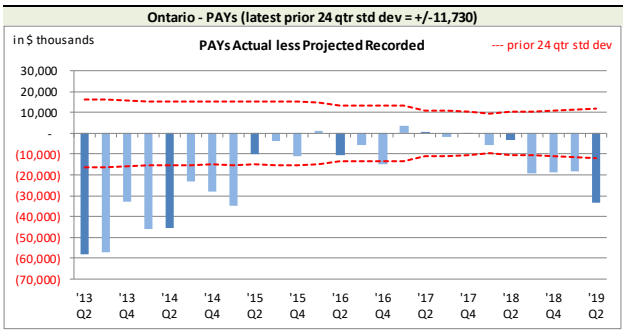
*Ontario RSP Actual **Recorded** by Calendar Quarter*

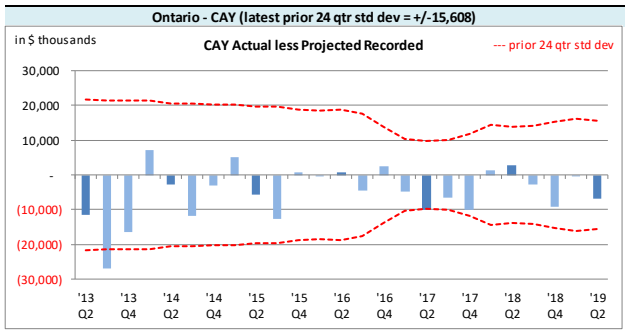




Recorded activity variances from the previous quarter's projections are shown in the charts below, including the prior 24-quarter standard deviation levels.

*Ontario RSP Actual vs Projected Summary: **Recorded** Variances by Calendar Quarter*





On Latest $ thousands		
Recorded	PAYs	CAY
Actual less Projected Recorded	28,569	53,306
std dev	11,730	15,608
A-P <> std dev	13	2
% <> std dev	52.0%	8.0%
norm <> std dev	31.7%	31.7%

With respect to **recorded** indemnity & allowed claims expense, the prior accident years' (PAYs) variances (left chart at the bottom of the previous page) indicate bias[12] in the projection process – specifically, our projections tend to be too high in retrospect, with only 3 times in the past 25 quarters where actuals were higher than our projections for the PAYs **recorded** amount. Further, the variance magnitudes have been growing again recently, after a run of lower levels (2016-Q4 to 2018-Q2 valuations). In addition, 52% of variances were outside of one standard deviation, suggesting the projection process has performed worse than simply projecting the prior 24-quarter average amount (where the projection would likely be outside of 1 standard deviation 32% of the time). Given the significant reductions in ultimate estimates in valuations since the 2010 reforms, it is difficult to determine at this point how much of the poor projection result is due to the various causes as discussed in Section B.4. However, our current view is that the current AvsP variances support the view that the historical valuation ultimate selections, in hindsight, were redundant to some degree (hence our reduced ultimate selections).

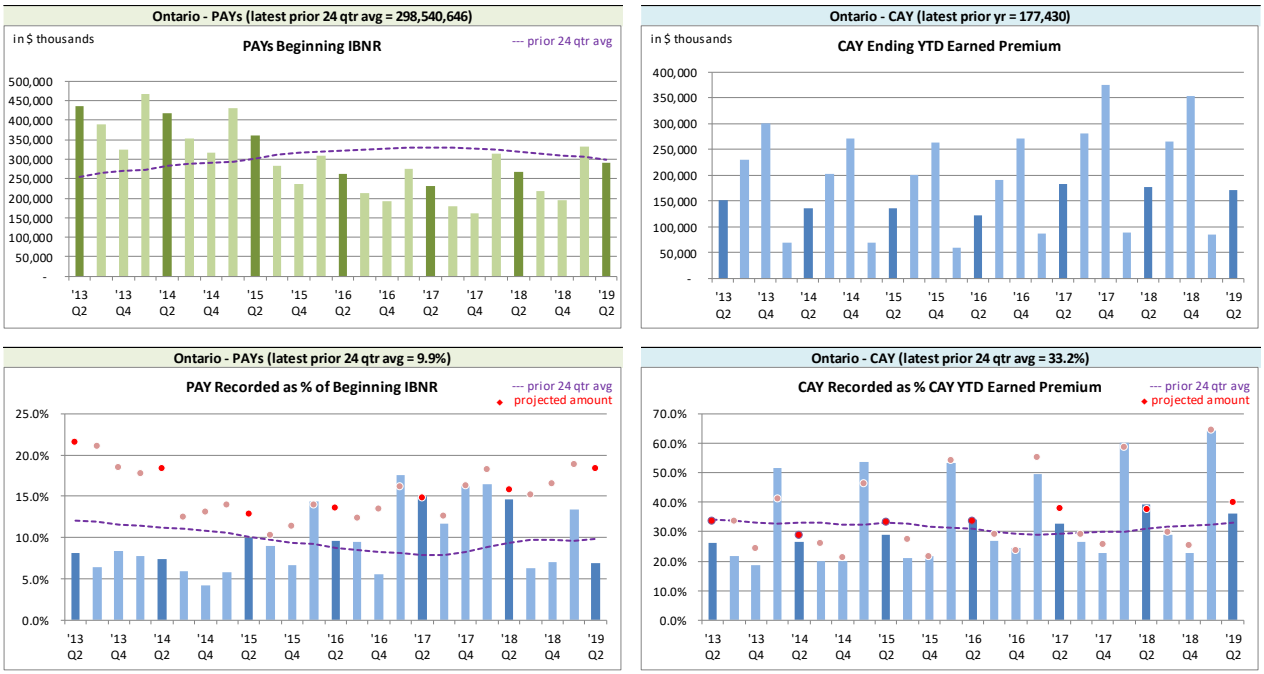
The PAYs **recorded** variance fell outside of the one standard deviation band during the latest quarter. The PAYs **recorded** claims activity in the quarter was reviewed and confirmed. We attribute the magnitude of the favourable variance to redundant (in hindsight) nominal IBNR levels adversely impacting the projections.

The current accident year (CAY) **recorded** variances (right chart at the bottom of the previous page) fell outside of one standard deviation 8% of the time, suggesting that the projection process has performed better than simply projecting the prior 24-quarter average amount, but this is, admittedly, not a difficult hurdle to overcome (as the 24-quarter average does not take into account the obvious and expected CAY pattern of recorded activity increases as the CAY moves from Q1 to Q4). Bias in the projections has been indicated at the 95% confidence level, with only 7 of 25 actuals higher than the associated projection.

We have included, for reference, additional charts at the top of the next page related to levels influencing **recorded** activity. Our comments on these charts are provided after the charts.

[12] *For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the recorded projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

Ontario RSP Levels that influence[13] **Recorded** activity by Calendar Quarter



We track beginning PAYs' IBNR as **recorded** activity comes out of IBNR. Changes in the PAYs' beginning IBNR (see upper left chart above) occur for several possible reasons:

- to offset actual **recorded** activity (through loss ratio matching);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

The PAYs **recorded** ratio as a percentage of beginning IBNR (lower left chart) suggests that projections using a 10% of beginning IBNR would have been a more successful strategy. In contrast, the CAY ratios to ytd earned premium (lower right chart) suggest close alignment of projections and actuals on that ratio basis.

With the benefit of hindsight, it may be that what now appears to be redundancy in our previous IBNR selections may have played a part in these inaccurate projections, as may have the previous practice (up to valuation 2014 Q2) of projecting emergence at a Government Line level. It is difficult to assess whether recent increases (since 2016 Q1) in the PAYs **recorded** activity relative to IBNR is being driven by changes in **recorded** activity/changes in case reserving practices, or the significant reductions in nominal IBNR with successive valuations.

CAY **recorded** activity relative to year-to-date earned premium (bottom right chart above) may be showing a potential (deteriorating) trend in relation to Q1 and Q2 **recorded** activity (similar trends for Q3 and Q4 are not quite as clear at this point). These deteriorations may reflect reductions in earned rate levels or, alternatively, increases in loss costs that are not being offset by earned rate changes. At this point, we are

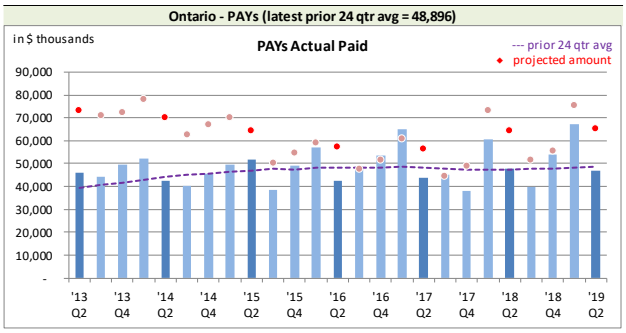
[13] *Our recorded activity projections are based on selected ratios of life-to-date recorded activity to ultimate, converted to a "recorded to beginning IBNR" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

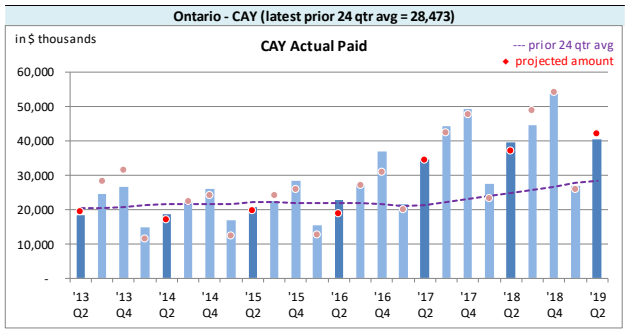
not able to draw definitive conclusions.

C.4.2 AvsP: Paid Indemnity & Allowed Claims Expense

The charts below show actual **paid** activity in each of the most recent 25 calendar quarters, along with a prior 24-quarter average to show how each quarter's actual compares with the average amount of the preceding 24 calendar quarters.

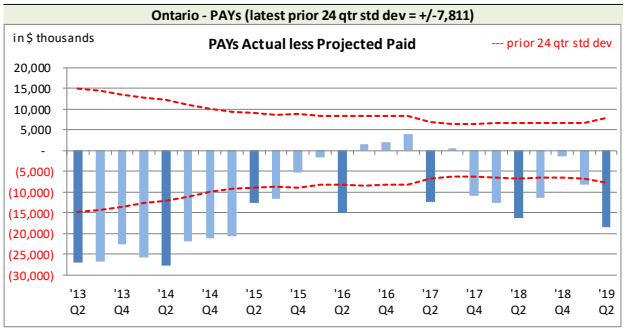
*Ontario RSP Actual **Paid** activity by Calendar Quarter*

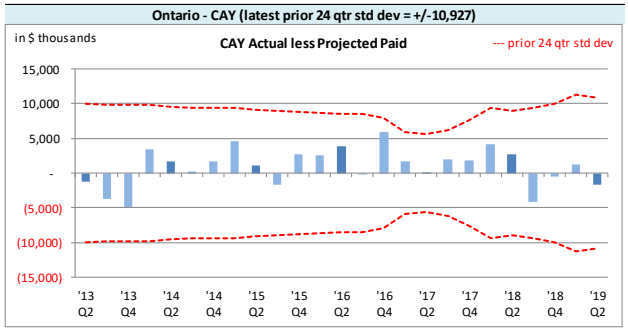




The charts below show the actual less projected **paid** variances for the last 25 calendar quarters, along with bands for the prior 24-quarter standard deviations to show how the variances from projection compare with historical standard deviations.

*Ontario RSP Actual vs Projected Summary: **Paid** Variances by Calendar Quarter*





On Latest $ thousands		
Paid	PAYs	CAY
Qtrly Avg Paid (prior 24 qtrs)	48,896	28,473
std dev	7,811	10,927
A-P <> std dev	18	-
% <> std dev	72.0%	0.0%
norm <> std dev	31.7%	31.7%

With respect to **paid** indemnity & allowed claims expense prior accident years' (PAYs) variances (left chart above), 72% of the variances have fallen outside of one standard deviation, suggesting the projection process has performed worse than projecting simply based on the preceding 24-quarter average. The variances suggest that the projection process has been biased[14] (with only 4 times in the past 25 quarters where actuals were higher than our projections for the PAYs **paid** amount).

[14] *For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the paid projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

The PAYs **paid** variance fell outside of the one standard deviation band during the latest quarter. The PAYs **paid** claims activity in the quarter was reviewed and confirmed. We attribute the magnitude of the favourable variance to redundant (in hindsight) nominal unpaid claims liability levels (i.e. case plus IBNR) adversely impacting the projections.

In contrast, the current accident year (CAY) **paid** variances (right chart at the bottom of the previous page) tend to show actuals higher than projected (although not by much). The CAY **paid** variances fell outside of one standard deviation 0% of the time suggesting the projection process has performed better than projecting simply based on the preceding 24-quarter average, and bias has not been indicated at a 95% confidence level, with 17 times in the past 25 quarters where actuals were higher than our projections for the **CAY paid** amount.

We have included, for reference, additional charts below related to levels influencing **paid** activity. Our comments on these charts are provided after the charts.

*Ontario RSP Levels that influence[15] **Paid** activity by Calendar Quarter*

We track beginning PAYs' unpaid balance (case and IBNR) as **paid** activity comes out of the unpaid balance. Changes in the PAYs' beginning unpaid balance (see upper left chart above) occur for several possible reasons:

- to offset actual **paid** activity (may reduce case or IBNR or both);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

[15] *Our paid projections are based on selected ratios of life-to-date paid activity to ultimate, converted to a "paid to beginning unpaid" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

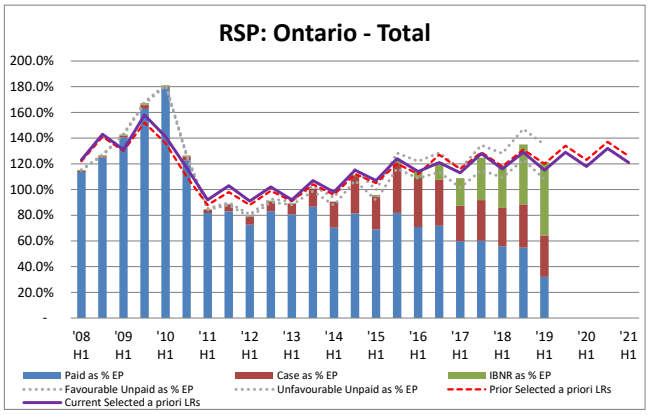
Similar to our comments related to CAY **recorded** activity as a percentage of year-to-date earned premium, there appears to be a deterioration in the CAY **paid** ratios to earned premium that supports our selections of a priori loss ratios (deteriorating at about 4-5% per accident year).

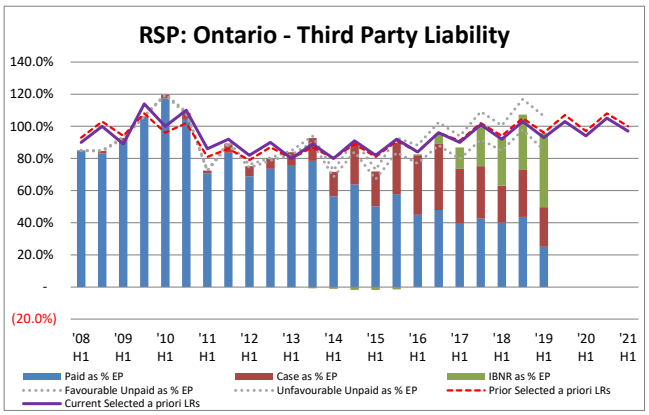
C.5 a priori method

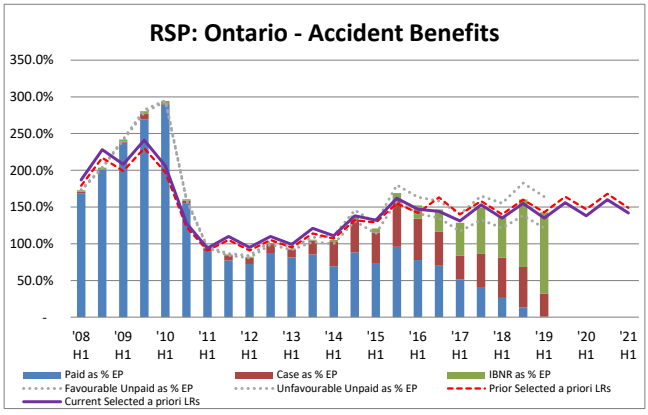
FA leverages the a priori method as one of the primary valuation methodologies, estimating ultimate by multiplying earned premium by a selected a priori loss ratio.

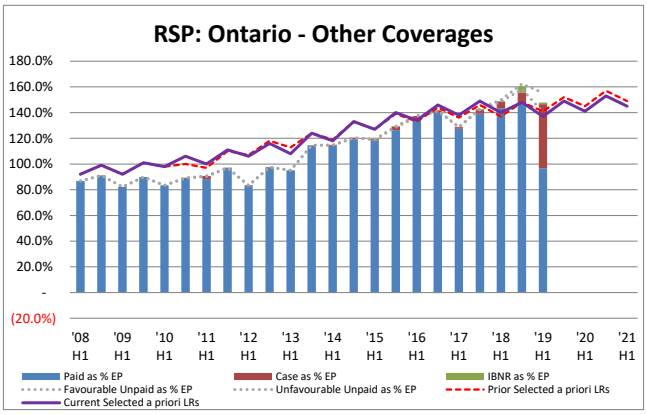
The Ontario RSP a priori loss ratios were updated as discussed below and are presented in the B.1.4, B.2.3, B.3.3, and B.4.3 exhibits in section L.

This valuation's a priori loss ratios are summarized in the charts below and the table at the top of the next page (by Government Line and accident half-year), with a comparison to the last valuation a priori loss ratios.







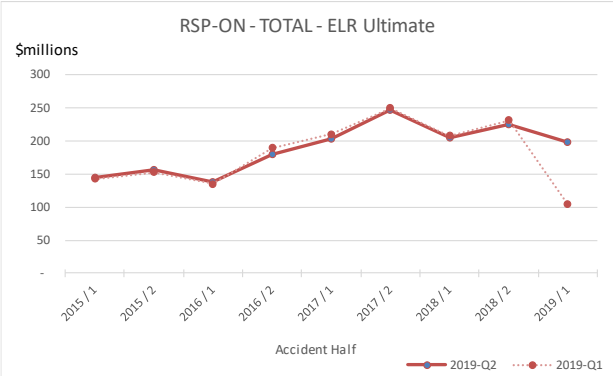


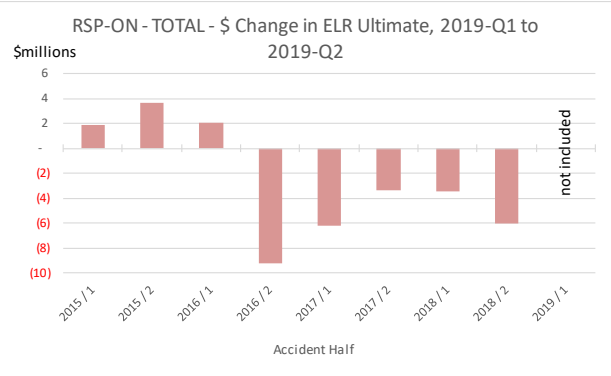
Accident Period	CURRENT Third Party Liability	CURRENT Accident Benefits	CURRENT Other Coverages	CURRENT Total	PRIOR Third Party Liability	PRIOR Accident Benefits	PRIOR Other Coverages	PRIOR Total	CHANGE Third Party Liability	CHANGE Accident Benefits	CHANGE Other Coverages	CHANGE Total
2014 / 1	80.0%	111.0%	118.0%	98.0%	80.0%	107.0%	119.0%	96.0%	-	4.0%	(1.0%)	2.0%
2014 / 2	91.0%	138.0%	133.0%	115.0%	89.0%	132.0%	133.0%	112.0%	2.0%	6.0%	-	3.0%
2015 / 1	82.0%	132.0%	127.0%	107.0%	81.0%	129.0%	127.0%	105.0%	1.0%	3.0%	-	2.0%
2015 / 2	92.0%	162.0%	140.0%	124.0%	91.0%	155.0%	139.0%	120.0%	1.0%	7.0%	1.0%	4.0%
2016 / 1	84.0%	147.0%	134.0%	114.0%	84.0%	142.0%	133.0%	112.0%	-	5.0%	1.0%	2.0%
2016 / 2	96.0%	144.0%	146.0%	121.0%	96.0%	163.0%	144.0%	127.0%	-	(19.0%)	2.0%	(6.0%)
2017 / 1	90.0%	131.0%	138.0%	113.0%	91.0%	140.0%	136.0%	116.0%	(1.0%)	(9.0%)	2.0%	(3.0%)
2017 / 2	101.0%	153.0%	149.0%	128.0%	102.0%	158.0%	146.0%	129.0%	(1.0%)	(5.0%)	3.0%	(1.0%)
2018 / 1	92.0%	135.0%	140.0%	116.0%	94.0%	140.0%	137.0%	118.0%	(2.0%)	(5.0%)	3.0%	(2.0%)
2018 / 2	103.0%	155.0%	148.0%	129.0%	105.0%	160.0%	148.0%	131.0%	(2.0%)	(5.0%)	-	(2.0%)
2019 / 1	93.0%	135.0%	137.0%	115.0%	96.0%	143.0%	141.0%	120.0%	(3.0%)	(8.0%)	(4.0%)	(5.0%)
2019 / 2	103.0%	156.0%	149.0%	129.0%	107.0%	164.0%	152.0%	134.0%	(4.0%)	(8.0%)	(3.0%)	(5.0%)
2020 / 1	94.0%	138.0%	141.0%	118.0%	97.0%	147.0%	145.0%	123.0%	(3.0%)	(9.0%)	(4.0%)	(5.0%)
2020 / 2	105.0%	160.0%	153.0%	132.0%	108.0%	168.0%	157.0%	137.0%	(3.0%)	(8.0%)	(4.0%)	(5.0%)
2021 / 1	97.0%	142.0%	145.0%	121.0%	100.0%	149.0%	149.0%	126.0%	(3.0%)	(7.0%)	(4.0%)	(5.0%)

The valuation results used to form the basis of the a priori estimates for the June 30, 2019 valuation were updated to use selected ultimates from the March 31, 2019 valuation. Trend structure models based on industry indemnity results as at December 31, 2018 were used (for the prior valuation a priori loss ratio assumptions, trend structure models based on industry indemnity results as at June 30, 2018 were used).

The impact of changes in the a priori (expected) method loss ratios are shown across all coverages in the charts below. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a $20.6 million decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

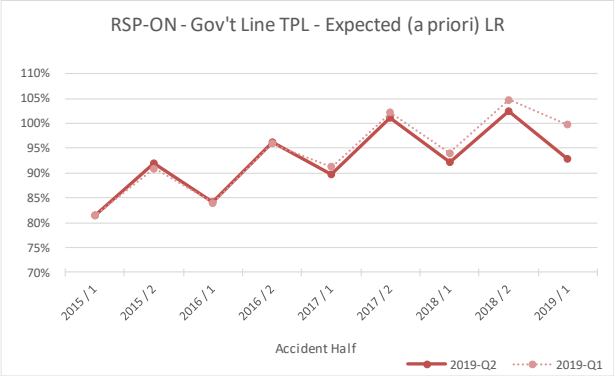
Ontario RSP – TOTAL - a priori method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

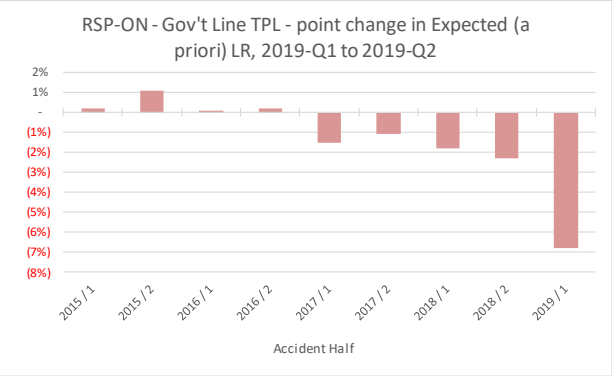




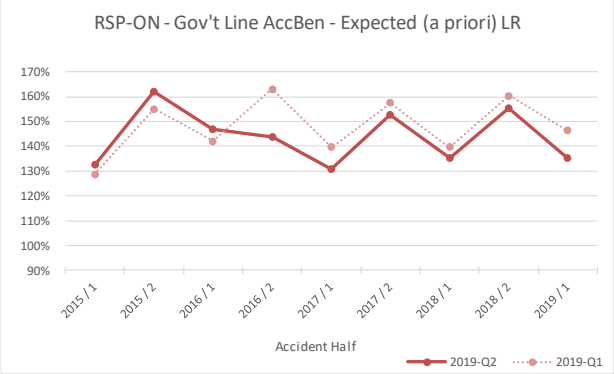
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for PAYs 2015-2018 inclusive, AccBen accounted for the largest overall change (decrease of $18.5 million), followed by TPL (decrease of $5.6 million) then Other (increase of $3.4 million) A priori method loss ratios and the associated point changes are shown in the charts at the top of the next page for Government Lines TPL and AccBen. ***Note that the scales differ in each chart***. For Government Line AccBen, the almost 20 point reduction in the loss ratio for accident half 2016-H2 was influenced by changes to the period structure of the FA selected trend models for the sub-coverages / coverages making up the Government Line.

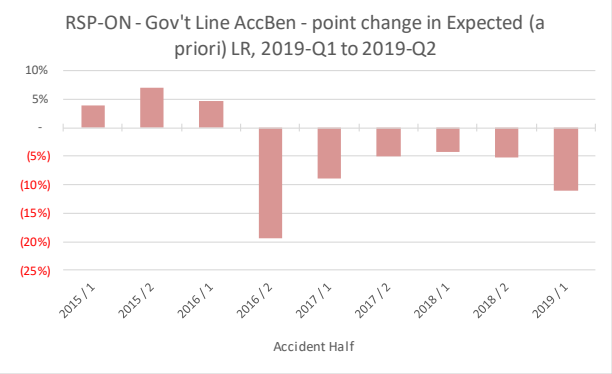
Ontario RSP – Gov't Line TPL – a priori method loss ratio comparisons – levels (left) and point change (right)





Ontario RSP – Gov't Line AccBen – a priori method loss ratio comparisons – levels (left) and point change (right)



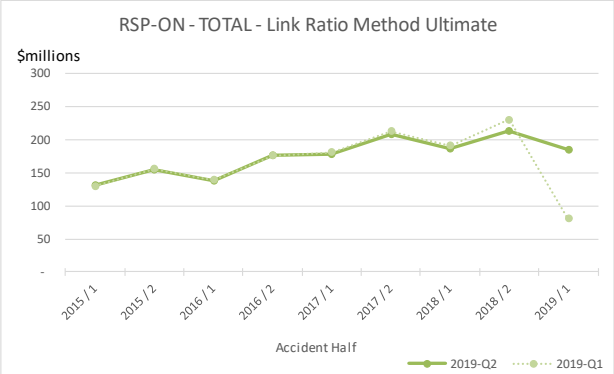


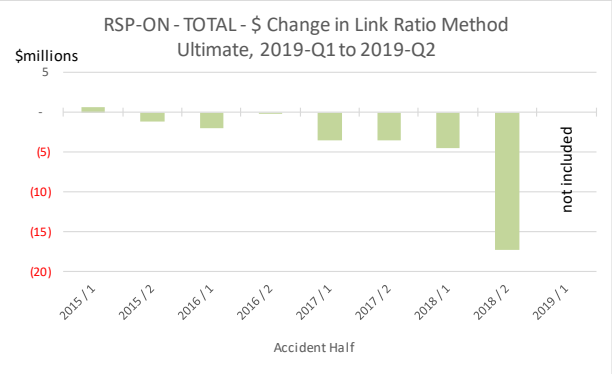
C.6 Link Ratio method

FA leverages the link ratio (also referred to as the chain ladder) method as one of the primary valuation methodologies, estimating ultimate by multiplying recorded claims amounts by development age selected link ratios (also referred to as development factors). Development age link ratios are selected taking into account historic values and other information as deemed appropriate. Changes in estimates of ultimate via this method can arise because of differing emergence relative to emergence implied by previous link ratio selections, as well as updated link ratio selections.

The impact of changes in the Link Ratio method loss ratios are shown across all coverages in the charts at the top of the next page. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a $31.3 million decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

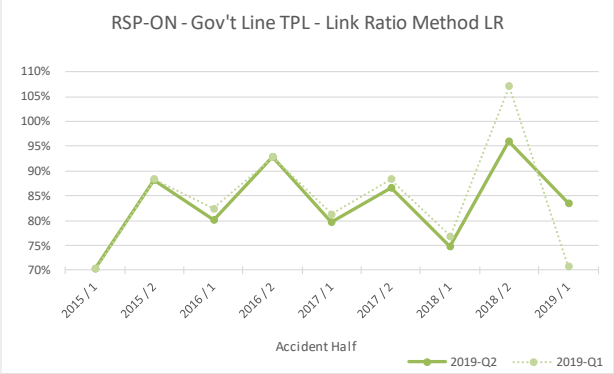
Ontario RSP – TOTAL – Link Ratio method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

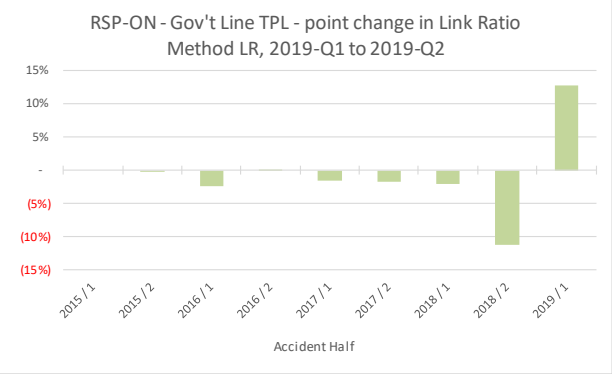




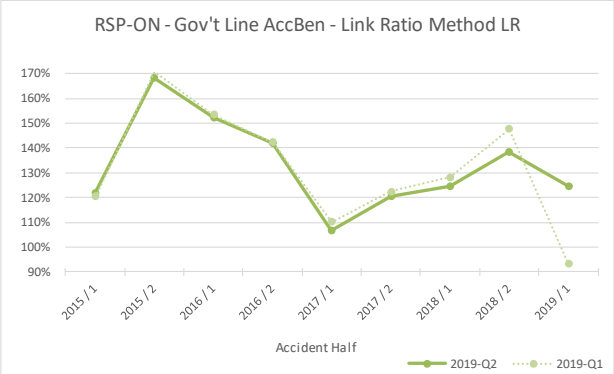
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines, and for PAYs 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $16.1 million), followed by AccBen (decrease of $12.3 million) then Other (decrease of $2.9 million). Link Ratio method loss ratios and the associated point changes are shown in the charts below for Government Lines TPL and at the top of the next page for AccBen. ***Note that the scales differ in each chart***. For Government Line AccBen, the almost 20 point reduction in the loss ratio for accident half 2016-H2 was influenced by changes to the period structure of the FA selected trend models for the sub-coverages / coverages making up the Government Line.

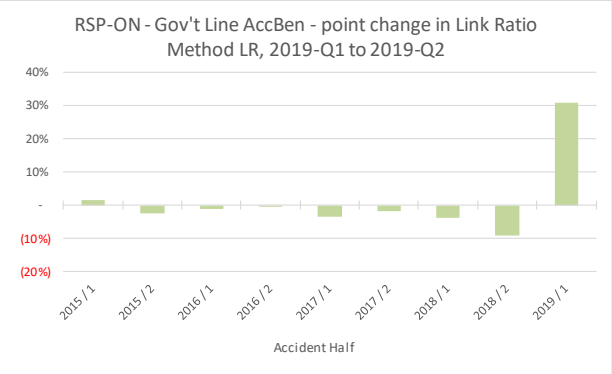
Ontario RSP – Gov't Line TPL – Link Ratio method loss ratio comparisons – levels (left) and point change (right)





Ontario RSP – Gov't Line AccBen – Link Ratio method loss ratio comparisons – levels (left) and point change (right)



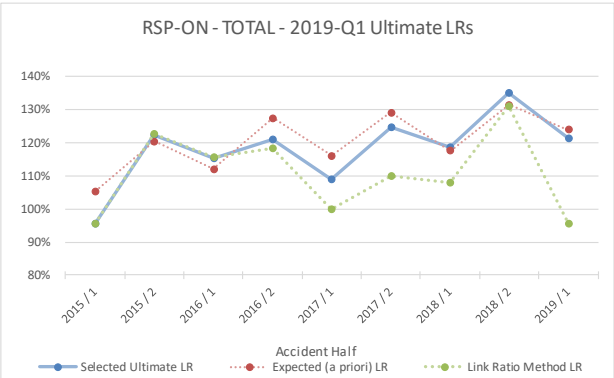


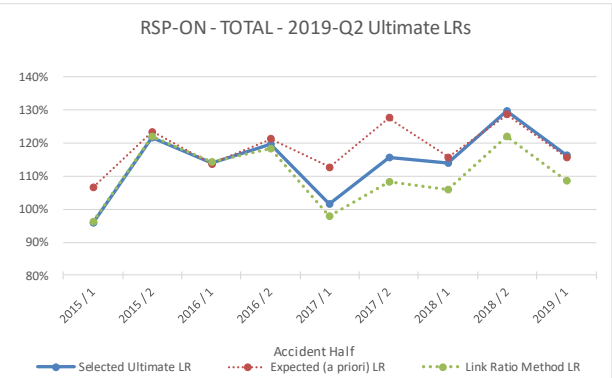
C.7 Current valuation IBNR / ultimate selections

Exhibit B.1.1 (see section L for all exhibits) summarizes the overall change in ultimate with this valuation and B.1.2 shows selected loss ratios over the most recent 4 valuations for comparison purposes on an all coverages basis. The B.2 exhibits provide information for third party liability, B.3 exhibits for accident benefits, and B.4 exhibits for the Other Government Line.

Using the a priori method and Link Ratio method as the primary methodologies, the Appointed Actuary will select from these methods, weighted averages of these methods (which include the B/F as a weighting methodology), or may choose a zero-IBNR selection. For the more recent accident halfs, weighted averages of the two primary methods are employed, as indicated below, where we show the prior valuation selections on the left and the current valuation selections on the right.

Ontario RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)



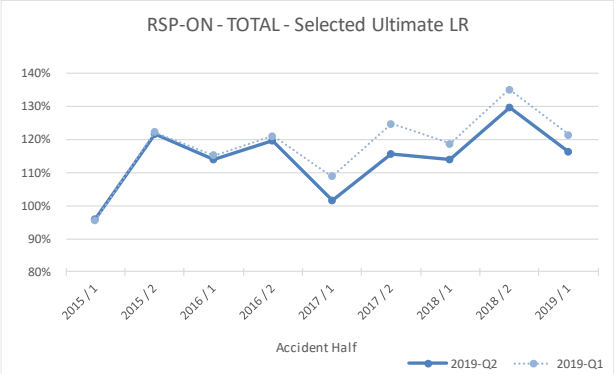


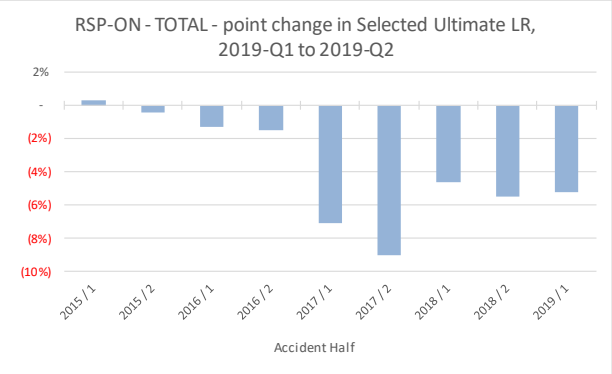
The two charts on the next page show that while there were changes in a priori method estimates and link ratio method estimates (see prior 2 sections), the changes within each method tended to be smaller – the real driver of changes in the selected ultimates are the relative weights given to the methods, where we have move toward more weight for the link ratio method. This is generally the case, as we tend to move weights toward the link ratio method over time as an accident half ages.

Focusing on the loss ratios based on selected ultimates, the left chart at the top of the next page shows the reduction in the total (all coverages) loss ratio selected from the 2019-Q1 valuation (dotted line) to the 2019-Q2 valuation (solid blue line). We show the loss ratio point change in the chart on the right,

varying from an increase of 0.3 points (2015-H1) to a decrease of 9.0 points (2017-H2)

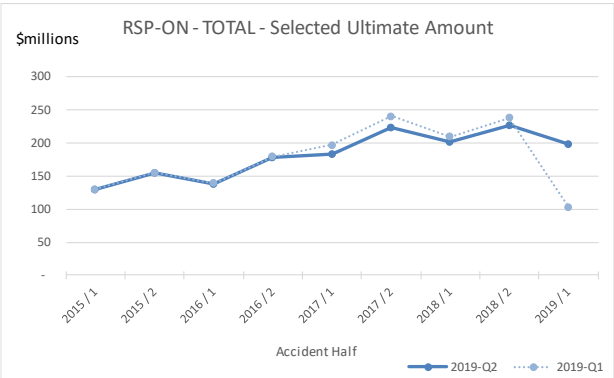
Ontario RSP – Selected ultimate loss ratios – level (left) and point change from prior valuation (right)

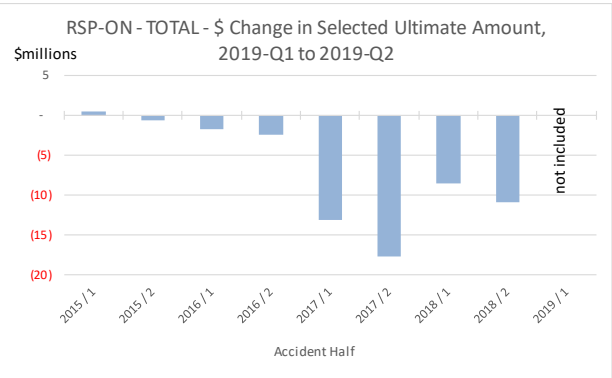




On average over the accident halfs shown, earned premium was approximately $160 million and as such, changes in several points of loss ratio translate to millions of dollars in ultimate estimate changes, as shown in the next charts. (Note that as 2019-H1 was only a partial half year at the 2019-Q1 valuation, the ultimate loss amount is not directly comparable to the amount selected at 2019-Q2 – hence, we do not include the associated change in the chart on the right). The total change shown in the chart on the right is a decrease of $54.5 million, accounting for over 90% of the $59.4 million total prior accident year changes during the quarter.

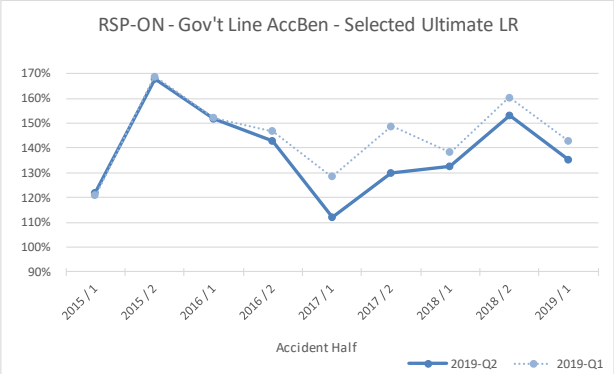
Ontario RSP – All Coverages Selected ultimate amounts – level (left) and amount change from prior valuation (right)

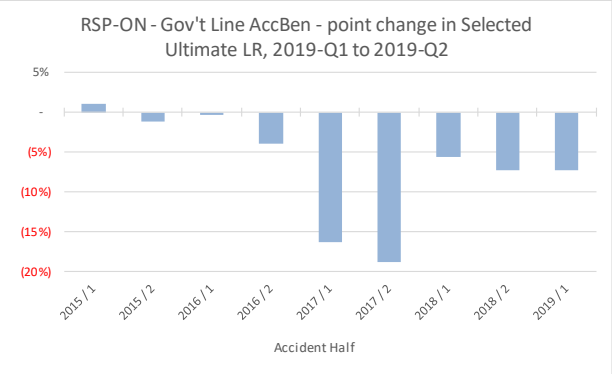




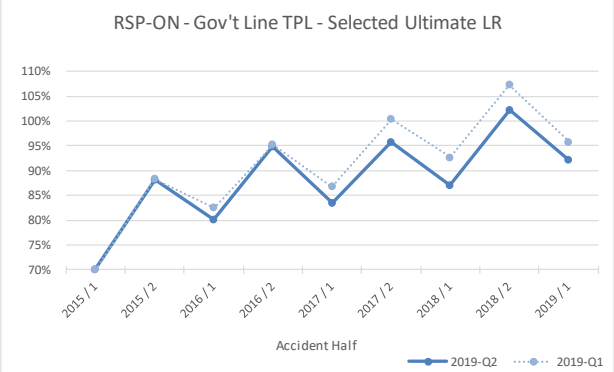
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for PAYs 2015-2018 inclusive, AccBen accounted for the largest overall change (decrease of $32.9 million), followed by TPL (decrease of $18.9 million) then Other (decrease of $2.7 million). Selected ultimate loss ratios and the associated point changes are shown at the top of the next page for Government Lines TPL and AccBen. ***Note that the scales differ in each chart***.

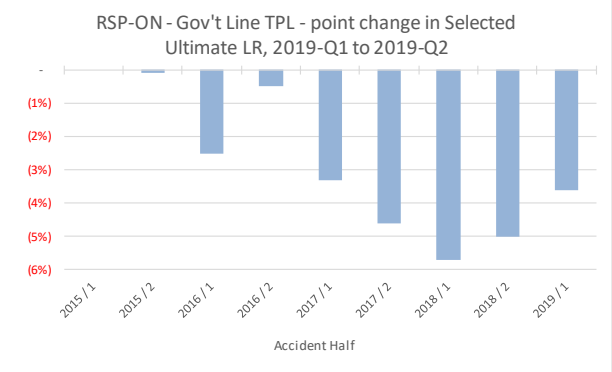
Ontario RSP – Gov't Line AccBen – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





Ontario RSP – Gov't Line TPL – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





C.8 Premium Liabilities / Future Accident Years

In order to provide a basis for estimating the full premium liability level for monthly statements (i.e. the level of premium deficiency liability / deferred policy acquisition cost asset to carry) we leverage the a priori loss ratios for the accident year underlying the unearned premium levels.

The test of recoverability leverages assumptions set by the Appointed Actuary. These include the Member expense allowances (taking into account the Board approved allowances) and policy administration / maintenance expense assumptions.

C.9 Actuarial Present Value Adjustments

C.9.1 Selected Claims Payment Patterns

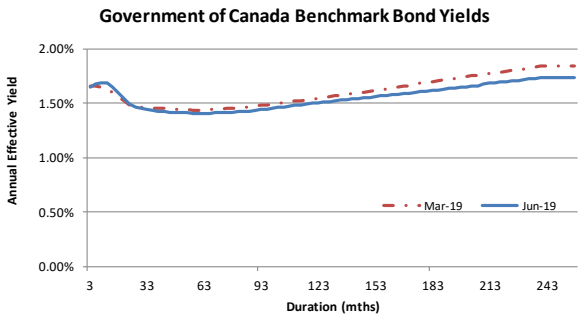
Payment patterns are selected through the emergence models (the same used for projecting future claims paid and recorded activity for the AvsP process), leveraging a paid to ultimate metric.

C.9.2 Selected Discount Rate

The projected future claims paid cash flows are matched to a simulated portfolio of Government of Canada benchmark monthly bonds (yields anchored to the valuation date), and 15 basis point investment

expense is assumed.

A **discount rate of 1.40%** per annum was selected for the valuation of the claim liabilities and premium liabilities at June 30, 2019, **down from 1.43%** selected with the March 31, 2019 valuation. The chart to the right shows the Government of Canada benchmark bond yield curves at March 2019 and June 2019.



Sensitivity to the discount rate assumption is presented in Exhibit C (see section L).

C.9.3 Selected Margins for Adverse Deviations

The margin for adverse deviation (**MfADs**) **for investment income** was **maintained at 25 basis points** with the current valuation.

Selected **claims development MfADs were** reviewed for all coverages and accident half years and **updated** as summarized in Exhibit D (see section L). The selected claims development MfADs for older accident years were reviewed and judgmentally reduced to reflect the decreasing uncertainty over time. **The estimated implementation impact of updating the claims development margins was a decrease in the nominal claims PfAD of $13.7 million**.

C.10 Special IBNR Provisions / Adjustments

There are no special IBNR provisions or adjustments included in this valuation.

D. ALBERTA GRID RSP

D.1 Valuation Highlights

A summary of the valuation results through time is available in the A exhibit (see section L for all exhibits), with detail related to the current valuation provided in the B.1.1 and B.1.2 exhibits.

The **change** in selected ultimate for prior accident years (**PAYs**) was **$13.7 million favourable** with this valuation (**4.8%** of the unpaid estimate as at last quarter), bringing the **calendar year-to-date total favourable** to **$13.7 million** (**4.8%** of the unpaid estimate as at the beginning of the **2019 calendar year**). These changes are presented by accident year and Government Line in the tables below.

Alberta Grid RSP - valuation changes in selected ultimate (favourable) / unfavourable **during Quarter**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(2,728)	168	(132)	(2,692)
2015	(2,073)	(34)	168	(1,939)
2016	(2,155)	(37)	82	(2,110)
2017	(3,593)	(36)	(24)	(3,653)
2018	(2,973)	(181)	(168)	(3,322)
TOTAL	(13,522)	(120)	(74)	(13,716)

Alberta Grid RSP - valuation changes in selected ultimate (favourable) / unfavourable **YTD**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(4,892)	2,749	(151)	(2,294)
2015	(2,752)	(49)	176	(2,625)
2016	(3,148)	(57)	67	(3,138)
2017	(1,390)	50	(139)	(1,479)
2018	(3,287)	(316)	(539)	(4,142)
TOTAL	(15,469)	2,377	(586)	(13,678)

The current valuation incorporates updated trend assumptions and industry loss development factors selected using Alberta PPV AIX 2018-H2 data.

Favourable PAYs third party liability development was driven by low levels of **recent accident year** (AY2014-2018) **bodily injury claims experience**. The $13.7 million favourable change in selected ultimates during the quarter is primarily due to the favourable third party liability development, slightly offset by unfavourable older year accident benefits activity driven by one large loss case reserve increase of $2.6 million.

The **selected loss ratio** for current accident year (**CAY) 2019** decreased by 2.9 points to 86.8% driven by **low levels of bodily injury** recorded claims activity in the quarter. The **selected loss ratio** for future accident year **(FAY) 2020** decreased 1.8 points to 89.5%. For both CAY 2019 and FAY 2020, selected loss ratios were further impacted by updated comprehensive a priori loss ratio selections as a result of using updated trend assumptions.

Summary descriptions of recent regulatory and legislative initiatives are available in section I.

The valuation process is described in more detail in section K, and a summary of changes to the process during this fiscal year is provided in section H.

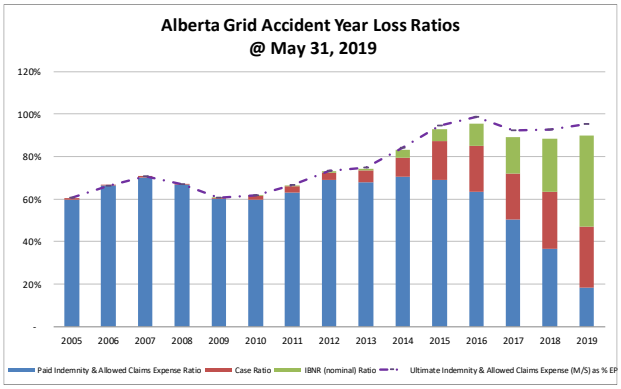
Policy liability projected cash flows and June 2019 government of Canada bond yields were used to determine the applicable discount rate. The selected investment income margin for adverse deviation ("MfAD") was maintained at 25 basis points with the current valuation.

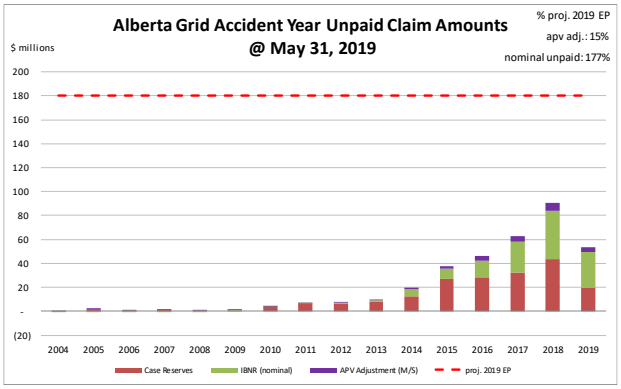
Selected claims development MfADs for all coverages and accident years were reviewed and **updated** with the current valuation. In particular, selected claims development MfADs for one older accident year was reviewed and judgmentally reduced to reflect the decreasing uncertainty over time (see Exhibit D in section L for claims development margins).

D.2 Booked results for the prior valuation implementation

It is helpful to consider how the portfolio looked after the **prior valuation** was implemented. In this case, the **May 2019 booked results** were **based on** assumptions derived from **the prior (March 31, 2019) valuation** and were discussed in the associated monthly Actuarial Highlights.

The charts below show the associated levels of claim liabilities[16] booked by accident year. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the then-current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	192,780	55.8%
ibnr	126,348	36.6%
M/S apv adjust.	26,223	7.6%
M/S total	345,351	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	92,371	103.7%
prem def/(dpac)	(8,928)	(10.0%)
M/S apv adjust.	5,657	6.3%
M/S total	89,100	100.0%

policy liabilities ($000s)

	amt	%
claim	319,128	73.5%
premium	83,443	19.2%
M/S apv adjust.	31,880	7.3%
M/S total	434,451	100.0%

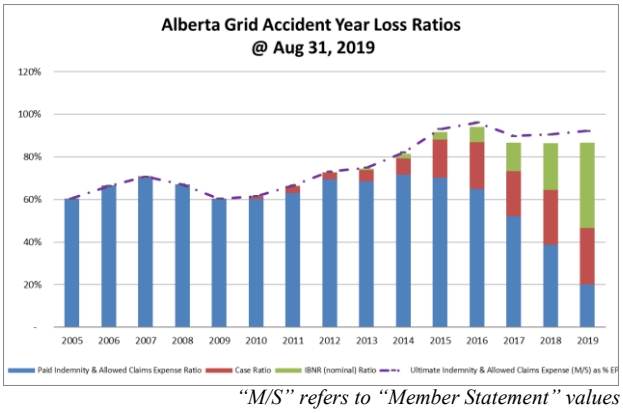
D.3 Booked results for the current valuation implementation

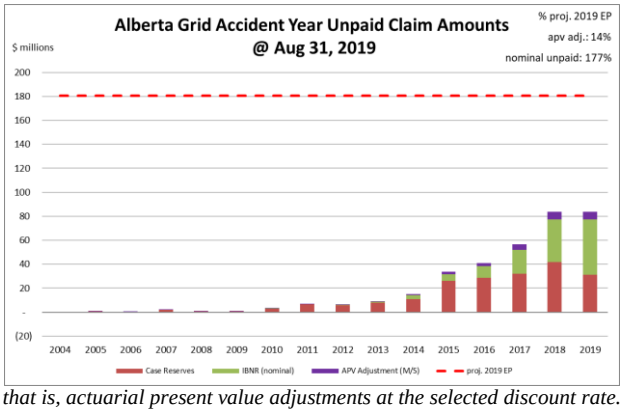
The **August 2019 booked results** were **based on** assumptions derived from **the current (June 30, 2019) valuation** and are discussed in the associated monthly Actuarial Highlights.

The charts at the top of the next page show the levels of claim liabilities booked by accident year on that

[16] *Claim liabilities refer to provision for unpaid indemnity and allowed claims expenses. Allowed claims expenses are first party legal and other expenses as listed in the RSP Claims Guide. Claims expenses paid through the Member company expense allowance are NOT included in this discussion.*

basis. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	197,840	57.5%
ibnr	120,565	35.1%
M/S apv adjust.	25,544	7.4%
M/S total	343,949	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	103,787	105.8%
prem def/(dpac)	(12,008)	(12.2%)
M/S apv adjust.	6,325	6.4%
M/S total	98,104	100.0%

policy liabilities ($000s)

	amt	%
claim	318,405	72.0%
premium	91,779	20.8%
M/S apv adjust.	31,869	7.2%
M/S total	442,053	100.0%

D.4 **Actual vs Projected (AvsP)**

Variances in projected recorded and paid emergence and the associated actual emergence are presented in the two following tables.

Recorded Emergence

Alberta Grid RSP

	Third Party Liability			Accident Benefits			Other Coverages			Total		
Accident Year	Projected Recorded Claims in 2019-Q2 [1]	Actual Recorded Claims in 2019-Q2 [2]	Actual Less Projected [3] =[2]-[1]	Projected Recorded Claims in 2019-Q2 [4]	Actual Recorded Claims in 2019-Q2 [5]	Actual Less Projected [6] =[5]-[4]	Projected Recorded Claims in 2019-Q2 [7]	Actual Recorded Claims in 2019-Q2 [8]	Actual Less Projected [9] =[8]-[7]	Projected Recorded Claims in 2019-Q2 [10] =[1]+[4]+[7]	Actual Recorded Claims in 2019-Q2 [11] =[2]+[5]+[8]	Actual Less Projected [12] =[11]-[10]
2014 & Prior	1,147	538	(609)	-	172	172	7	(102)	(109)	1,154	608	(546)
2015	770	245	(525)	3	(25)	(28)	(5)	133	138	768	353	(415)
2016	1,459	1,248	(211)	4	(35)	(39)	(7)	31	38	1,456	1,244	(212)
2017	3,745	1,711	(2,034)	4	60	56	(93)	(192)	(99)	3,656	1,579	(2,077)
2018	5,831	2,728	(3,103)	254	147	(107)	(1,929)	(2,039)	(110)	4,156	836	(3,320)
2019	13,821	9,894	(3,927)	1,331	1,399	68	9,879	5,630	(4,249)	25,031	16,923	(8,108)
Total	**26,773**	**16,364**	**(10,409)**	**1,596**	**1,718**	**122**	**7,852**	**3,461**	**(4,391)**	**36,221**	**21,543**	**(14,678)**
2018 & prior	12,952	6,470	(6,482)	265	319	54	(2,027)	(2,169)	(142)	11,190	4,620	(6,570)

*projected recorded claims based on Recorded to Ultimate emergence model as at 2019-Q1

As indicated in the table at the bottom of the previous page, total recorded emergence at $21.5 million was $14.7 million (40.5%) less than the $36.2 million projected. The current accident year (CAY2019) accounted for 55.2% of the favourable variance, $8.1 million, in particular being driven by lower than projected recorded recent accident year **bodily injury** (AY2014-AY2019) and current accident year **collision claims** experience.

Paid Emergence

Alberta Grid RSP

Accident Year	Third Party Liability			Accident Benefits			Other Coverages			Total		
	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected
	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]
			=[14]-[13]			=[17]-[16]			=[20]-[19]	=[13]+[16]+[19]	=[14]+[17]+[20]	=[23]-[22]
2014 & Prior	5,889	5,516	(373)	557	2,662	2,105	109	(3)	(112)	6,555	8,175	1,620
2015	3,265	1,776	(1,489)	54	22	(32)	34	-	(34)	3,353	1,798	(1,555)
2016	3,527	2,768	(759)	163	56	(107)	14	(17)	(31)	3,704	2,807	(897)
2017	3,693	3,436	(257)	218	267	49	(184)	(100)	84	3,727	3,603	(124)
2018	5,060	4,145	(915)	679	695	16	(533)	(703)	(170)	5,206	4,137	(1,069)
2019	4,172	3,998	(174)	541	607	66	7,111	6,043	(1,068)	11,824	10,648	(1,176)
Total	**25,606**	**21,639**	**(3,967)**	**2,212**	**4,309**	**2,097**	**6,551**	**5,220**	**(1,331)**	**34,369**	**31,168**	**(3,201)**
2018 & prior	21,434	17,641	(3,793)	1,671	3,702	2,031	(560)	(823)	(263)	22,545	20,520	(2,025)

*projected paid claims based on Paid to Ultimate emergence model as at 2019-Q1

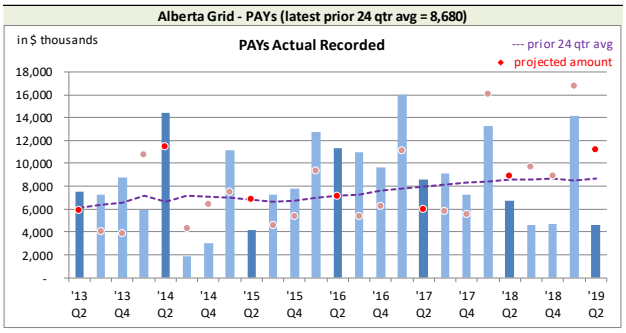
As indicated above, total paid emergence at $31.2 million was $3.2 million (9.3%) less than the $34.4 million projected.

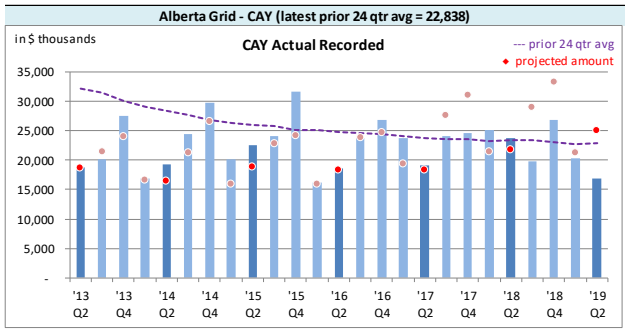
Additional detail and summary charts akin to those found in the monthly Actuarial Highlights are presented in the sections that follow.

D.4.1 AvsP: Recorded Indemnity & Allowed Claims Expense

Actual **recorded** activity (**paid** and case reserve changes) over the last 25-calendar quarters is shown in the charts below, including the "prior 24 quarter average" level.

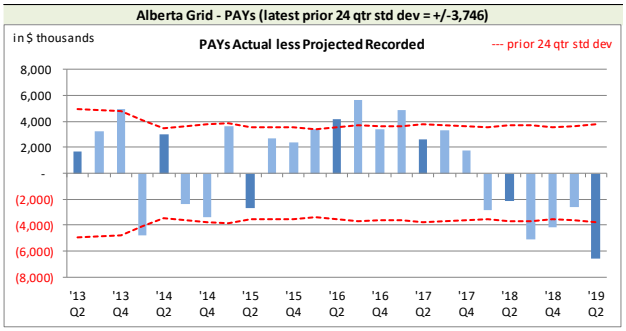
*Alberta Grid RSP Actual **Recorded** by Calendar Quarter*

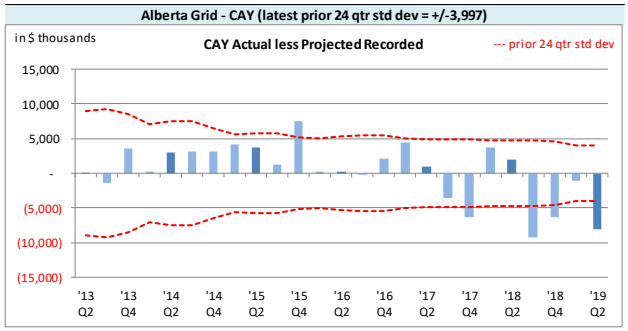




Recorded activity variances from the previous quarter's projections are shown in the charts at the top of the next page, including the prior 24-quarter standard deviation levels.

*Alberta Grid RSP Actual vs Projected Summary: **Recorded** Variances by Calendar Quarter*





On Latest $ thousands		
Recorded	PAYs	CAY
Actual less Projected Recorded	8,680	22,838
std dev	3,746	3,997
A-P <> std dev	9	5
% <> std dev	36.0%	20.0%
norm <> std dev	31.7%	31.7%

With respect to **recorded** indemnity & allowed claims expense, the prior accident years' (PAYs) variances (left chart above) fell outside of one standard deviation 36% of the time , suggesting the projection process has performed no better than projecting the prior 24-quarter average amount. The variances show that actuals have been generally higher than projected but the magnitude of the variances have not necessarily been extremely high and bias[17] has not been indicated at the 95% confidence level, with 15 times in the past 25 quarters where actuals were higher than our projections for the PAYs **recorded** amount. While there may be various causes for this as outlined in Section B.4, we believe the main driver of these variances is that the prior valuation selections of ultimate in 2015 through 2017 have proven, in hindsight, to be redundant more recently.

The PAYs **recorded** variance fell outside of the one standard deviation band during the latest quarter. The variance was reviewed and confirmed, with the variance attributed to process variance.

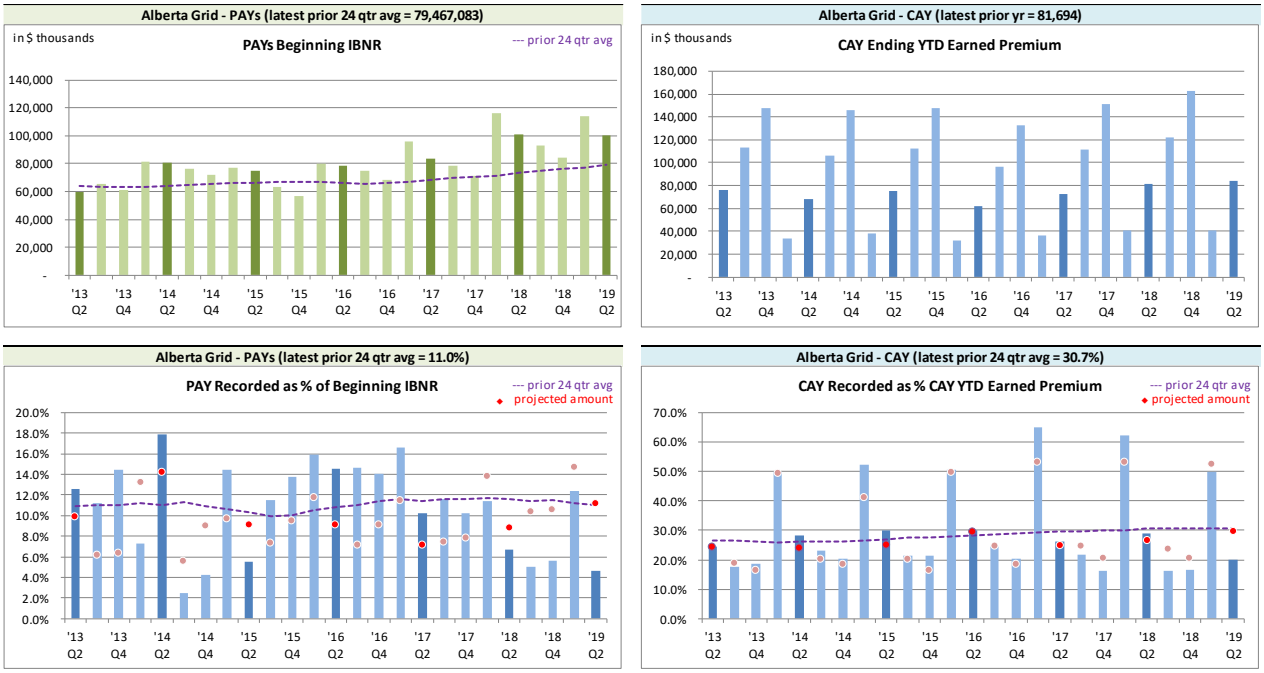
The current accident year (CAY) **recorded** variances (right chart above) fell outside of one standard deviation 20% of the time, suggesting that the projection process has performed better than simply projecting the prior 24-quarter average amount, and variances do not indicate bias at the 95% confidence level.

The CAY **recorded** variance fell outside of the one standard deviation band during the latest quarter. The variance was reviewed and confirmed, with the variance attributed to process variance.

We have included, for reference, additional charts at the top of the next page related to levels influencing **recorded** activity.

[17] *For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 24 quarters presented, if the recorded projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

*Alberta Grid RSP Levels that influence[18] **Recorded** activity by Calendar Quarter*



We track beginning PAYs' IBNR as **recorded** activity comes out of IBNR. Changes in the PAYs' beginning IBNR (see upper left chart above) occur for several possible reasons:

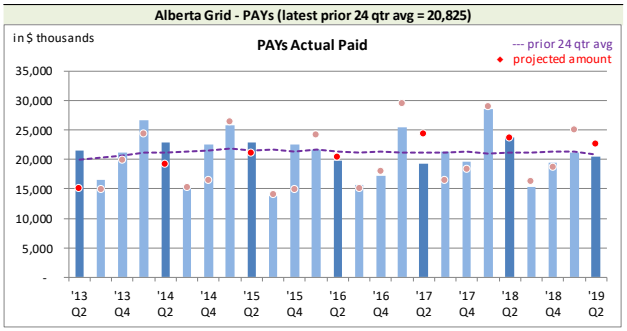
- to offset actual **recorded** activity (through loss ratio matching);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

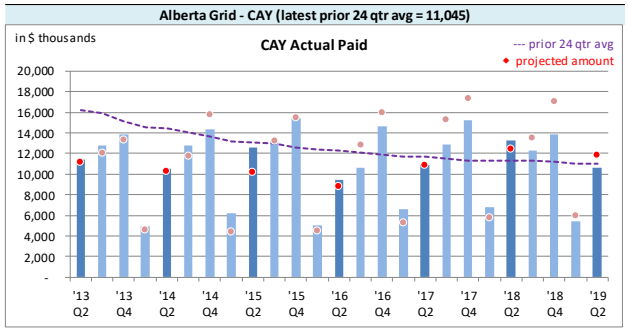
D.4.2 AvsP: Paid Indemnity & Allowed Claims Expense

The charts at the top of the next page show actual **paid** activity in each of the most recent 25 calendar quarters, along with a prior 24-quarter average to show how each quarter's actual compares with the average amount of the preceding 24 calendar quarters.

[18] *Our recorded activity projections are based on selected ratios of life-to-date recorded activity to ultimate, converted to a "recorded to beginning IBNR" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

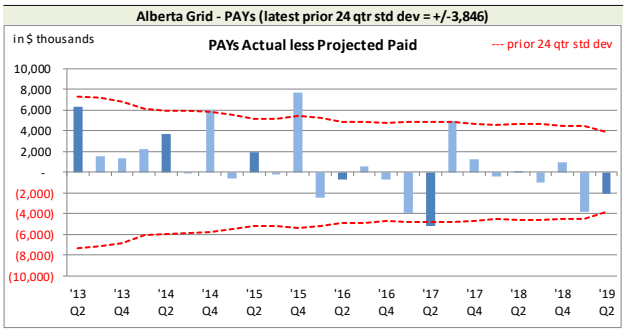
*Alberta Grid RSP Actual **Paid** activity by Calendar Quarter*

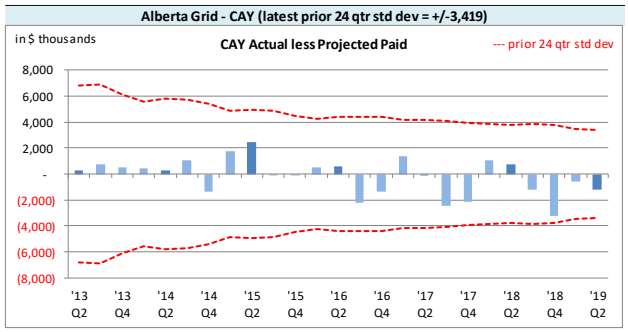




The charts below show the actual less projected **paid** variances for the last 25 calendar quarters, along with bands for the prior 24-quarter standard deviations to show how the variances from projection compare with historical standard deviations.

*Alberta Grid RSP Actual vs Projected Summary: **Paid** Variances by Calendar Quarter*





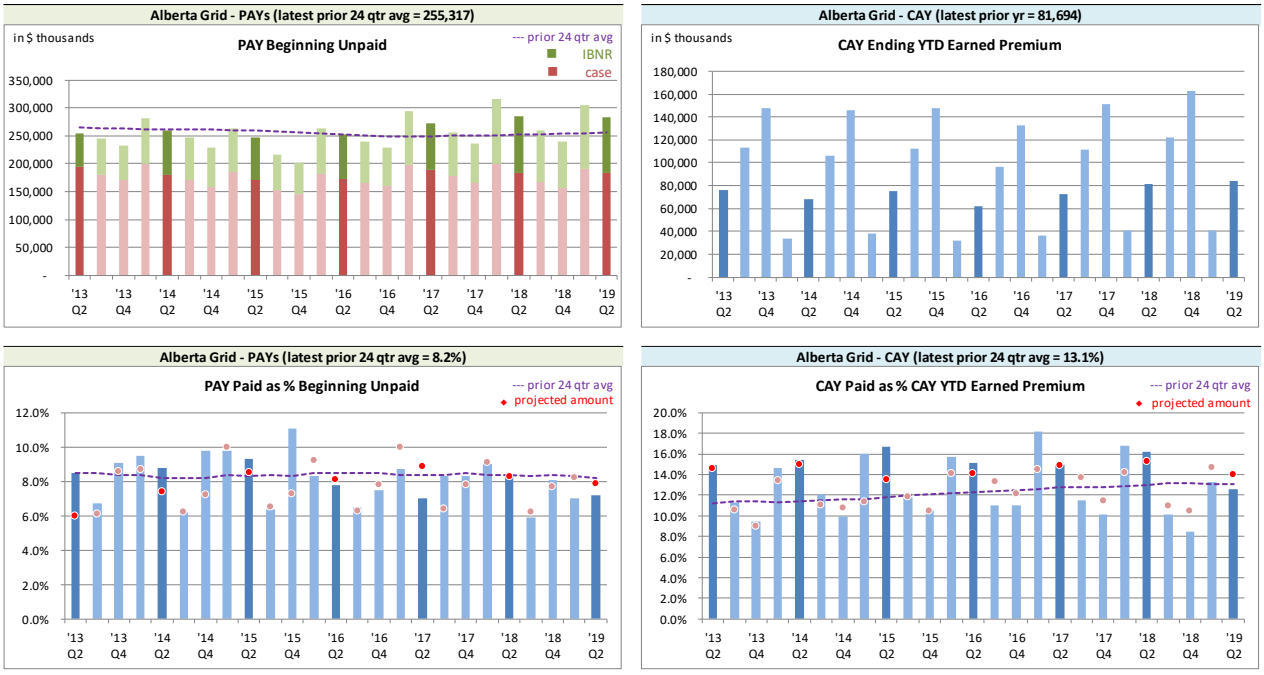
On Latest $ thousands		
Paid	PAYs	CAY
Qtrly Avg Paid (prior 24 qtrs)	20,825	11,045
std dev	3,846	3,419
A-P <> std dev	4	-
% <> std dev	16.0%	0.0%
norm <> std dev	31.7%	31.7%

With respect to **paid** indemnity & allowed claims expense prior accident years' (PAYs) variances (left chart above), 16% of the variances have fallen outside of one standard deviation, suggesting the projection process has performed better than projecting simply based on the preceding 24-month average. With 14 times of the past 25 quarters where actuals were higher than projected, there does not appear to be evidence of bias in the projection process.

The current accident year (CAY) **paid** variances (right chart above) have not fallen outside of one standard deviation, suggesting that the projection process has performed better than simply projecting the prior 24-quarter average amount. There does not appear to be evidence of bias in the projection process over the more recent periods, with 13 times of the past 25 quarters actuals being higher than projected.

We have included, for reference, additional charts at the top of the next page related to levels influencing **paid** activity.

Alberta Grid RSP Levels that influence[19] ***Paid*** *activity by Calendar Quarter*



We track beginning PAYs' unpaid balance (case and IBNR) as **paid** activity comes out of the unpaid balance. Changes in the PAYs' beginning unpaid balance (see upper left chart above) occur for several possible reasons:

- to offset actual **paid** activity (may reduce case or IBNR or both);
- the annual switchover as a current accident year becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

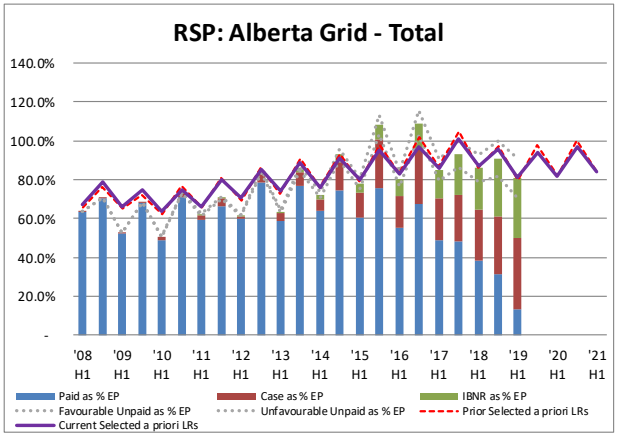
D.5 a priori method

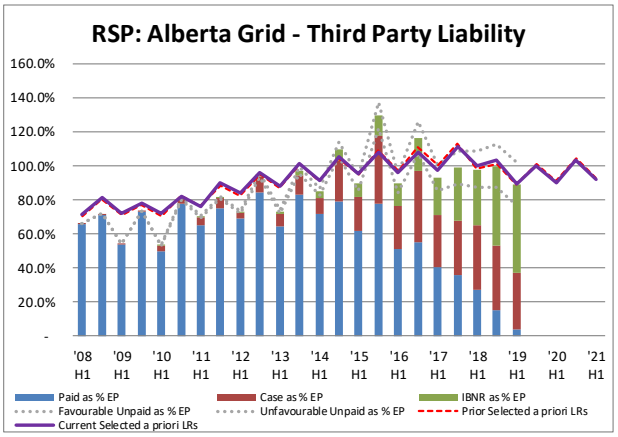
FA leverages the a priori method as one of the primary valuation methodologies, estimating ultimate by multiplying earned premium by a selected a priori loss ratio.

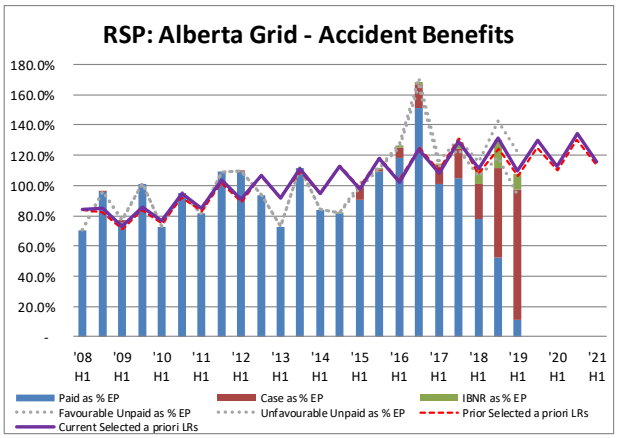
The Alberta Grid RSP a priori loss ratios were updated as discussed below and are presented in the B.1.4, B.2.3, B.3.3, and B.4.3 exhibits in section L.

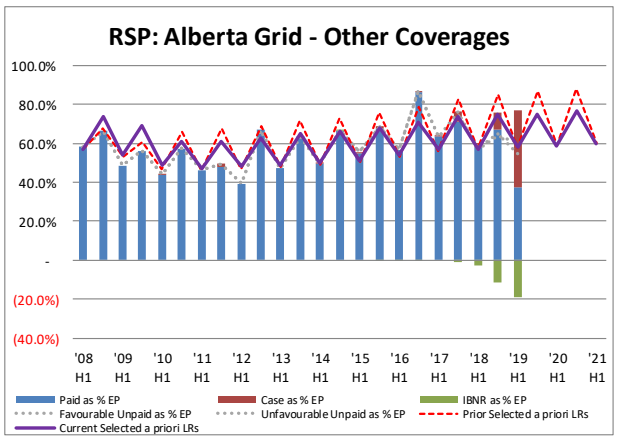
This valuation's a priori loss ratios are summarized in the charts and table at the top of the next page (by Government Line and accident half-year), with a comparison to the last valuation a priori loss ratios.

[19]*Our paid projections are based on selected ratios of life-to-date paid activity to ultimate, converted to a paid to beginning unpaid ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*









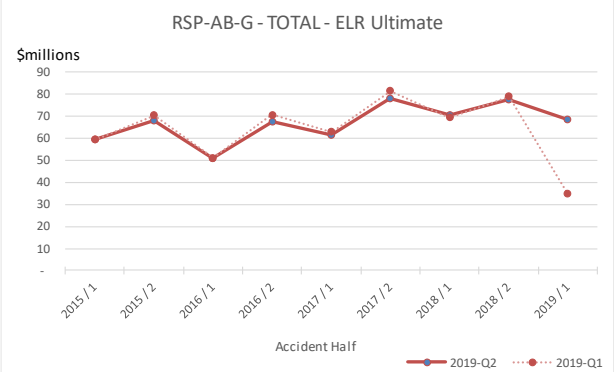
	CURRENT				PRIOR				CHANGE			
Accident Period	Third Party Liability	Accident Benefits	Other Coverages	Total	Third Party Liability	Accident Benefits	Other Coverages	Total	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 / 1	91.0%	95.0%	50.0%	76.0%	91.0%	95.0%	49.0%	76.0%	-	-	1.0%	-
2014 / 2	105.0%	113.0%	66.0%	91.0%	104.0%	113.0%	73.0%	93.0%	1.0%	-	(7.0%)	(2.0%)
2015 / 1	95.0%	98.0%	51.0%	80.0%	95.0%	99.0%	50.0%	79.0%	-	(1.0%)	1.0%	1.0%
2015 / 2	108.0%	118.0%	68.0%	95.0%	109.0%	118.0%	76.0%	98.0%	(1.0%)	-	(8.0%)	(3.0%)
2016 / 1	96.0%	102.0%	54.0%	83.0%	97.0%	103.0%	53.0%	83.0%	(1.0%)	(1.0%)	1.0%	-
2016 / 2	108.0%	124.0%	71.0%	97.0%	111.0%	125.0%	79.0%	102.0%	(3.0%)	(1.0%)	(8.0%)	(5.0%)
2017 / 1	97.0%	108.0%	57.0%	86.0%	100.0%	110.0%	56.0%	87.0%	(3.0%)	(2.0%)	1.0%	(1.0%)
2017 / 2	111.0%	129.0%	74.0%	101.0%	113.0%	131.0%	83.0%	105.0%	(2.0%)	(2.0%)	(9.0%)	(4.0%)
2018 / 1	100.0%	111.0%	57.0%	87.0%	98.0%	108.0%	57.0%	86.0%	2.0%	3.0%	-	1.0%
2018 / 2	103.0%	131.0%	75.0%	96.0%	101.0%	124.0%	85.0%	97.0%	2.0%	7.0%	(10.0%)	(1.0%)
2019 / 1	89.0%	110.0%	58.0%	81.0%	89.0%	106.0%	58.0%	80.0%	-	4.0%	-	1.0%
2019 / 2	100.0%	130.0%	75.0%	94.0%	101.0%	125.0%	87.0%	98.0%	(1.0%)	5.0%	(12.0%)	(4.0%)
2020 / 1	90.0%	113.0%	59.0%	82.0%	91.0%	110.0%	59.0%	82.0%	(1.0%)	3.0%	-	-
2020 / 2	103.0%	134.0%	77.0%	97.0%	104.0%	130.0%	88.0%	100.0%	(1.0%)	4.0%	(11.0%)	(3.0%)
2021 / 1	92.0%	116.0%	60.0%	84.0%	93.0%	113.0%	60.0%	84.0%	(1.0%)	3.0%	-	-

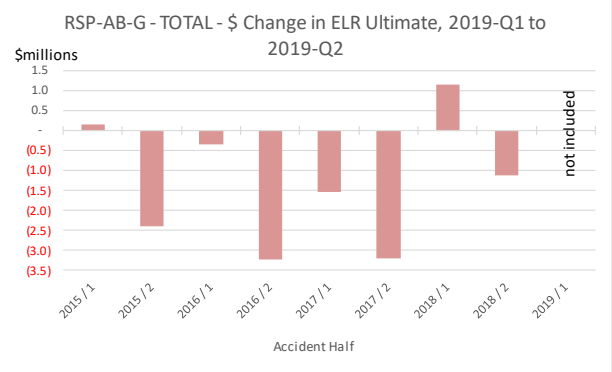
The valuation results used to form the basis of the a priori estimates for the June 30, 2019 valuation were updated to use selected ultimates from the March 31, 2019 valuation. Trend structure models based on industry indemnity results as at December 31, 2018 were used (for the prior valuation a priori loss ratio assumptions, trend structure models based on industry indemnity results as at June 30, 2018 were used).

The impact of changes in the a priori (expected) method loss ratios are shown across all coverages in the charts at the top of the next page. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a

$10.5 million decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

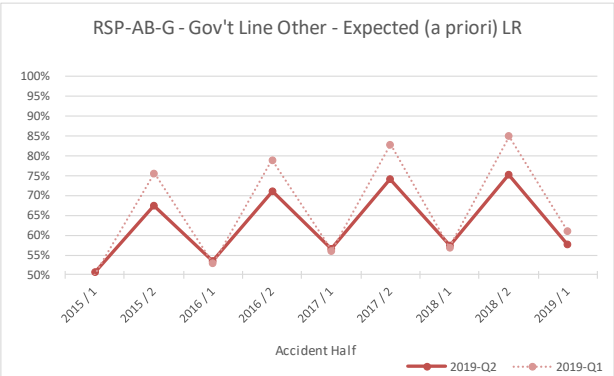
Alberta Grid RSP – TOTAL - a priori method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

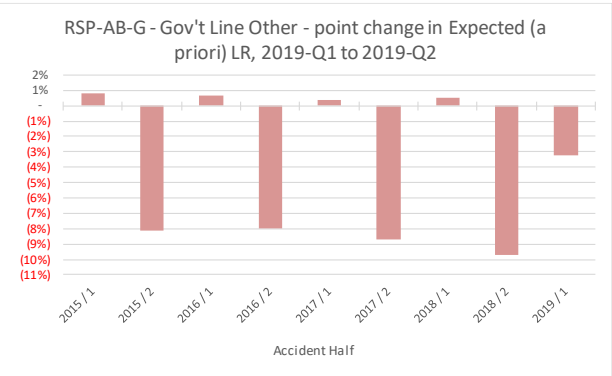




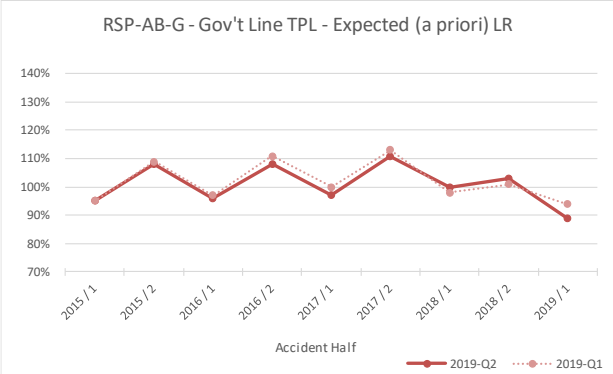
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for Prior Accident years 2015-2018 inclusive, Other accounted for the largest overall change (decrease of $7.4 million), followed by TPL (decrease of $3.2 million) then Accben (increase of $0.1 million) A priori method loss ratios and the associated point changes are shown below for Government Lines AccBen and TPL. ***Note that the scales differ in each chart***. For Government Line Other, the reduction in the loss ratio was influenced by the FA selected trend models reacting to new data and decreasing the intensity of seasonality adjustments for the sub-coverages / coverages making up the Government Line.

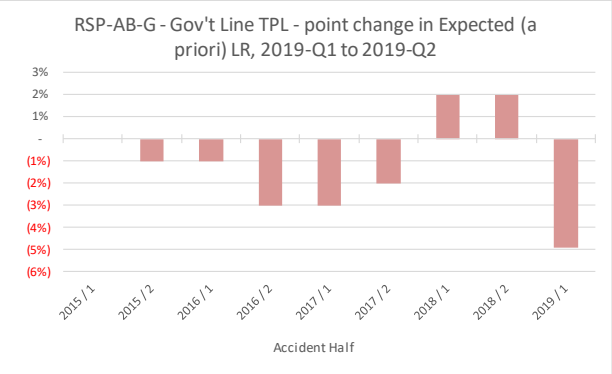
Alberta Grid RSP – Gov't Line Other – a priori method loss ratio comparisons – levels (left) and point change (right)





Alberta Grid RSP – Gov't Line TPL – a priori method loss ratio comparisons – levels (left) and point change (right)



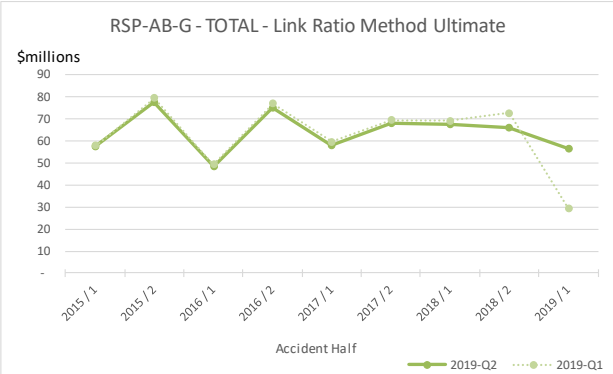


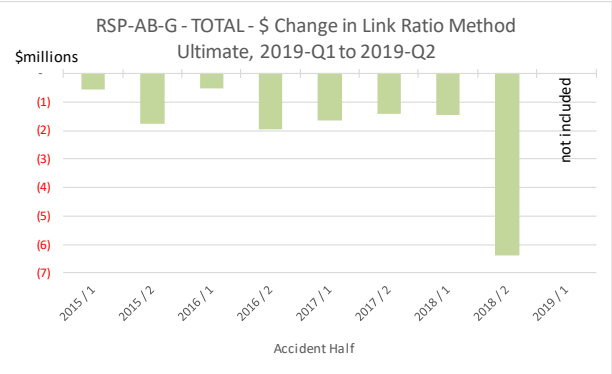
D.6 Link Ratio method

FA leverages the link ratio (also referred to as the chain ladder) method as one of the primary valuation methodologies, estimating ultimate by multiplying recorded claims amounts by development age selected link ratios (also referred to as development factors). Development age link ratios are selected taking into account historic values and other information as deemed appropriate. Changes in estimates of ultimate via this method can arise because of differing emergence relative to emergence implied by previous link ratio selections, as well as updated link ratio selections.

The impact of changes in the Link Ratio method loss ratios are shown across all coverages in the charts below. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a $15.7 million decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

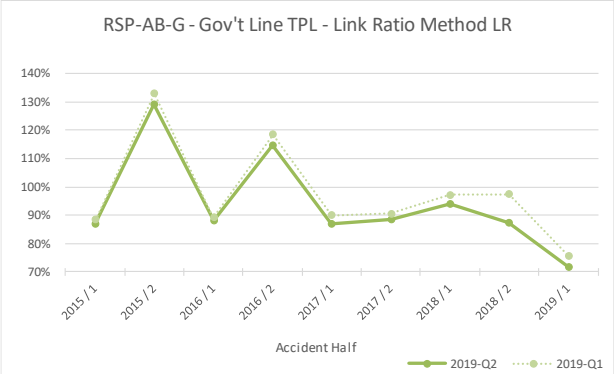
Alberta Grid RSP – TOTAL – Link Ratio method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

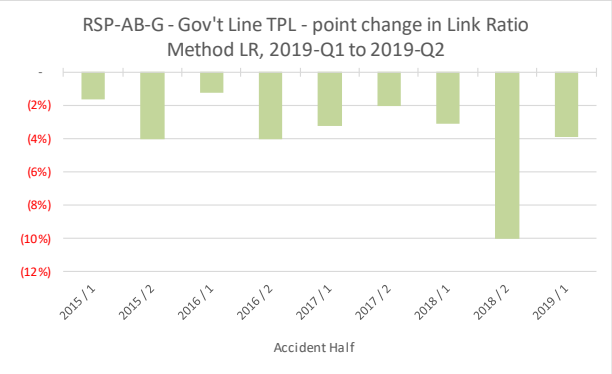




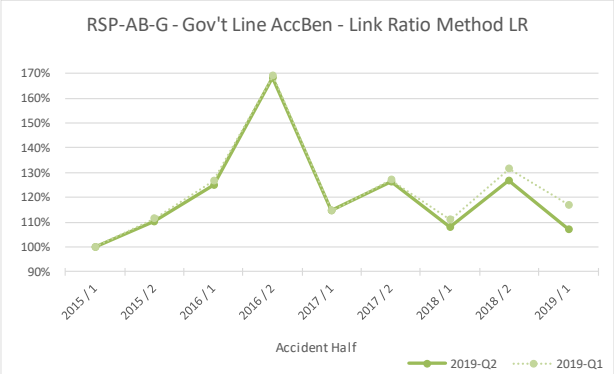
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines, and for Prior Accident years 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $15.2 million), followed by AccBen (decrease of $0.4 million) then Other (decrease of $0.1 million). Link Ratio method loss ratios and the associated point changes are shown below for Government Lines TPL and AccBen. ***Note that the scales differ in each chart.***

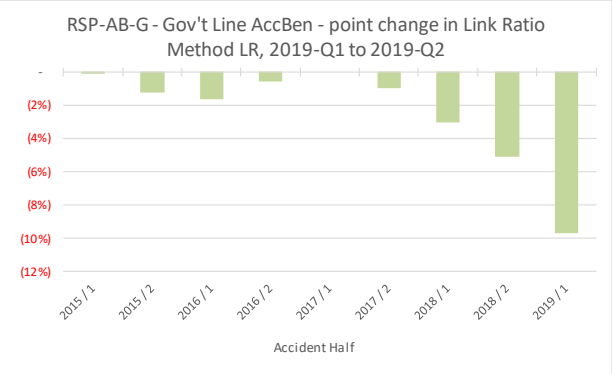
Alberta Grid RSP – Gov't Line TPL – Link Ratio method loss ratio comparisons – levels (left) and point change (right)





Alberta Grid RSP – Gov't Line AccBen – Link Ratio method loss ratio comparisons – levels (left) and point change (right)



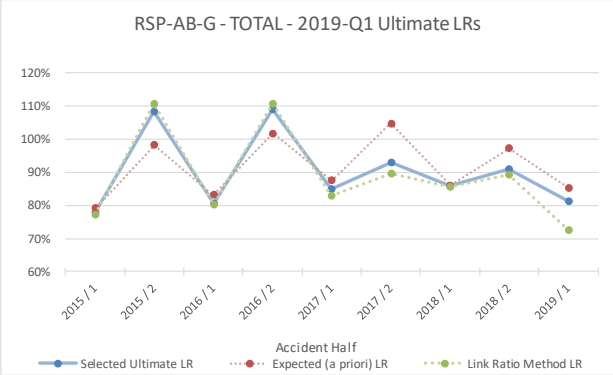


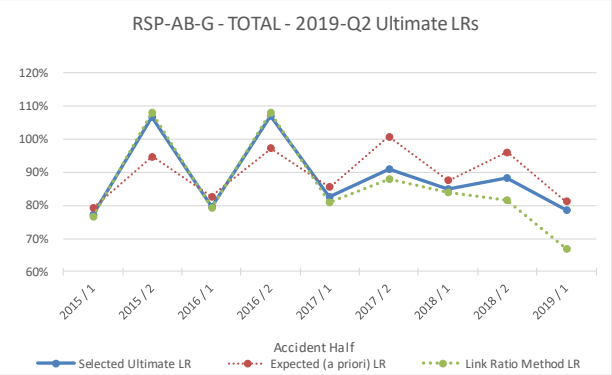
D.7 Current valuation IBNR / ultimate selections

Exhibit B.1.1 (see section L for all exhibits) summarizes the overall change in ultimate with this valuation and B.1.2 shows selected loss ratios over the most recent 4 valuations for comparison purposes on an all coverages basis. The B.2 exhibits provide information for third party liability, B.3 exhibits for accident benefits, and B.4 exhibits for the Other Government Line.

Using the a priori method and Link Ratio method as the primary methodologies, the Appointed Actuary will select from these methods, weighted averages of these methods (which include the B/F as a weighting methodology), or may choose a zero-IBNR selection. For the more recent accident halfs, weighted averages of the two primary methods are employed, as indicated below, where we show the prior valuation selections on the left and the current valuation selections on the right.

Alberta Grid RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)

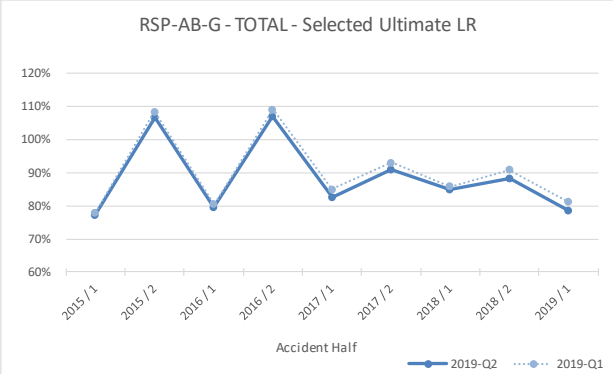


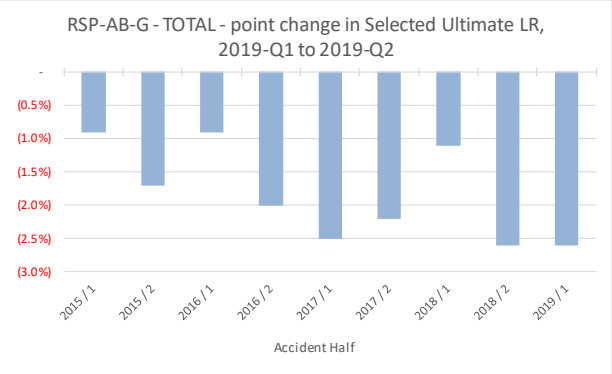


The preceding two charts show that there were minor changes in a priori method estimates and more significant reductions in link ratio method estimates for the two more recent accident halfs. Those accident halfs align with the inclusion of the MIR clarification impact effective June 2018 in FA's selected trend models and coincide with the inflow of post-reform data which may be communicating some of the impact.

Focusing on the loss ratios based on selected ultimates, the left chart below shows the reduction in the total (all coverages) loss ratio selected from the 2019-Q1 valuation (dotted line) to the 2019-Q2 valuation (solid blue line). We show the loss ratio point change in the chart on the right, varying from a decrease of 0.9 points (2015-H1) to a decrease of 2.6 points (2018-H2)

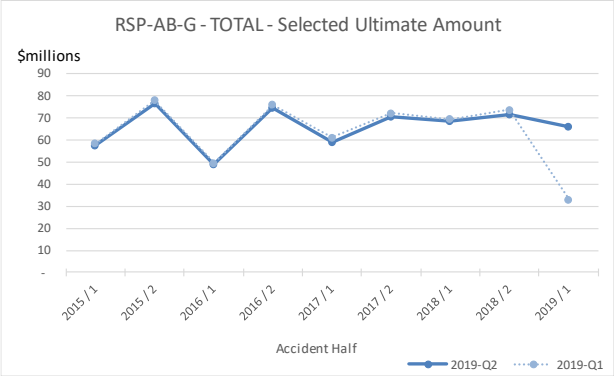
Alberta Grid RSP – Selected ultimate loss ratios – level (left) and point change from prior valuation (right)

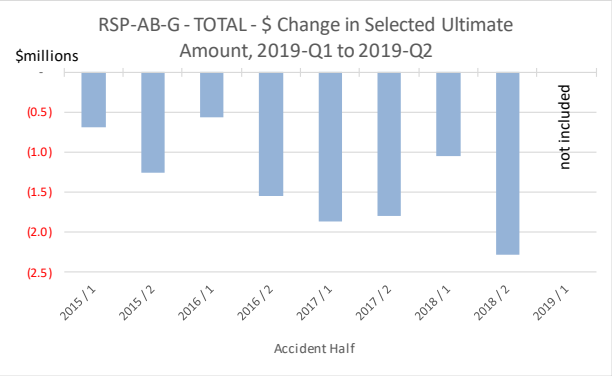




On average over the accident halfs shown, earned premium was approximately $75 million and as such, changes in several points of loss ratio translate to millions of dollars in ultimate estimate changes, as shown in the charts at the top of the next page. (Note that as 2019-H1 was only a partial half year at the 2019-Q1 valuation, the ultimate loss amount is not directly comparable to the amount selected at 2019-Q2 – hence, we do not include the associated change in the chart on the right). The total change shown in the chart on the right is a decrease of $11.0 million, accounting for over 80% of the $13.7 million total PAY changes during the quarter.

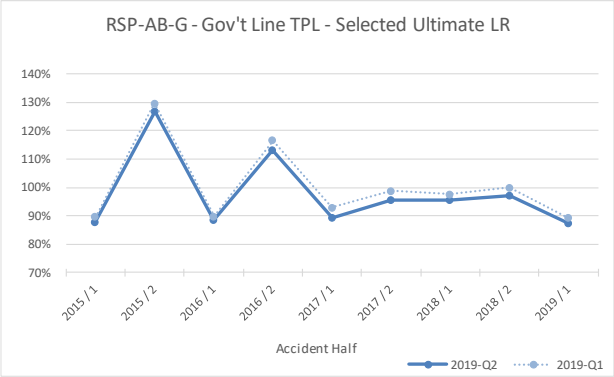
Alberta Grid RSP – All Coverages Selected ultimate amounts – level (left) and amount change from prior valuation (right)

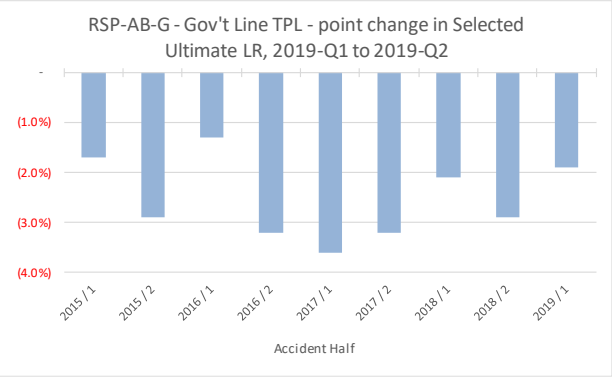




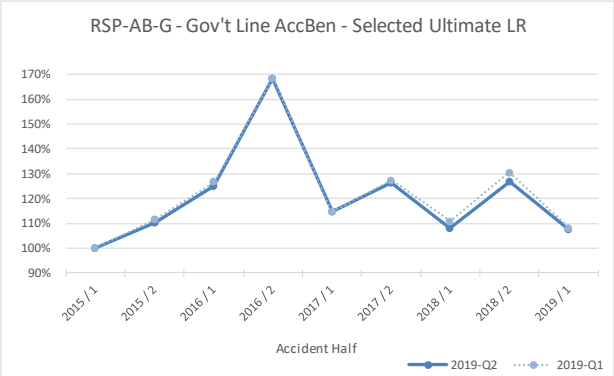
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for PAYs 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $10.8 million), followed by AccBen (decrease of $0.3 million) then Other (increase of $0.1 million). Selected ultimate loss ratios and the associated point changes are shown below for Government Lines TPL and AccBen. ***Note that the scales differ in each chart***.

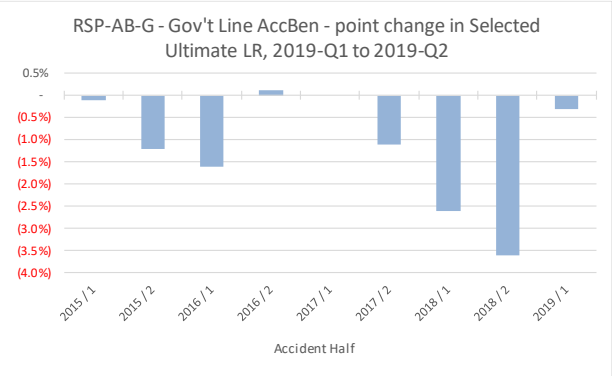
Alberta Grid RSP – Gov't Line TPL – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





Alberta Grid RSP – Gov't Line AccBen – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





D.8 Premium Liabilities / Future Accident Years

In order to provide a basis for estimating the full premium liability level for monthly statements (i.e. the level of premium deficiency liability / deferred policy acquisition cost asset to carry) we leverage the a priori loss ratios for the accident year underlying the unearned premium levels.

The test of recoverability leverages assumptions set by the Appointed Actuary. These include the Member expense allowances (taking into account the Board approved allowances) and policy administration / maintenance expense assumptions.

D.9 Actuarial Present Value Adjustments

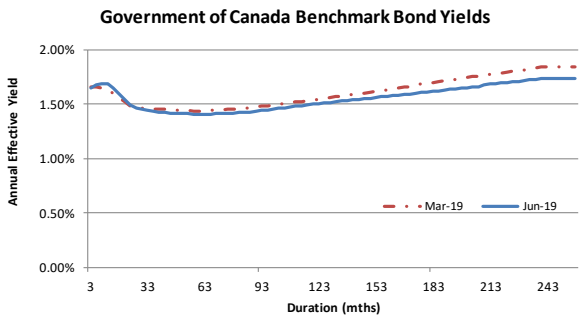
D.9.1 Selected Claims Payment Patterns

Payment patterns are selected through the emergence models (the same used for projecting future claims paid and recorded activity for the AvsP process), leveraging a "paid to ultimate" metric.

D.9.2 Selected Discount Rate

The projected future claims paid cash flow are matched to a simulated portfolio of Government of Canada benchmark monthly bonds (yields anchored to the valuation date), and 15 basis point investment expense is assumed.

A **discount rate of 1.41%** per annum was selected for the valuation of the claim liabilities and premium liabilities at June 30, 2019, **down from 1.44%** selected with the March 31, 2019 valuation. The chart to the right shows the Government of Canada benchmark bond yield curves at March 2019 and June 2019.



Sensitivity to the discount rate assumption is presented in Exhibit C (see section L).

D.9.3 Selected Margins for Adverse Deviations

The **margin for adverse deviation** (MfADs) **for investment income** was **maintained at 25 basis points** with the current valuation.

Selected **claims development margins were reviewed** for all coverages and accident half years and these are summarized in Exhibit D (see section L). The selected claims development MfADs for one older accident year was reviewed and judgmentally reduced to reflect the decreasing uncertainty over time. **The estimated implementation impact of updating the claims development MfADs was a decrease in the nominal claims PfAD of $0.9 million**.

D.10 Special IBNR Provisions / Adjustments

There were no special IBNR provisions or adjustments included with the current valuation.

E. ALBERTA NON-GRID RSP

E.1 Valuation Highlights

A summary of the valuation results through time is available in the A exhibit (see section L for all exhibits), with detail related to the current valuation provided in the B.1.1 and B.1.2 exhibits.

The **change** in selected ultimate for **prior accident years** was **$14.3 million favourable** with this valuation (**9.2%** of the unpaid estimate as at last quarter), bringing the **calendar year-to-date total favourable** to **$14.6 million** (**9.4%** of the unpaid estimate as at the beginning of the **2019 calendar year**). These changes are presented by accident year and Government Line in the tables below.

Alberta Non-Grid RSP - valuation changes in selected ultimate (favourable) / unfavourable **during Quarter**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(1,528)	(762)	(60)	(2,350)
2015	(1,047)	(7)	(15)	(1,069)
2016	(1,313)	(142)	(367)	(1,822)
2017	(2,928)	(23)	(183)	(3,134)
2018	(4,518)	(98)	(1,309)	(5,925)
TOTAL	(11,334)	(1,032)	(1,934)	(14,300)

Alberta Non-Grid RSP - valuation changes in selected ultimate (favourable) / unfavourable **YTD**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(1,753)	(768)	(93)	(2,614)
2015	(1,570)	(16)	(40)	(1,626)
2016	(1,610)	(175)	(369)	(2,154)
2017	(2,155)	(139)	(61)	(2,355)
2018	(4,730)	(531)	(575)	(5,836)
TOTAL	(11,818)	(1,629)	(1,138)	(14,585)

The current valuation incorporates updated trend assumptions and industry loss development factors selected using Alberta PPV AIX 2018-H2 data.

During the current valuation (as at June 30, 2019), the favourable PAYs development was driven by low levels of recorded activity levels in **bodily injury and accident benefits** over recent accident year (AY2014-2018) **across multiple Member companies**.

The **selected loss ratio** for current accident year **2019** decreased by 3.9 to 104.8% and future accident year **2020** decreased by 3.7 points to 106.7%. Changes in the selected loss ratio for CAY 2019 were driven by low levels of bodily injury claims experience reported in the quarter, with further impact by reduction in comprehensive a priori loss ratios as a result of using updated trend assumptions.

Summary descriptions of recent regulatory and legislative initiatives are available in section I.

The valuation process is described in more detail in section K, and a summary of changes to the process during this fiscal year is provided in section H.

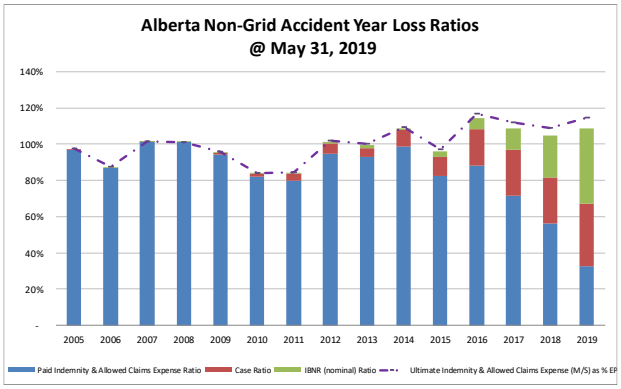
Policy liability projected cash flows and June 2019 government of Canada bond yields were used to determine the applicable discount rate. The selected investment income margin for adverse deviation (MfAD) was maintained at 25 basis points with the current valuation.

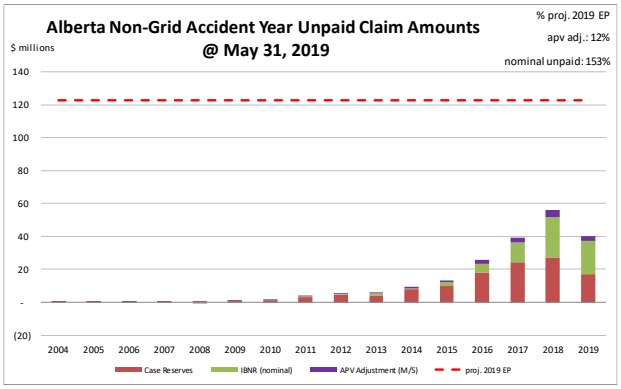
Selected claims development margins for all coverages and accident years were reviewed with the current valuation. In particular, selected claims development MfADs for one older accident year was reviewed and judgmentally reduced to reflect the decreasing uncertainty over time (see Exhibit D in section L for claims development margins).

E.2 Booked results for the prior valuation implementation

It is helpful to consider how the portfolio looked after the **prior valuation** was implemented. In this case, the **May 2019 booked results** were **based on** assumptions derived from **the prior (March 31, 2019) valuation** and were discussed in the associated monthly Actuarial Highlights.

The charts below show the associated levels of claim liabilities[20] booked by accident year. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the then-current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	118,535	58.6%
ibnr	68,681	33.9%
M/S apv adjust.	15,231	7.5%
M/S total	202,447	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	59,598	85.7%
prem def/(dpac)	5,680	8.2%
M/S apv adjust.	4,237	6.1%
M/S total	69,515	100.0%

policy liabilities ($000s)

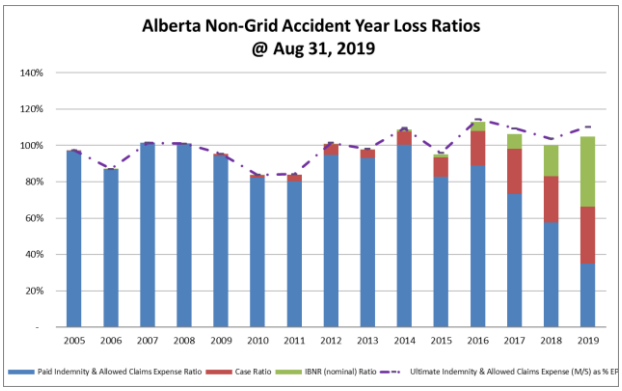
	amt	%
claim	187,216	68.8%
premium	65,278	24.0%
M/S apv adjust.	19,468	7.2%
M/S total	271,962	100.0%

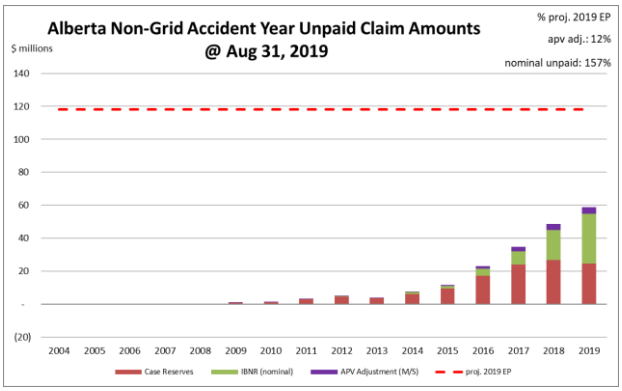
E.3 Booked results for the current valuation implementation

The **August 2019 booked results** were **based on** assumptions derived from **the current (June 30, 2019) valuation** and are discussed in the associated monthly Actuarial Highlights.

The charts at the top of the next page show the levels of claim liabilities booked by accident year on that basis. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.

[20] *Claim liabilities refer to provision for unpaid indemnity and allowed claims expenses. Allowed claims expenses are first party legal and other expenses as listed in the RSP Claims Guide. Claims expenses paid through the Member company expense allowance are NOT included in this discussion.*





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	121,345	60.8%
ibnr	63,598	31.9%
M/S apv adjust.	14,553	7.3%
M/S total	199,496	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	61,067	88.4%
prem def/(dpac)	3,771	5.5%
M/S apv adjust.	4,279	6.2%
M/S total	69,117	100.0%

policy liabilities ($000s)

	amt	%
claim	184,943	68.9%
premium	64,838	24.1%
M/S apv adjust.	18,832	7.0%
M/S total	268,613	100.0%

E.4 Actual vs Projected (AvsP)

Variances in projected recorded and paid emergence and the associated actual emergence is presented in the two following tables.

Recorded Emergence

Alberta Non-Grid RSP

	Third Party Liability			Accident Benefits			Other Coverages			Total		
	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected
Accident Year	[1]	[2]	[3] =[2]-[1]	[4]	[5]	[6] =[5]-[4]	[7]	[8]	[9] =[8]-[7]	[10] =[1]+[4]+[7]	[11] =[2]+[5]+[8]	[12] =[11]-[10]
2014 & Prior	305	185	(120)	-	(758)	(758)	9	7	(2)	314	(566)	(880)
2015	376	(233)	(609)	3	-	(3)	6	(5)	(11)	385	(238)	(623)
2016	888	157	(731)	4	(127)	(131)	16	(291)	(307)	908	(261)	(1,169)
2017	2,271	671	(1,600)	4	67	63	(256)	(416)	(160)	2,019	322	(1,697)
2018	4,243	1,610	(2,633)	17	(28)	(45)	(2,462)	(3,256)	(794)	1,798	(1,674)	(3,472)
2019	10,112	7,915	(2,197)	1,580	1,539	(41)	9,280	8,406	(874)	20,972	17,860	(3,112)
Total	**18,195**	**10,305**	**(7,890)**	**1,608**	**693**	**(915)**	**6,593**	**4,445**	**(2,148)**	**26,396**	**15,443**	**(10,953)**
2018 & prior	8,083	2,390	(5,693)	28	(846)	(874)	(2,687)	(3,961)	(1,274)	5,424	(2,417)	(7,841)

*projected recorded claims based on Recorded to Ultimate emergence model as at 2019-Q1

As indicated above, total recorded emergence at $15.4 million was $11.0 million (41.5%) less than the $26.4 million projected.

Favourable recent accident year third party liability is driven by low levels of recent accident year **bodily injury recorded claims experience** and favourable claims settlements.

Paid Emergence

Alberta Non-Grid RSP

Accident Year	Third Party Liability: Projected Paid Claims in 2019-Q2 [13]	Third Party Liability: Actual Paid Claims in 2019-Q2 [14]	Third Party Liability: Actual Less Projected [15] =[14]-[13]	Accident Benefits: Projected Paid Claims in 2019-Q2 [16]	Accident Benefits: Actual Paid Claims in 2019-Q2 [17]	Accident Benefits: Actual Less Projected [18] =[17]-[16]	Other Coverages: Projected Paid Claims in 2019-Q2 [19]	Other Coverages: Actual Paid Claims in 2019-Q2 [20]	Other Coverages: Actual Less Projected [21] =[20]-[19]	Total: Projected Paid Claims in 2019-Q2 [22] =[13]+[16]+[19]	Total: Actual Paid Claims in 2019-Q2 [23] =[14]+[17]+[20]	Total: Actual Less Projected [24] =[23]-[22]
2014 & Prior	2,765	2,978	213	247	18	(229)	151	9	(142)	3,163	3,005	(158)
2015	1,190	609	(581)	3	-	(3)	55	(35)	(90)	1,248	574	(674)
2016	1,267	1,433	166	17	(63)	(80)	43	(241)	(284)	1,327	1,129	(198)
2017	3,146	1,361	(1,785)	142	188	46	(310)	(362)	(52)	2,978	1,187	(1,791)
2018	3,495	2,039	(1,456)	755	670	(85)	(661)	(1,309)	(648)	3,589	1,400	(2,189)
2019	2,727	2,406	(321)	646	663	17	9,872	9,088	(784)	13,245	12,157	(1,088)
Total	**14,590**	**10,826**	**(3,764)**	**1,810**	**1,476**	**(334)**	**9,150**	**7,150**	**(2,000)**	**25,550**	**19,452**	**(6,098)**
2018 & prior	11,863	8,420	(3,443)	1,164	813	(351)	(722)	(1,938)	(1,216)	12,305	7,295	(5,010)

*projected paid claims based on Paid to Ultimate emergence model as at 2019-Q1

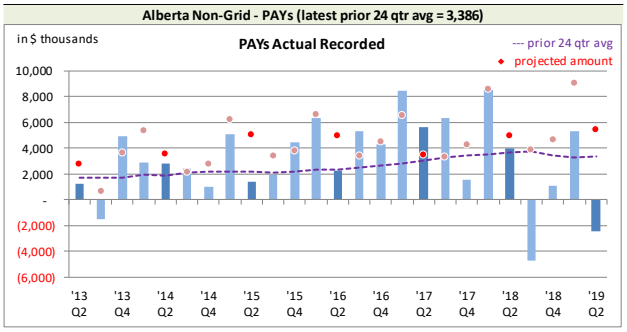
As indicated above, total paid emergence at $19.5 million was $6.1 million (23.9%) less than the $25.6 million projected.

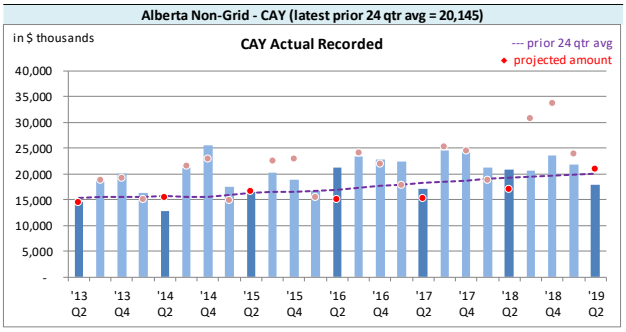
Additional detail and summary charts akin to those found in the monthly Actuarial Highlights are presented in the sections that follow.

E.4.1 AvsP: Recorded Indemnity & Allowed Claims Expense

Actual **recorded** activity (**paid** and case reserve changes) over the last 25-calendar quarters is shown in the charts below, including the prior 24 quarter average level.

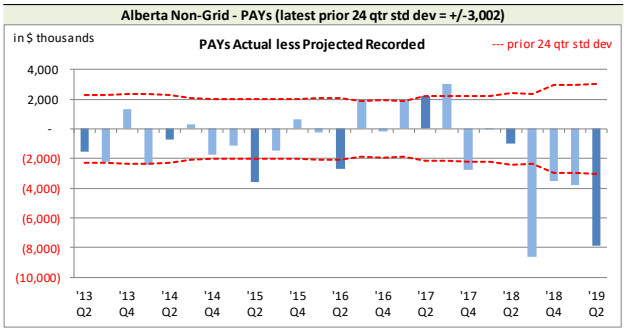
*Alberta Non-Grid RSP Actual **Recorded** by Calendar Quarter*

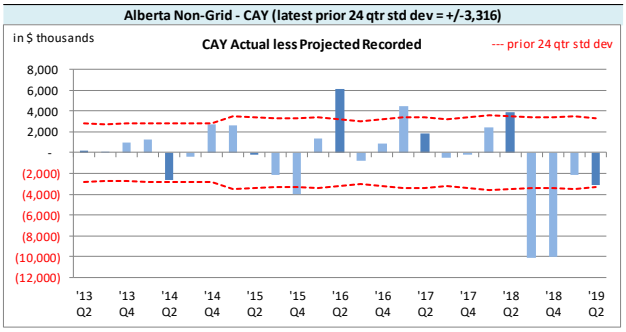




Recorded activity variances from the previous quarter's projections are shown in the charts at the top of the next page, including the prior 24-quarter standard deviation levels.

*Alberta Non-Grid RSP Actual vs Projected Summary: **Recorded** Variances by Calendar Quarter*





On Latest $ thousands		
Recorded	PAYs	CAY
Actual less Projected Recorded	3,386	20,145
std dev	3,002	3,316
A-P <> std dev	12	6
% <> std dev	48.0%	24.0%
norm <> std dev	31.7%	31.7%

With respect to **recorded** indemnity & allowed claims expense, the prior accident years' (PAYs) variances (left chart above) fell outside of one standard deviation 48% of the time, suggesting the projection process has performed no better than projecting the prior 24-quarter average amount. Bias[21] has been indicated at the 95% confidence level with 7 times in the past 25 quarters where actuals were higher than our projections for the PAYs **recorded** amount.

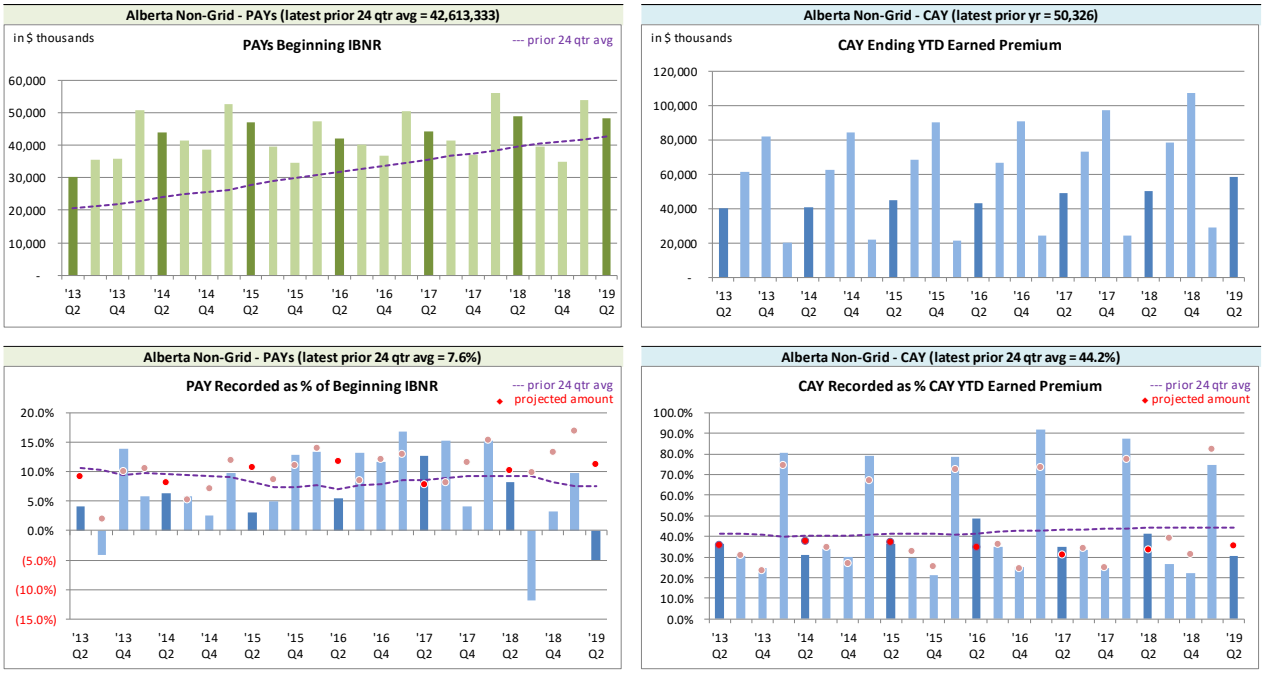
The PAYs **recorded** variance fell outside of the one standard deviation band during the latest quarter. The variance was reviewed and confirmed, with the variance attributed to process variance.

The current accident year (CAY) **recorded** variances (right chart above) fell outside of one standard deviation 24% of the time suggesting that the projection process has performed better than simply projecting the prior 24-quarter average amount. As well, there does not appear to be evidence of bias in the projection process.

We have included, for reference, additional charts at the top of the next page related to levels influencing **recorded** activity.

[21] *For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the recorded projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

Alberta Non-Grid RSP Levels that influence[22] ***Recorded*** *activity by Calendar Quarter*



We track beginning PAYs' IBNR as **recorded** activity comes out of IBNR. Changes in the PAYs' beginning IBNR (see upper left chart above) occur for several possible reasons:

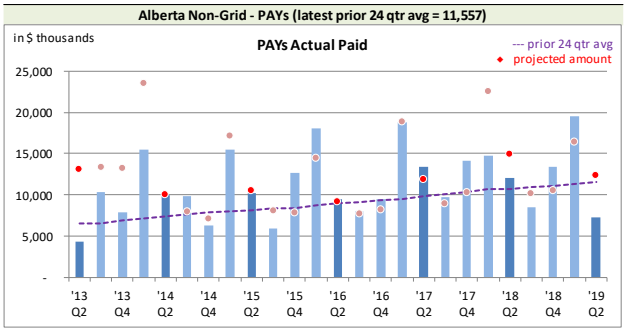
- to offset actual **recorded** activity (through loss ratio matching);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

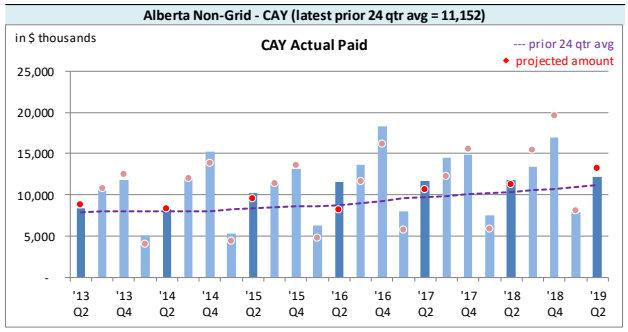
E.4.2 AvsP: Paid Indemnity & Allowed Claims Expense

The charts at the top of the next page show actual **paid** activity in each of the most recent 25 calendar quarters, along with a prior 24-quarter average to show how each quarter's actual compares with the average amount of the preceding 24 calendar quarters.

[22] *Our recorded activity projections are based on selected ratios of life-to-date recorded activity to ultimate, converted to a "recorded to beginning IBNR" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

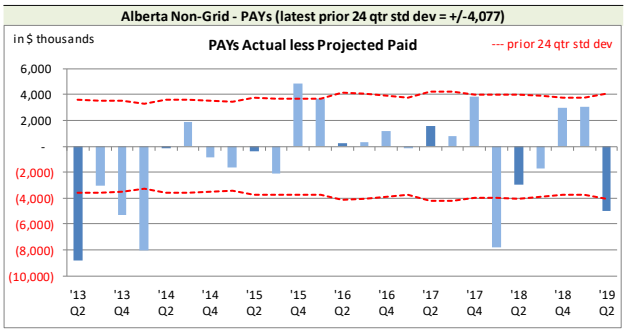
*Alberta Non-Grid RSP Actual **Paid** activity by Calendar Quarter*

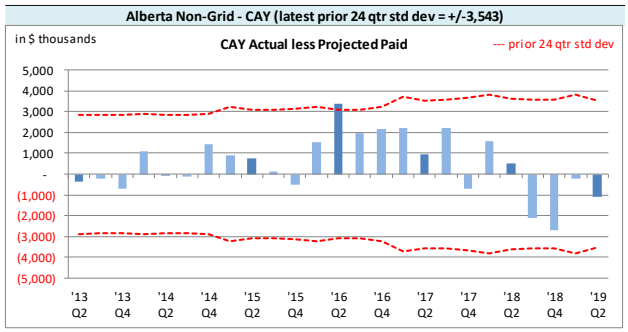




The charts below show the actual less projected **paid** variances for the last 25 calendar quarters, along with bands for the prior 24-quarter standard deviations to show how the variances from projection compare with historical standard deviations.

*Alberta Non-Grid RSP Actual vs Projected Summary: **Paid** Variances by Calendar Quarter*





On Latest $ thousands		
Paid	PAYs	CAY
Qtrly Avg Paid (prior 24 qtrs)	11,557	11,152
std dev	4,077	3,543
A-P <> std dev	6	1
% <> std dev	24.0%	4.0%
norm <> std dev	31.7%	31.7%

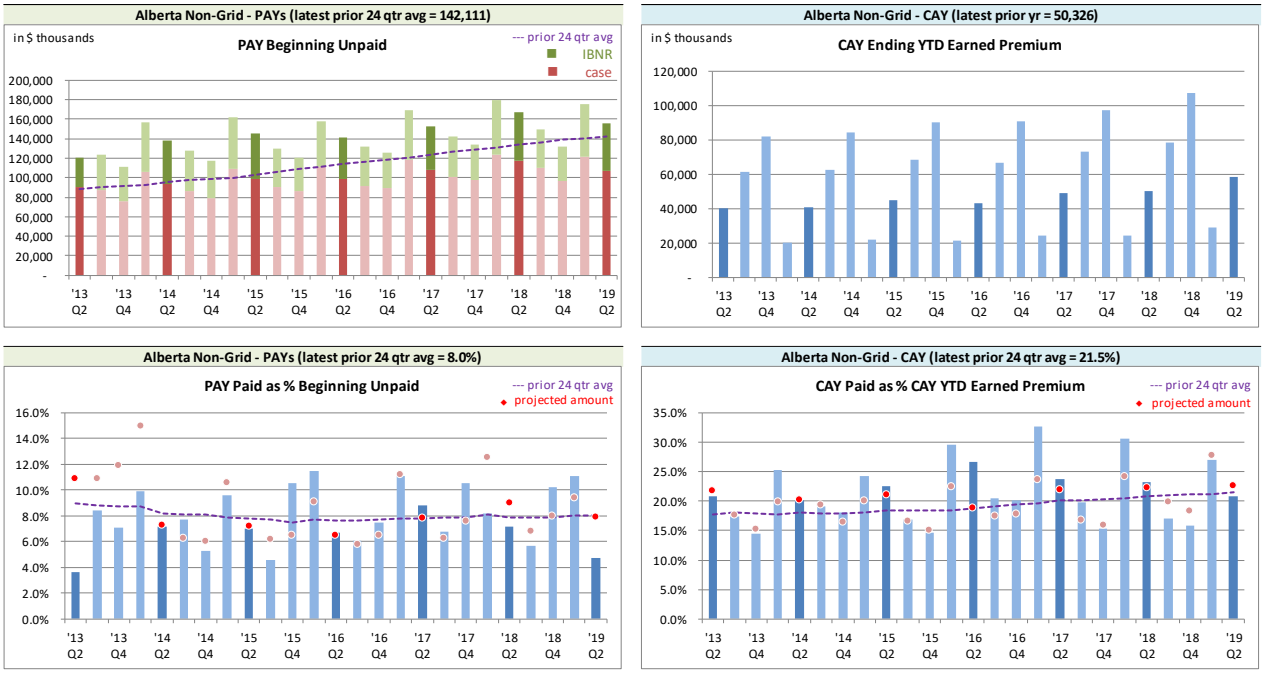
With respect to **paid** indemnity & allowed claims expense prior accident years' (PAYs) variances (left chart above), 24% of the variances have fallen outside of one standard deviation, suggesting the projection process has performed better than projecting simply based on the preceding 24-month average. With 11 times of the past 25 quarters where actuals were higher than projected, there does not appear to be evidence of bias in the projection process.

The PAYs **recorded** variance fell outside of the one standard deviation band during the latest quarter. The variance was reviewed and confirmed, with the variance attributed to process variance.

The current accident year (CAY) **paid** projection variances had 4% outside of one standard deviation, suggesting the projection process has performed better than simply projecting the prior 24-quarter average amount. That said, up until 2017-Q4, there may have been some projection bias (actuals tending to be higher than projections), which may suggest the CAY selections have been deficient.

We have included, for reference, additional charts at the top of the next page related to levels influencing **paid** activity.

*Alberta Non-Grid RSP Levels that influence[23] **Paid** activity by Calendar Quarter*



We track beginning PAYs' unpaid balance (case and IBNR) as **paid** activity "comes out of" the unpaid balance. Changes in the PAYs' beginning unpaid balance (see upper left chart above) occur for several possible reasons:

- to offset actual **paid** activity (may reduce case or IBNR or both);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

We do not believe we can draw consistent conclusions from metrics provided in the charts above at this time.

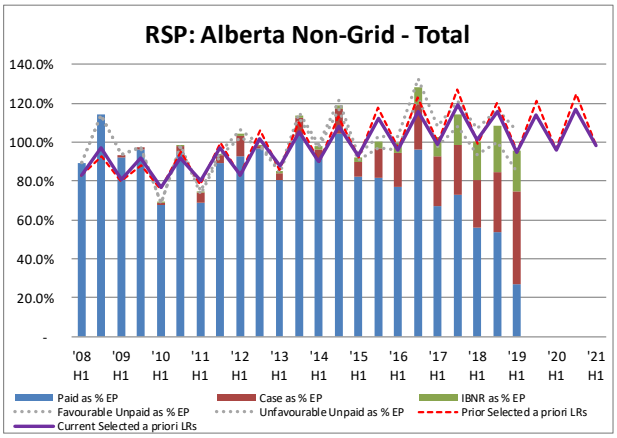
E.5 a priori method

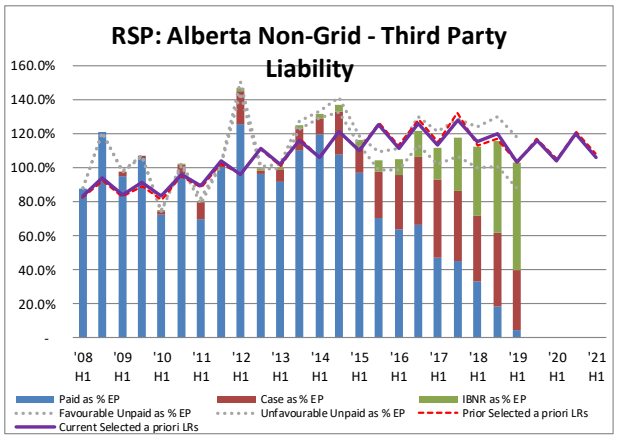
FA leverages the a priori method as one of the primary valuation methodologies, estimating ultimate by multiplying earned premium by a selected a priori loss ratio.

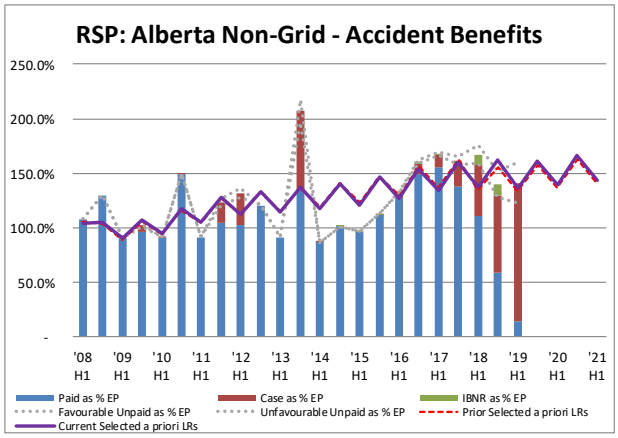
The Alberta Non-Grid RSP a priori loss ratios were updated as discussed below and are presented in the B.1.4, B.2.3, B.3.3, and B.4.3 exhibits in section L.

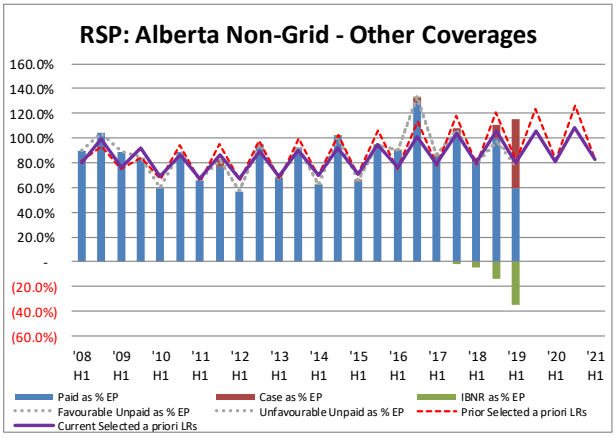
This valuation's a priori loss ratios are summarized in the charts and table at the top of the next page (by Government Line and accident half-year), with a comparison to the last valuation a priori loss ratios.

[23] *Our paid projections are based on selected ratios of life-to-date paid activity to ultimate, converted to a "paid to beginning unpaid" ratio, ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*









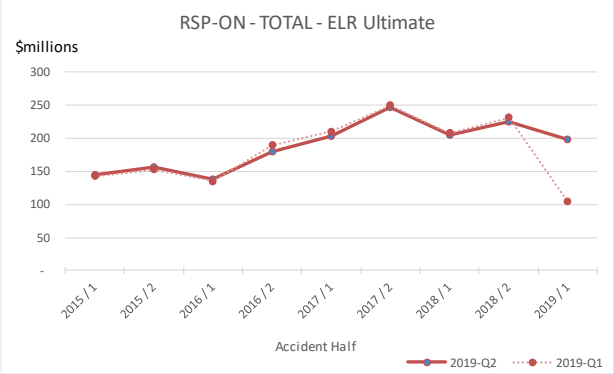
	CURRENT				PRIOR				CHANGE			
Accident Period	Third Party Liability	Accident Benefits	Other Coverages	Total	Third Party Liability	Accident Benefits	Other Coverages	Total	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 / 1	106.0%	117.0%	70.0%	90.0%	106.0%	119.0%	69.0%	90.0%	-	(2.0%)	1.0%	-
2014 / 2	121.0%	140.0%	92.0%	108.0%	121.0%	141.0%	102.0%	113.0%	-	(1.0%)	(10.0%)	(5.0%)
2015 / 1	110.0%	121.0%	71.0%	93.0%	110.0%	123.0%	70.0%	92.0%	-	(2.0%)	1.0%	1.0%
2015 / 2	125.0%	146.0%	95.0%	112.0%	126.0%	147.0%	106.0%	118.0%	(1.0%)	(1.0%)	(11.0%)	(6.0%)
2016 / 1	111.0%	127.0%	76.0%	96.0%	113.0%	129.0%	75.0%	97.0%	(2.0%)	(2.0%)	1.0%	(1.0%)
2016 / 2	126.0%	154.0%	101.0%	116.0%	128.0%	156.0%	113.0%	123.0%	(2.0%)	(2.0%)	(12.0%)	(7.0%)
2017 / 1	113.0%	134.0%	79.0%	99.0%	115.0%	137.0%	78.0%	100.0%	(2.0%)	(3.0%)	1.0%	(1.0%)
2017 / 2	128.0%	160.0%	104.0%	119.0%	132.0%	163.0%	118.0%	127.0%	(4.0%)	(3.0%)	(14.0%)	(8.0%)
2018 / 1	115.0%	137.0%	80.0%	101.0%	113.0%	135.0%	79.0%	99.0%	2.0%	2.0%	1.0%	2.0%
2018 / 2	120.0%	162.0%	106.0%	116.0%	117.0%	155.0%	121.0%	120.0%	3.0%	7.0%	(15.0%)	(4.0%)
2019 / 1	103.0%	136.0%	80.0%	95.0%	103.0%	133.0%	81.0%	95.0%	-	3.0%	(1.0%)	-
2019 / 2	116.0%	161.0%	106.0%	114.0%	117.0%	157.0%	123.0%	121.0%	(1.0%)	4.0%	(17.0%)	(7.0%)
2020 / 1	104.0%	139.0%	81.0%	96.0%	105.0%	137.0%	82.0%	96.0%	(1.0%)	2.0%	(1.0%)	-
2020 / 2	120.0%	166.0%	108.0%	117.0%	121.0%	163.0%	126.0%	125.0%	(1.0%)	3.0%	(18.0%)	(8.0%)
2021 / 1	106.0%	143.0%	83.0%	98.0%	108.0%	141.0%	84.0%	99.0%	(2.0%)	2.0%	(1.0%)	(1.0%)

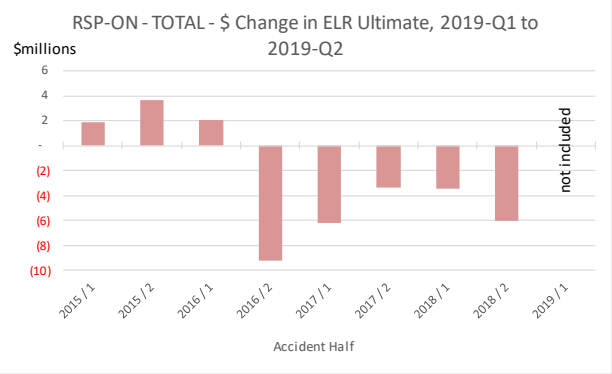
The valuation results used to form the basis of the a priori estimates for the June 30, 2019 valuation were updated to use selected ultimates from the March 31, 2019 valuation. Trend structure models based on industry indemnity results as at December 31, 2018 were used (for the prior valuation a priori loss ratio assumptions, trend structure models based on industry indemnity results as at June 30, 2018 were used).

The impact of changes in the a priori (expected) method loss ratios are shown across all coverages in the charts at the top of the next page. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a

$14.1 million decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

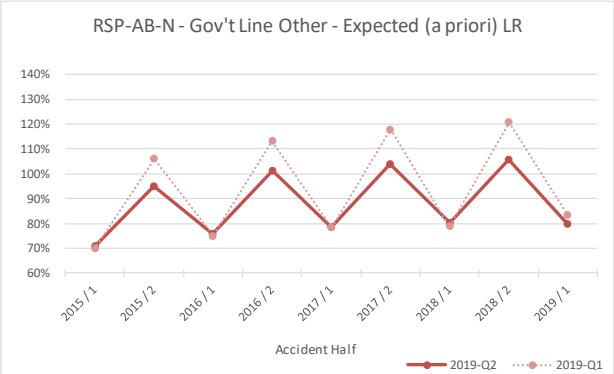
Alberta non-Grid RSP – TOTAL - a priori method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

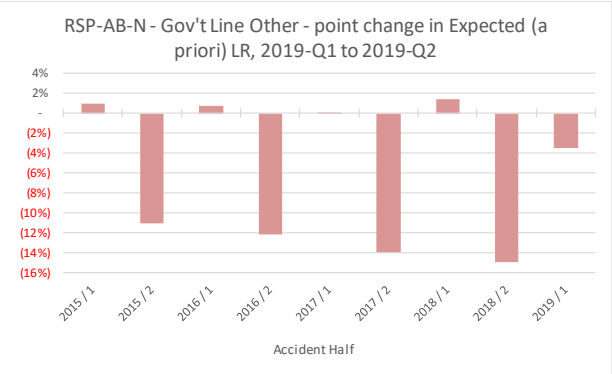




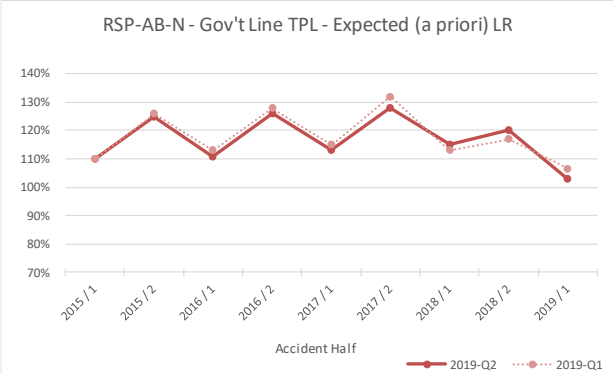
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for PAYs 2015-2018 inclusive, Other accounted for the largest overall change (decrease of $11.2 million), followed by TPL (decrease of $2.8 million) then AccBen (decrease of $0.1 million). A priori method loss ratios and the associated point changes are shown below for Government Lines Other and TPL. ***Note that the scales differ in each chart***. For Government Line Other, the reduction in the loss ratio was influenced by the FA selected trend models reacting to new data and decreasing the intensity of seasonality adjustments for the sub-coverages / coverages making up the Government Line.

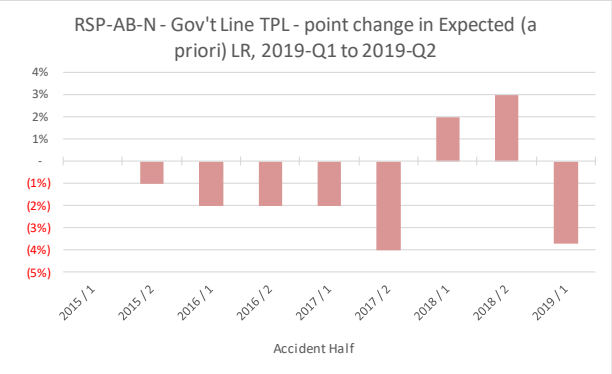
Alberta non-Grid RSP – Gov't Line Other – a priori method loss ratio comparisons – levels (left) and point change (right)





Alberta non-Grid RSP – Gov't Line TPL – a priori method loss ratio comparisons – levels (left) and point change (right)



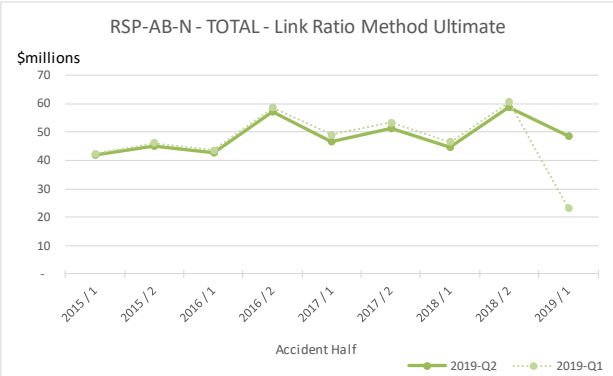


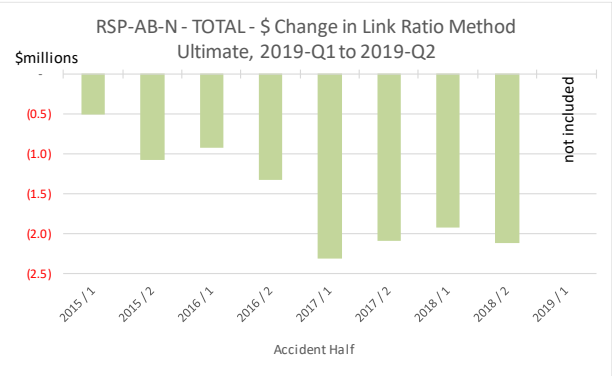
E.6 Link Ratio method

FA leverages the link ratio (also referred to as the chain ladder) method as one of the primary valuation methodologies, estimating ultimate by multiplying recorded claims amounts by development age selected link ratios (also referred to as development factors). Development age link ratios are selected taking into account historic values and other information as deemed appropriate. Changes in estimates of ultimate via this method can arise because of differing emergence relative to emergence implied by previous link ratio selections, as well as updated link ratio selections.

The impact of changes in the Link Ratio method loss ratios are shown across all coverages in the charts below. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a $12.3 million decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

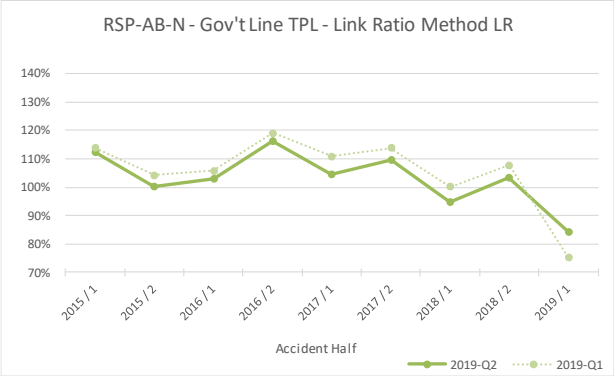
Alberta non-Grid RSP – TOTAL – Link Ratio method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

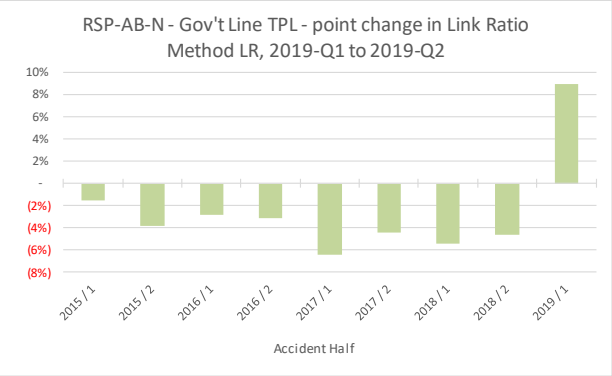




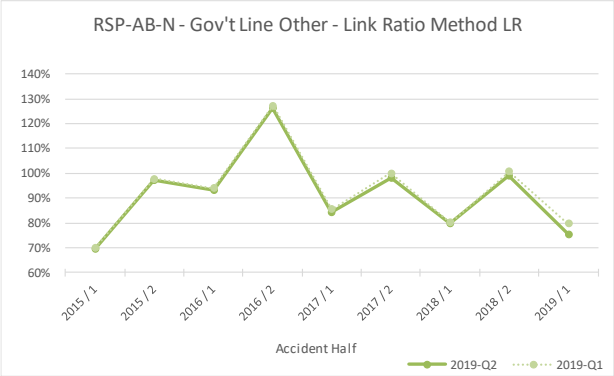
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines, and for Prior Accident years 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $9.6 million), followed by Other (decrease of $2.5 million) then AccBen (decrease of $0.1 million). Link Ratio method loss ratios and the associated point changes are shown at the top of the next page for Government Lines TPL and Other. ***Note that the scales differ in each chart***.

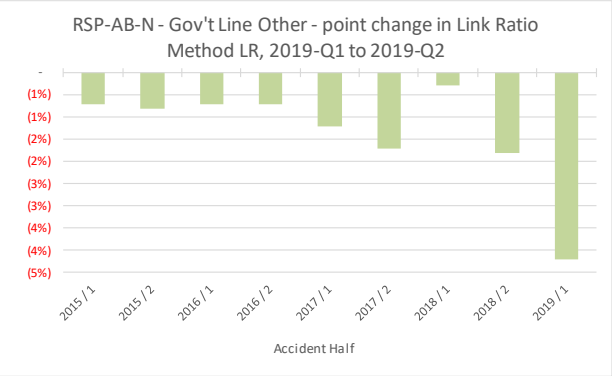
Alberta non-Grid RSP –Gov't Line TPL – Link Ratio method loss ratio comparisons – levels (left) and point change (right)





Alberta non-Grid RSP –Gov't Line Other – Link Ratio method loss ratio comparisons – levels (left) and point change (right)



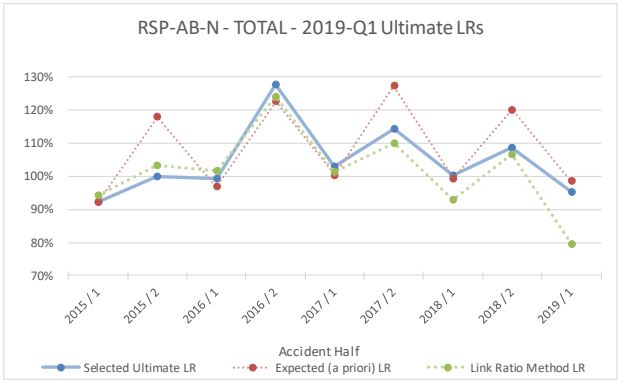


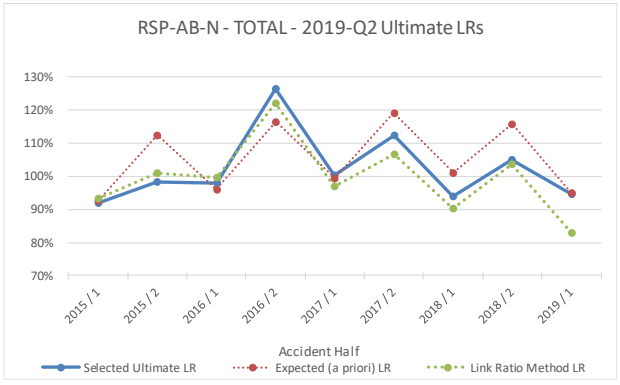
E.7 Current valuation IBNR / ultimate selections

Exhibit B.1.1 (see section L for all exhibits) summarizes the overall change in ultimate with this valuation and B.1.2 shows selected loss ratios over the most recent 4 valuations for comparison purposes on an all coverages basis. The B.2 exhibits provide information for third party liability, B.3 exhibits for accident benefits, and B.4 exhibits for the Other Government Line.

Using the a priori method and Link Ratio method as the primary methodologies, the Appointed Actuary will select from these methods, weighted averages of these methods (which include the B/F as a weighting methodology), or may choose a zero-IBNR selection. For the more recent accident halfs, weighted averages of the two primary methods are employed, as indicated in the charts at the top of the next page, where we show the prior valuation selections on the left and the current valuation selections on the right.

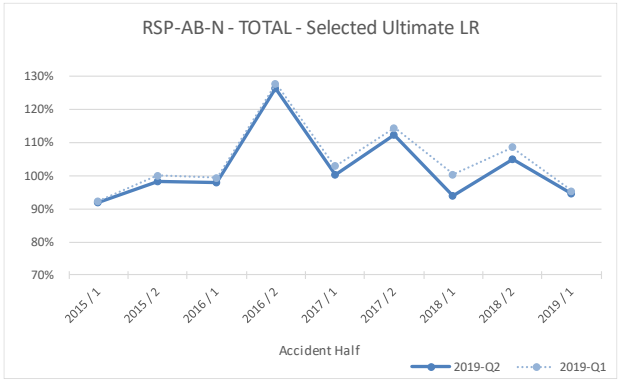
Alberta non-Grid RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)

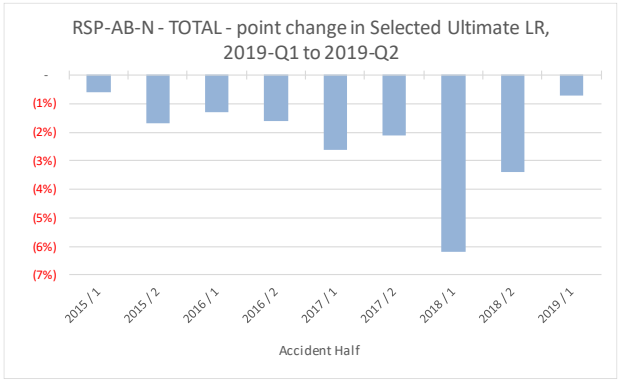




Focusing on the loss ratios based on selected ultimates, the left chart below shows the reduction in the total (all coverages) loss ratio selected from the 2019-Q1 valuation (dotted line) to the 2019-Q2 valuation (solid blue line). We show the loss ratio point change in the chart on the right, varying from a decrease of 0.6 points (2015-H1) to a decrease of 6.2 points (2018-H1)

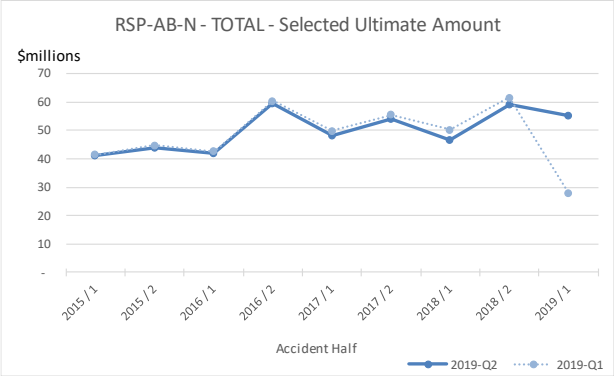
Alberta non-Grid RSP – Selected ultimate loss ratios – level (left) and point change from prior valuation (right)

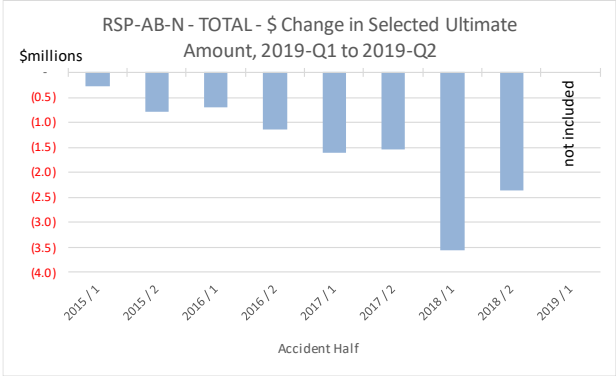




On average over the accident halfs shown, earned premium was approximately $50 million and as such, changes in several points of loss ratio translate to millions of dollars in ultimate estimate changes, as shown in the next charts. (Note that as 2019-H1 was only a partial half year at the 2019-Q1 valuation, the ultimate loss amount is not directly comparable to the amount selected at 2019-Q2 – hence, we do not include the associated change in the chart on the right). The total change shown in the chart on the right is a decrease of $12.0 million, accounting for over 80% of the $14.3 million total prior accident year changes during the quarter.

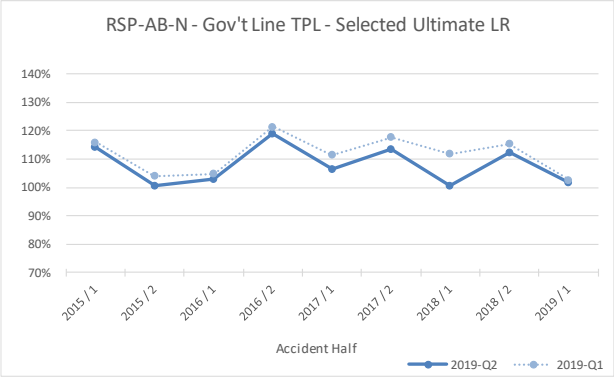
Alberta non-Grid RSP – All Coverages Selected ultimate amounts – level (left) and amount change from prior valuation (right)

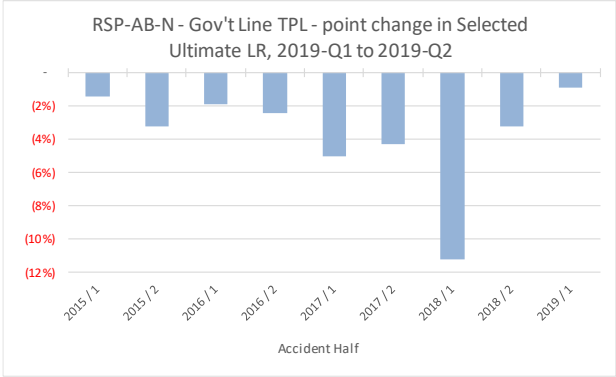




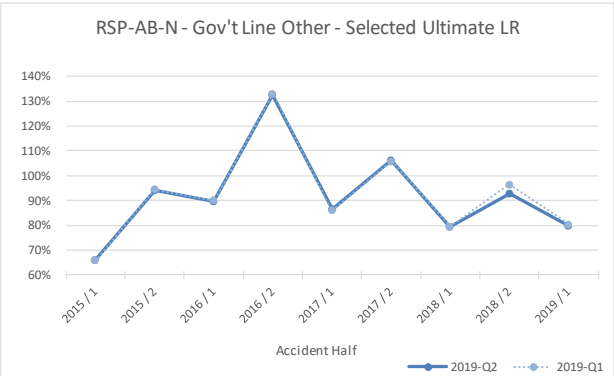
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for Prior Accident years 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $9.8 million), followed by Other (decrease of $1.9 million) then AccBen (decrease of $0.3 million). Selected ultimate loss ratios and the associated point changes are shown below for Government Lines TPL and Other. ***Note that the scales differ in each chart.***

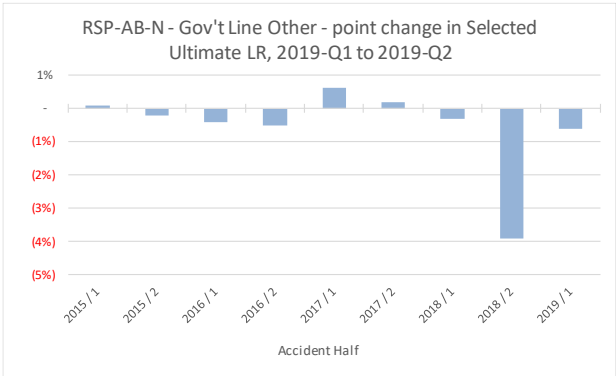
Alberta non-Grid RSP – Gov't Line TPL – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





Alberta non-Grid RSP –Gov't Line Other – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





E.8 Premium Liabilities / Future Accident Years

In order to provide a basis for estimating the full premium liability level for monthly statements (i.e. the level of premium deficiency liability / deferred policy acquisition cost asset to carry) we leverage the a priori loss ratios for the accident year underlying the unearned premium levels.

The test of recoverability leverages assumptions that are set by the Appointed Actuary. These include the Member expense allowances (taking into account the Board approved allowances) and policy administration / maintenance expense assumptions.

E.9 Actuarial Present Value Adjustments

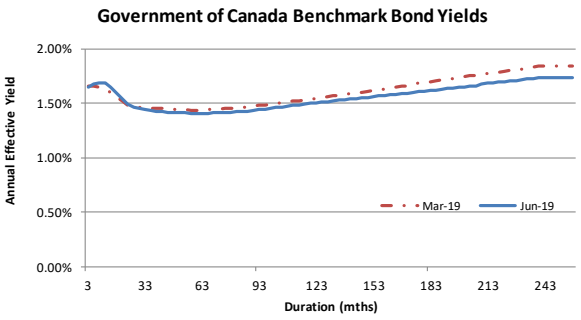
E.9.1 Selected Claims Payment Patterns

Payment patterns are selected through the emergence models (the same used for projecting future claims paid and recorded activity for the AvsP process), leveraging a "paid to ultimate" metric.

E.9.2 Selected Discount Rate

The projected future claims paid cash flow are matched to a simulated portfolio of Government of Canada benchmark monthly bonds (yields anchored to the valuation date), and 15 basis point investment expense is assumed.

A **discount rate of 1.43%** per annum was selected for the valuation of the claim liabilities and premium liabilities at June 30, 2019, **down from 1.46%** selected with the March 31, 2019 valuation. The chart to the right shows the Government of Canada benchmark bond yield curves at March 2019 and June 2019.



Sensitivity to the discount rate assumption is presented in Exhibit C (see section L).

E.9.3 Selected Margins for Adverse Deviations

The **margin for adverse deviation** (MfADs) **for investment income** was **maintained at 25 basis points** with the current valuation.

Selected **claims development margins were reviewed** for all coverages and accident half years and these are summarized in Exhibit D (see section L). The selected claims development MfADs for one older accident year was reviewed and judgmentally reduced to reflect the decreasing uncertainty over time. **The estimated implementation impact of updating the claims development MfADs was a decrease in the nominal claims PfAD of $0.5 million.**

E.10 Special IBNR Provisions / Adjustments

There were no special IBNR provisions or adjustments included with the current valuation.

F. NEW BRUNSWICK RSP

F.1 Valuation Highlights

A summary of the valuation results through time is available in the A exhibit (see section L for all exhibits), with detail related to the current valuation provided in the B.1.1 and B.1.2 exhibits.

The **change** in selected ultimate for **prior accident years** was **$1.1 million unfavourable** with this valuation (**5.8%** of the unpaid estimate as at last quarter), bringing the **calendar year-to-date total unfavourable** to **$1.2 million** (**6.3%** of the unpaid estimate as at the beginning of the **2019 calendar year**). These changes are presented by accident year and Government Line in the tables below.

New Brunswick RSP - valuation changes in selected ultimate (favourable) / unfavourable **during Quarter**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(197)	(2)	(6)	(205)
2015	(158)	-	(4)	(162)
2016	(254)	(76)	(3)	(333)
2017	46	(102)	(8)	(64)
2018	(249)	(40)	(45)	(334)
TOTAL	(812)	(220)	(66)	(1,098)

New Brunswick RSP - valuation changes in selected ultimate (favourable) / unfavourable **YTD**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	(172)	(355)	169	(358)
2015	(186)	(1)	(4)	(191)
2016	(202)	(74)	(10)	(286)
2017	46	(105)	(13)	(72)
2018	(329)	106	(68)	(291)
TOTAL	(843)	(429)	74	(1,198)

The current valuation incorporates updated trend assumptions and industry loss development factors selected using New Brunswick PPV AIX 2018-H2 data.

Caution must be exercised in reviewing the variances as this is a small pool and single claim transactions that are normal course for the business may look unusual and generate relatively significant variances that in nominal value terms are not that significant overall.

The **selected loss ratio** for **accident year 2019** (current accident year; AY2019) decreased 2.9 points to 73.6% and **accident year 2020** (future accident year; AY2020) decreased 4.5 points to 73.0%, with the changes impacted by updated a priori loss ratio selections as a result of using updated trend assumptions.

Summary descriptions of recent regulatory and legislative initiatives are available in section I.

The valuation process is described in more detail in section K, and a summary of changes to the process during this fiscal year is provided in section H.

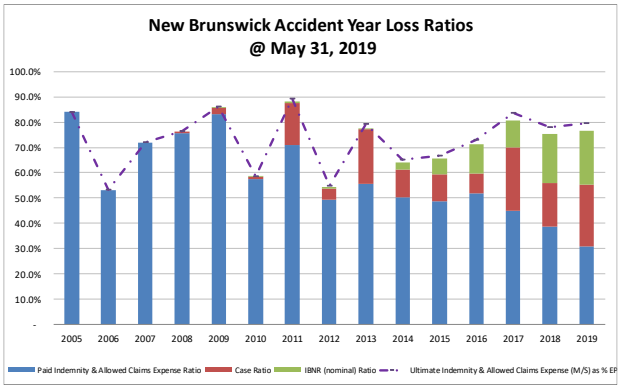
Policy liability projected cash flows and June 2019 government of Canada bond yields were used to determine the applicable discount rate. The selected investment income margin for adverse deviation (MfAD) was maintained at 25 basis points with the current valuation.

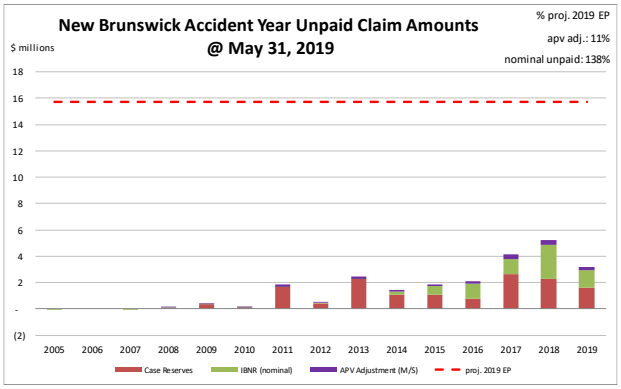
Selected claims development margins for all coverages and accident years were reviewed with the current valuation. In particular, selected claims development MfADs for on older accident year were reviewed and judgmentally reduced to reflect the decreasing uncertainty over time (see Exhibit D in section L for claims development margins).

F.2 Booked results for the prior valuation implementation

It is helpful to consider how the portfolio looked after the **prior valuation** was implemented. In this case, the **May 2019 booked results** were **based on** assumptions derived from **the prior (March 31, 2019) valuation** and were discussed in the associated monthly Actuarial Highlights.

The charts below show the associated levels of claim liabilities[24] booked by accident year. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the then-current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	14,302	61.4%
ibnr	7,334	31.5%
M/S apv adjust.	1,664	7.1%
M/S total	23,300	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	8,114	118.9%
prem def/(dpac)	(1,681)	(24.6%)
M/S apv adjust.	390	5.7%
M/S total	6,823	100.0%

policy liabilities ($000s)

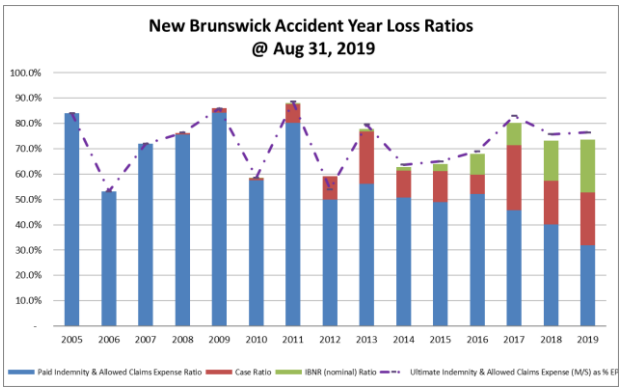
	amt	%
claim	21,636	71.8%
premium	6,433	21.4%
M/S apv adjust.	2,054	6.8%
M/S total	30,123	100.0%

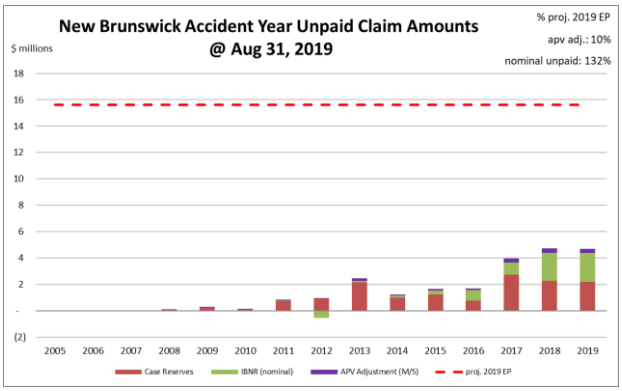
F.3 Booked results for the current valuation implementation

The **August 2019 booked results** were **based on** assumptions derived from **the current June 30, 2019) valuation** and are discussed in the associated monthly Actuarial Highlights.

The charts at the top of the next page show the levels of claim liabilities booked by accident year on that basis. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.

[24] *Claim liabilities refer to provision for unpaid indemnity and allowed claims expenses. Allowed claims expenses are first party legal and other expenses as listed in the RSP Claims Guide. Claims expenses paid through the Member company expense allowance are NOT included in this discussion.*





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	14,455	65.5%
ibnr	6,073	27.5%
M/S apv adjust.	1,530	6.9%
M/S total	22,058	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	8,738	124.3%
prem def/(dpac)	(2,105)	(29.9%)
M/S apv adjust.	397	5.6%
M/S total	7,030	100.0%

policy liabilities ($000s)

	amt	%
claim	20,528	70.6%
premium	6,633	22.8%
M/S apv adjust.	1,927	6.6%
M/S total	29,088	100.0%

F.4 Actual vs Projected (AvsP)

Variances in projected recorded and paid emergence and the associated actual emergence are presented in the two following tables.

Recorded Emergence

New Brunswick RSP

	Third Party Liability			Accident Benefits			Other Coverages			Total		
	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected
Accident Year	[1]	[2]	[3] =[2]-[1]	[4]	[5]	[6] =[5]-[4]	[7]	[8]	[9] =[8]-[7]	[10] =[1]+[4]+[7]	[11] =[2]+[5]+[8]	[12] =[11]-[10]
2014 & Prior	173	(42)	(215)	33	-	(33)	5	(2)	(7)	211	(44)	(255)
2015	88	4	(84)	3	(2)	(5)	1	-	(1)	92	2	(90)
2016	85	(10)	(95)	10	10	-	1	-	(1)	96	-	(96)
2017	92	78	(14)	13	(31)	(44)	1	(11)	(12)	106	36	(70)
2018	224	50	(174)	19	99	80	(24)	(42)	(18)	219	107	(112)
2019	1,517	998	(519)	254	111	(143)	832	856	24	2,603	1,965	(638)
Total	**2,179**	**1,078**	**(1,101)**	**332**	**187**	**(145)**	**816**	**801**	**(15)**	**3,327**	**2,066**	**(1,261)**
2018 & prior	662	80	(582)	78	76	(2)	(16)	(55)	(39)	724	101	(623)

*projected recorded claims based on Recorded to Ultimate emergence model as at 2019-Q1

As indicated above, total recorded emergence at $2.1 million was $1.3 million (37.9%) less than the $3.3 million projected.

We have previously reduced selected a priori loss ratios to address the continuing current accident year actual less projected variance (paid and recorded projections have continued to exceed actual experience),

and will continue to monitor developments as they arise.

Paid Emergence

New Brunswick RSP

	Third Party Liability			Accident Benefits			Other Coverages			Total		
Accident Year	Projected Paid Claims in 2019-Q2 [13]	Actual Paid Claims in 2019-Q2 [14]	Actual Less Projected [15] =[14]-[13]	Projected Paid Claims in 2019-Q2 [16]	Actual Paid Claims in 2019-Q2 [17]	Actual Less Projected [18] =[17]-[16]	Projected Paid Claims in 2019-Q2 [19]	Actual Paid Claims in 2019-Q2 [20]	Actual Less Projected [21] =[20]-[19]	Projected Paid Claims in 2019-Q2 [22] =[13]+[16]+[19]	Actual Paid Claims in 2019-Q2 [23] =[14]+[17]+[20]	Actual Less Projected [24] =[23]-[22]
2014 & Prior	622	(7)	(629)	52	1	(51)	13	7	(6)	687	1	(686)
2015	58	23	(35)	111	10	(101)	-	-	-	169	33	(136)
2016	69	22	(47)	31	16	(15)	1	-	(1)	101	38	(63)
2017	151	67	(84)	25	8	(17)	1	-	(1)	177	75	(102)
2018	142	89	(53)	99	41	(58)	70	24	(46)	311	154	(157)
2019	536	434	(102)	32	25	(7)	882	881	(1)	1,450	1,340	(110)
Total	**1,578**	**628**	**(950)**	**350**	**101**	**(249)**	**967**	**912**	**(55)**	**2,895**	**1,641**	**(1,254)**
2018 & prior	1,042	194	(848)	318	76	(242)	85	31	(54)	1,445	301	(1,144)

*projected paid claims based on Paid to Ultimate emergence model as at 2019-Q1

As indicated above, total paid emergence at $1.6 million was $1.3 million (43.3%) more than the $2.9 million projected.

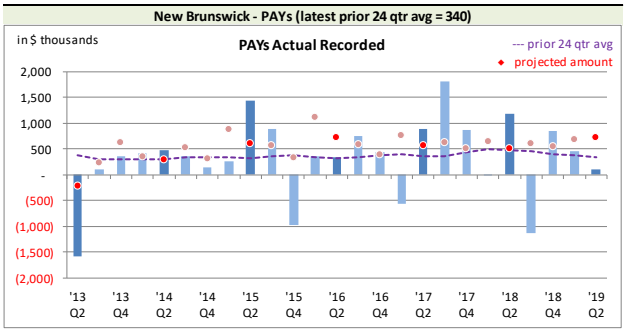
Claims transaction activity is generally volatile and differences between actual and projected claims emergence are anticipated due to this natural process variance (this is particularly true where volumes are low), caution must be exercised in reviewing the variances as this is a small pool and single claim transactions that are normal course for the business may look unusual and generate relatively significant variances that in nominal value terms are not that significant overall.

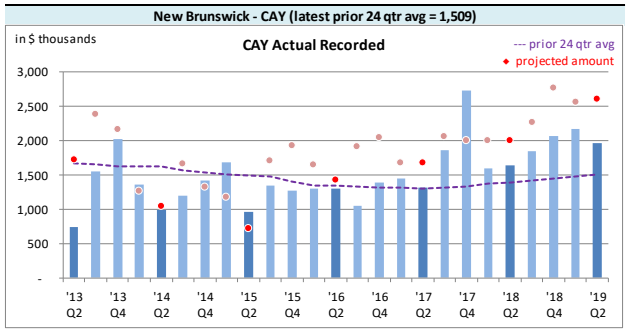
Additional detail and summary charts akin to those found in the monthly Actuarial Highlights are presented in the sections that follow.

F.4.1 AvsP: Recorded Indemnity & Allowed Claims Expense

Actual **recorded** activity (**paid** and case reserve changes) over the last 25-calendar quarters is shown in the charts below, including the "prior 24 quarter average" level.

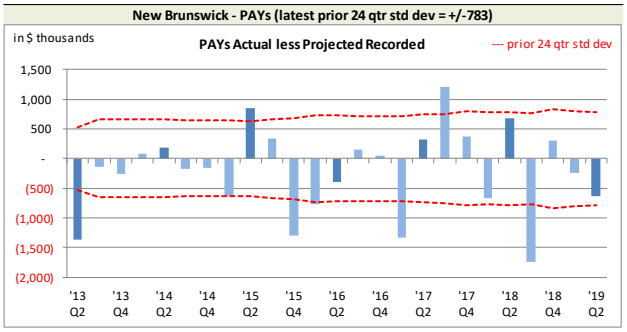
*New Brunswick RSP Actual **Recorded** by Calendar Quarter*

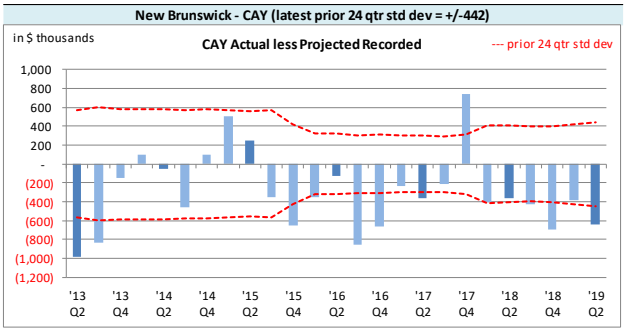




Recorded activity variances from the previous quarter's projections are shown in the charts at the top of the next page, including the "prior 24-quarter standard deviation" levels.

*New Brunswick RSP Actual vs Projected Summary: **Recorded** Variances by Calendar Quarter*





On Latest $ thousands		
Recorded	PAYs	CAY
Actual less Projected Recorded	340	1,509
std dev	783	442
A-P <> std dev	7	11
% <> std dev	28.0%	44.0%
norm <> std dev	31.7%	31.7%

With respect to **recorded** indemnity & allowed claims expense activity, the prior accident years' (PAYs) variances (left chart above) do not appear to indicate a projection bias[25]. With 28% of variances outside of one standard deviation, the results suggest that the projection process has performed not much better than simply projecting the prior 24-quarter average amount. At the current time, we do not believe the variances provide much in the way of feedback to the selections of ultimate.

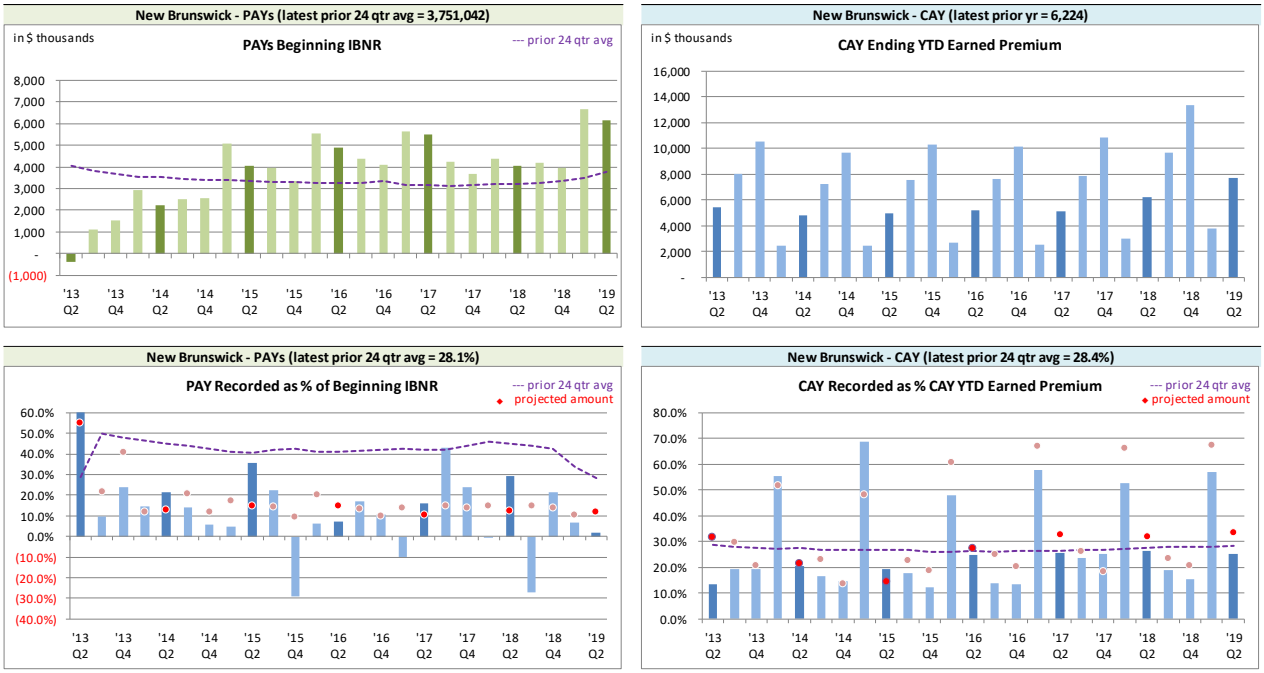
The current accident year (CAY) **recorded** variances (right chart above) fell outside of one standard deviation 44% of the time, suggesting that the projection process has performed no better than simply projecting the prior 24-quarter average amount. In addition, bias is evident, as only 5 of the last 25 quarters have had actual recorded indemnity higher than projected which is outside of a 95% confidence range, although the magnitude of the variances have not necessarily been extremely high. The high projected recorded to ytd-earned-premium ratios (bottom right chart above) compared to historical ratios suggest some shortcoming of the emergence model currently used which appears to project too high on CAY recorded activities.

The **CAY recorded** variance fell outside of the one standard deviation band during the latest quarter. The CAY recorded claims activity in the quarter was reviewed and confirmed, although with the continued favourable variances, our projection model or our parameters selected for the model appear to be likely the cause and will be reviewed.

We have included, for reference, additional charts at the top of the next page related to levels influencing **recorded** activity.

[25]*For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the recorded projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

New Brunswick RSP Levels that influence[26] ***Recorded*** *activity by Calendar Quarter*



(Note: The PAYs ratio relative to beginning IBNR is overwhelmed by the 2013 quarters where low levels of beginning IBNR were followed by recorded activity that were multiples of the IBNR level; the axis in the left chart above was limited to focus the discussion)

We track beginning PAYs' IBNR as **recorded** activity comes out of IBNR. Changes in the PAYs' beginning IBNR (see upper left chart above) occur for several possible reasons:

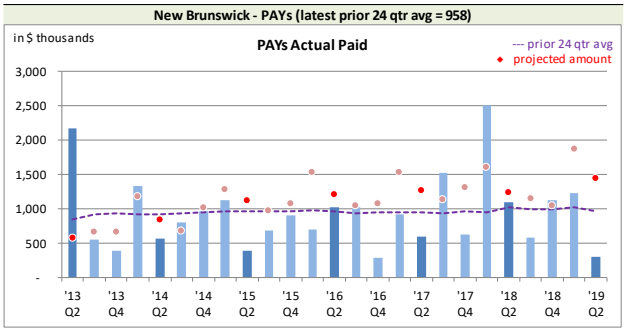
- to offset actual **recorded** activity (through loss ratio matching);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

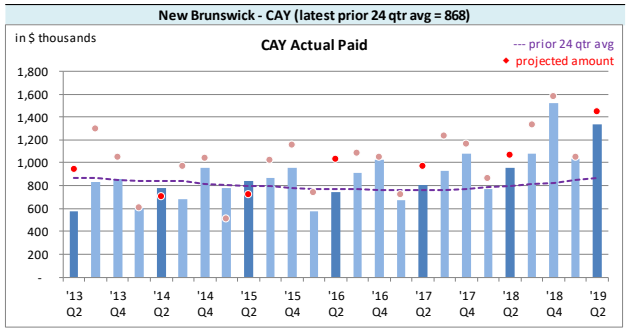
F.4.2 AvsP: Paid Indemnity & Allowed Claims Expense

The charts at the top of the next page show actual **paid** activity in each of the most recent 25 calendar quarters, along with a "prior 24-quarter average" to show how each quarter's actual compares with the average amount of the preceding 24 calendar quarters.

[26] *Our recorded activity projections are based on selected ratios of life-to-date recorded activity to ultimate, converted to a "recorded to beginning IBNR" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

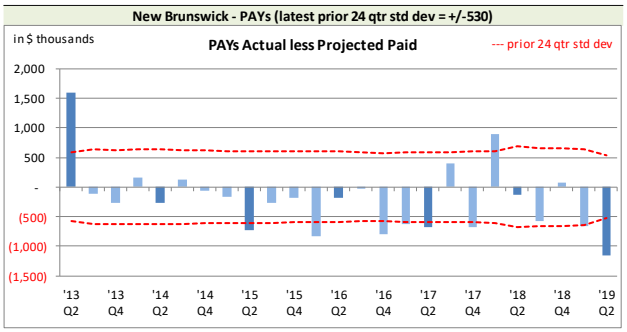
*New Brunswick RSP Actual **Paid** activity by Calendar Quarter*

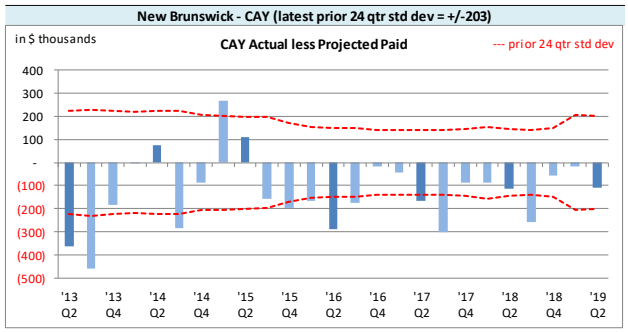




The charts below show the actual less projected **paid** variances for the last 25 calendar quarters, along with bands for the prior 24-quarter standard deviations to show how the variances from projection compare with historical standard deviations.

*New Brunswick RSP Actual vs Projected Summary: **Paid** Variances by Calendar Quarter*





On Latest $ thousands		
Paid	PAYs	CAY
Qtrly Avg Paid (prior 24 qtrs)	958	868
std dev	530	203
A-P <> std dev	10	11
% <> std dev	40.0%	44.0%
norm <> std dev	31.7%	31.7%

With respect to **paid** indemnity & allowed claims expense prior accident years' (PAYs) variances (left chart above), 40% of the variances have fallen outside of one standard deviation, suggesting the projection process has performed no better than simply projecting the preceding 24-quarter average. In addition for the **PAYs paid** amount, bias[27] has been indicated at a 95% confidence level as only 6 of 25 quarters had actuals higher than projections. We are looking into ways to improve the projections.

The PAYs **recorded** variance fell outside of the one standard deviation band during the latest quarter. The variance was reviewed and confirmed, with the variance attributed to process variance.

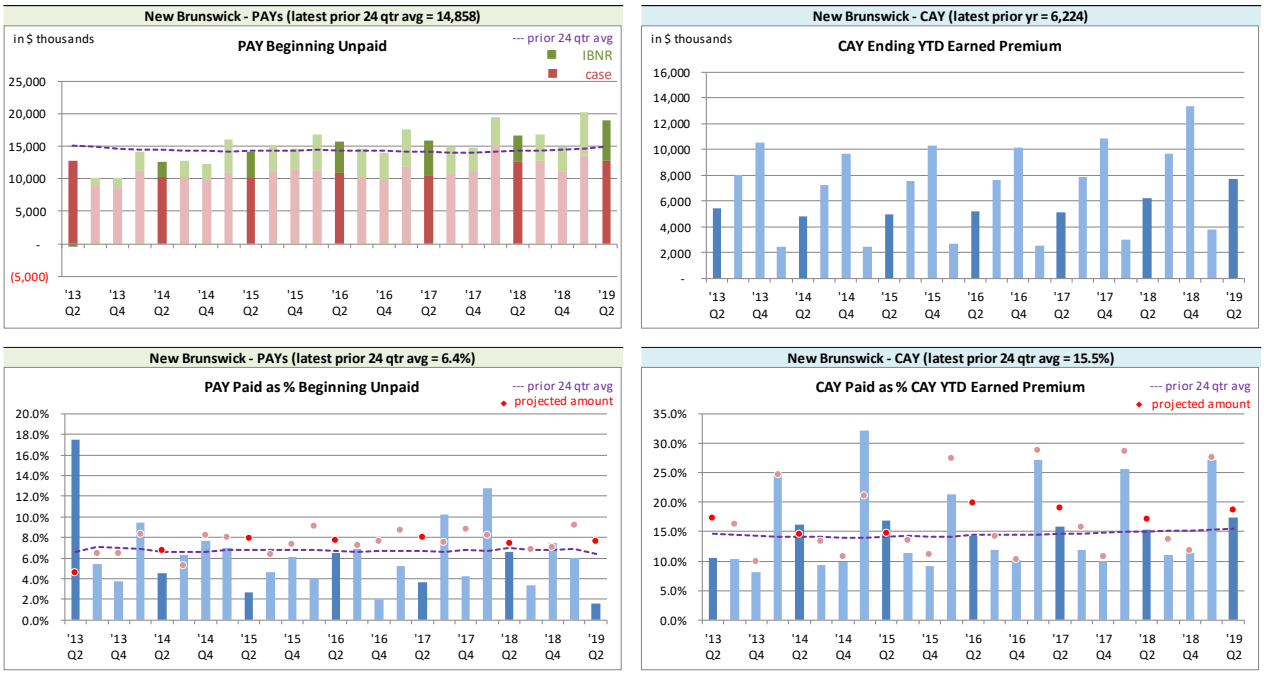
The current accident year (CAY) **paid** variances (right chart middle above) indicates evidence of bias in the projection process (with only 3 times in the past 25 quarters where actuals were higher than our projections) and as 44% of the variances fall outside one standard deviation, the projection process has performed worse than projecting simply based on the preceding 24-quarter average. The high projected

[27] *For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the paid projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

paid to ytd-earned-premium ratios (bottom right chart below) compared to historical ratios suggest some shortcoming of the emergence model currently used which appears to project too high on CAY paid activities.

We have included, for reference, additional charts below related to levels influencing **paid** activity.

*New Brunswick RSP Levels that influence[28] **Paid** activity by Calendar Quarter*



We track beginning PAYs' unpaid balance (case and IBNR) as **paid** activity comes out of the unpaid balance. Changes in the PAYs' beginning unpaid balance (see upper left chart above) occur for several possible reasons:

- to offset actual **paid** activity (may reduce case or IBNR or both);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

F.5 a priori method

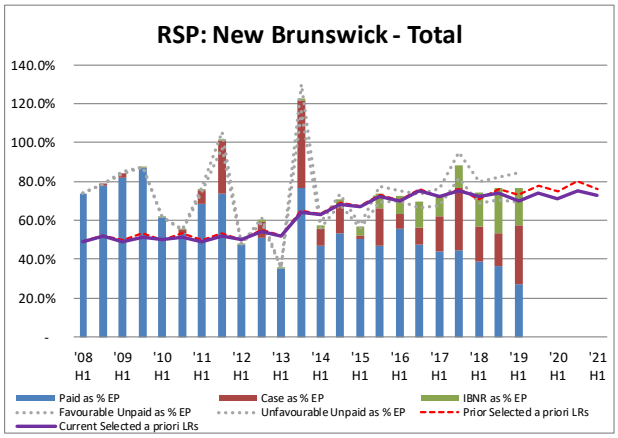
FA leverages the a priori method as one of the primary valuation methodologies, estimating ultimate by multiplying earned premium by a selected a priori loss ratio.

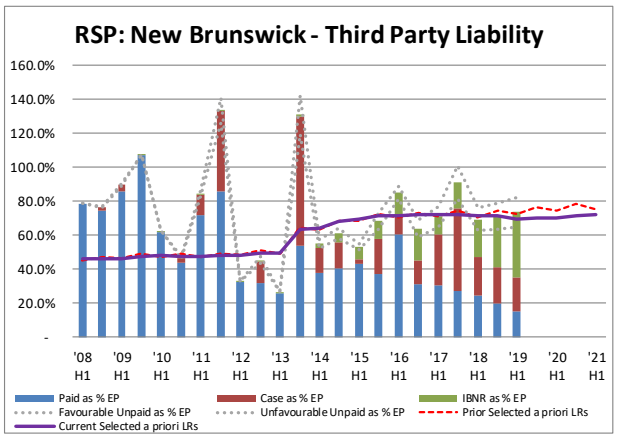
The New Brunswick RSP a priori loss ratios were updated as discussed below and are presented in the B.1.4, B.2.3, B.3.3, and B.4.3 exhibits in section L.

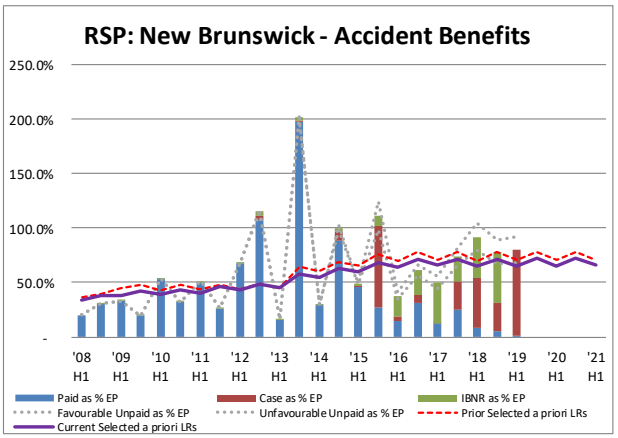
This valuation's a priori loss ratios are summarized in the charts and the table below (by Government

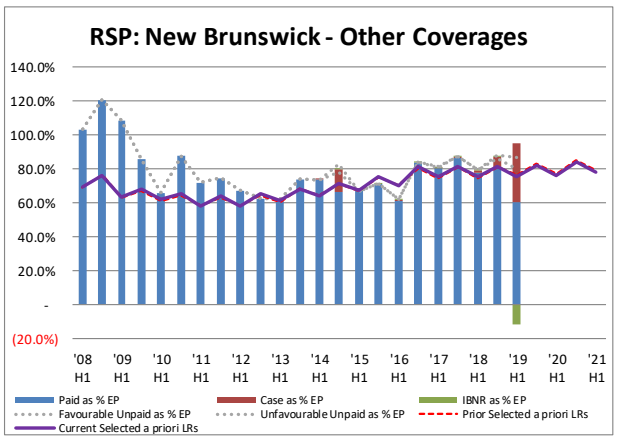
[28] *Our paid projections are based on selected ratios of life-to-date paid activity to ultimate, converted to a "paid to beginning unpaid" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

Line and accident half-year), with a comparison to the last valuation a priori loss ratios.









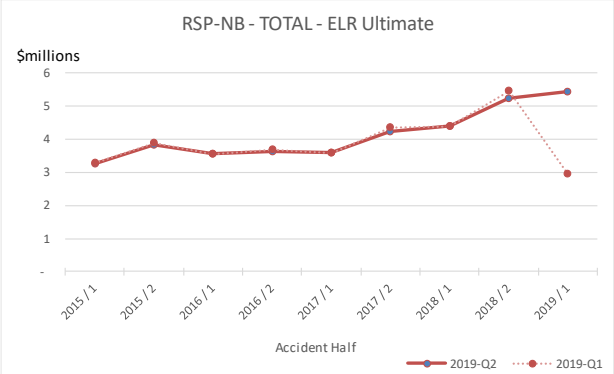
	CURRENT				PRIOR				CHANGE			
Accident Period	Third Party Liability	Accident Benefits	Other Coverages	Total	Third Party Liability	Accident Benefits	Other Coverages	Total	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 / 1	64.0%	55.0%	64.0%	63.0%	63.0%	60.0%	64.0%	63.0%	1.0%	(5.0%)	-	-
2014 / 2	68.0%	63.0%	71.0%	68.0%	68.0%	69.0%	71.0%	69.0%	-	(6.0%)	-	(1.0%)
2015 / 1	69.0%	60.0%	67.0%	67.0%	68.0%	66.0%	67.0%	67.0%	1.0%	(6.0%)	-	-
2015 / 2	71.0%	68.0%	75.0%	72.0%	72.0%	76.0%	75.0%	73.0%	(1.0%)	(8.0%)	-	(1.0%)
2016 / 1	71.0%	64.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	1.0%	(6.0%)	-	-
2016 / 2	72.0%	71.0%	81.0%	75.0%	73.0%	78.0%	80.0%	76.0%	(1.0%)	(7.0%)	1.0%	(1.0%)
2017 / 1	72.0%	66.0%	75.0%	72.0%	71.0%	71.0%	74.0%	72.0%	1.0%	(5.0%)	1.0%	-
2017 / 2	72.0%	71.0%	81.0%	75.0%	74.0%	78.0%	81.0%	76.0%	(2.0%)	(7.0%)	-	(1.0%)
2018 / 1	71.0%	65.0%	75.0%	72.0%	70.0%	70.0%	74.0%	71.0%	1.0%	(5.0%)	1.0%	1.0%
2018 / 2	71.0%	71.0%	81.0%	74.0%	74.0%	78.0%	81.0%	76.0%	(3.0%)	(7.0%)	-	(2.0%)
2019 / 1	69.0%	65.0%	75.0%	70.0%	72.0%	71.0%	76.0%	73.0%	(3.0%)	(6.0%)	(1.0%)	(3.0%)
2019 / 2	70.0%	72.0%	82.0%	74.0%	76.0%	78.0%	83.0%	78.0%	(6.0%)	(6.0%)	(1.0%)	(4.0%)
2020 / 1	70.0%	65.0%	76.0%	71.0%	74.0%	71.0%	77.0%	75.0%	(4.0%)	(6.0%)	(1.0%)	(4.0%)
2020 / 2	71.0%	72.0%	84.0%	75.0%	78.0%	78.0%	85.0%	80.0%	(7.0%)	(6.0%)	(1.0%)	(5.0%)
2021 / 1	72.0%	66.0%	78.0%	73.0%	75.0%	71.0%	79.0%	76.0%	(3.0%)	(5.0%)	(1.0%)	(3.0%)

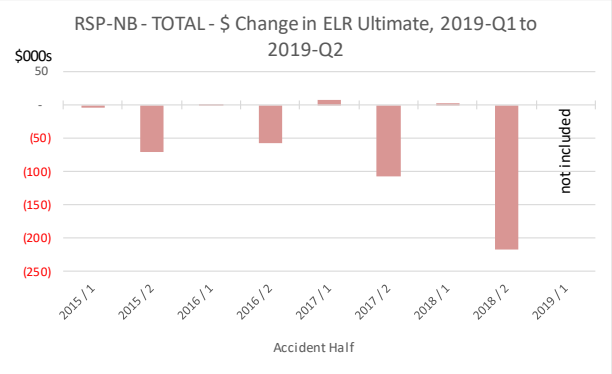
The valuation results used to form the basis of the a priori estimates for the June 30, 2019 valuation were updated to use selected ultimates from the March 31, 2019 valuation. Trend structure models based on industry indemnity results as at December 31, 2018 were used (for the prior valuation a priori loss ratio assumptions, trend structure models based on industry indemnity results as at June 30, 2018 were used).

The impact of changes in the a priori (expected) method loss ratios are shown across all coverages in the charts below. While the chart on the left does not indicate significant changes relative to total amounts

by accident half, the actual dollar changes in amounts in the right chart sum to a $440 thousand decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

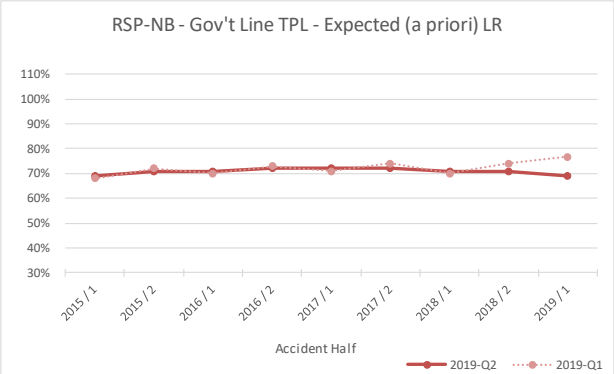
New Brunswick RSP – TOTAL - a priori method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

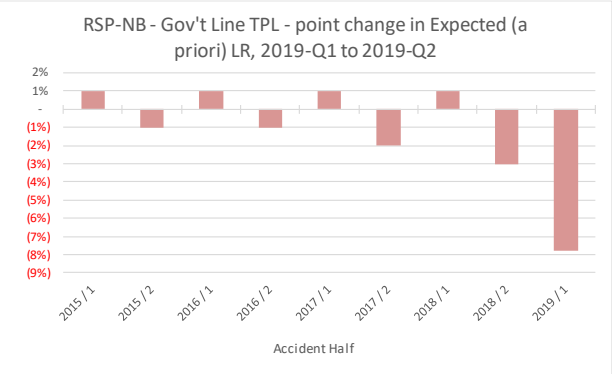




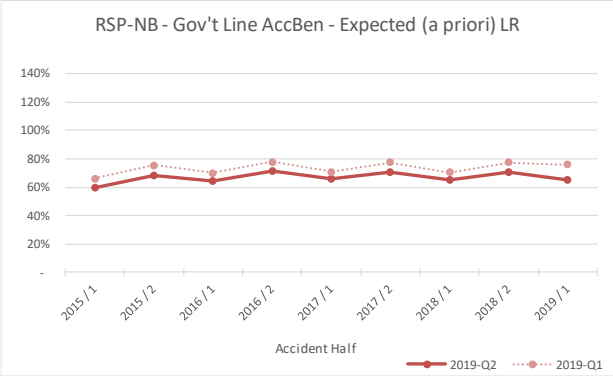
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for PAYs 2015-2018 inclusive, AccBen accounted for the largest overall change (decrease of $280 thousand), followed by TPL (decrease of $180 thousand) then Other (increase of $10 thousand) A priori method loss ratios and the associated point changes are shown below and at the top of the next page for Government Lines TPL and AccBen. ***Note that the scales differ in each chart***.

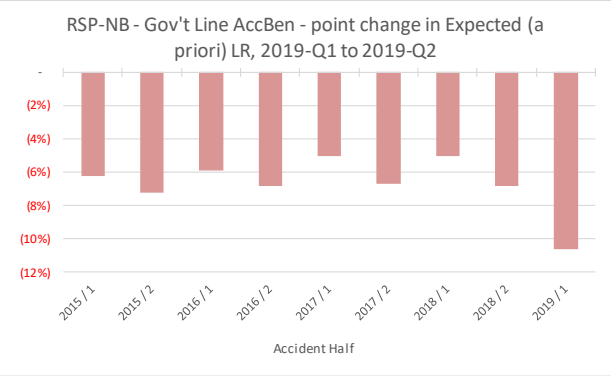
New Brunswick RSP – Gov't Line TPL – a priori method loss ratio comparisons – levels (left) and point change (right)





New Brunswick RSP – Gov't Line AccBen – a priori method loss ratio comparisons – levels (left) and point change (right)



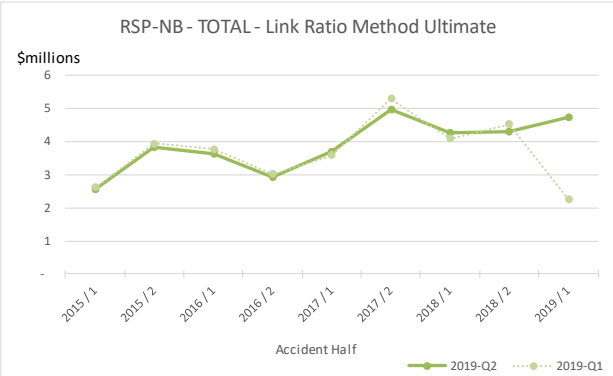


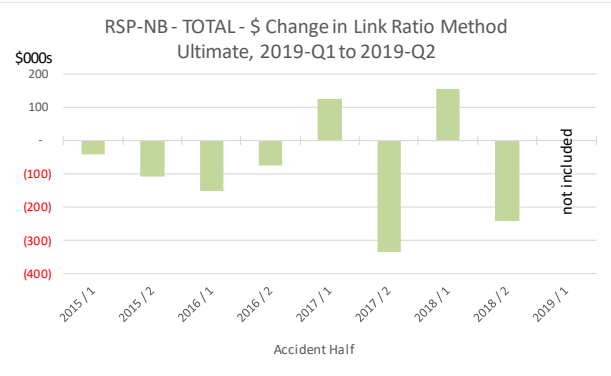
F.6 Link Ratio method

FA leverages the link ratio (also referred to as the chain ladder) method as one of the primary valuation methodologies, estimating ultimate by multiplying recorded claims amounts by development age selected link ratios (also referred to as development factors). Development age link ratios are selected taking into account historic values and other information as deemed appropriate. Changes in estimates of ultimate via this method can arise because of differing emergence relative to emergence implied by previous link ratio selections, as well as updated link ratio selections.

The impact of changes in the Link Ratio method loss ratios are shown across all coverages in the charts below. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a $670 thousand decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

New Brunswick RSP – TOTAL – Link Ratio method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

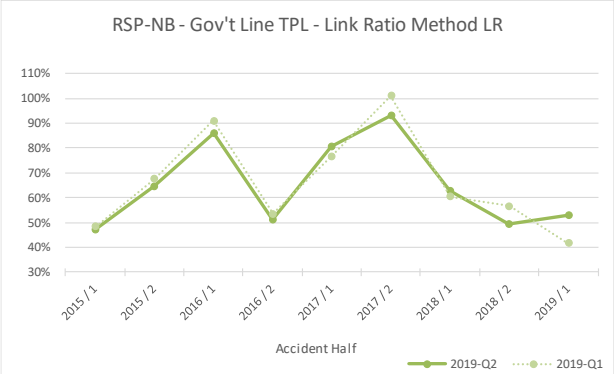


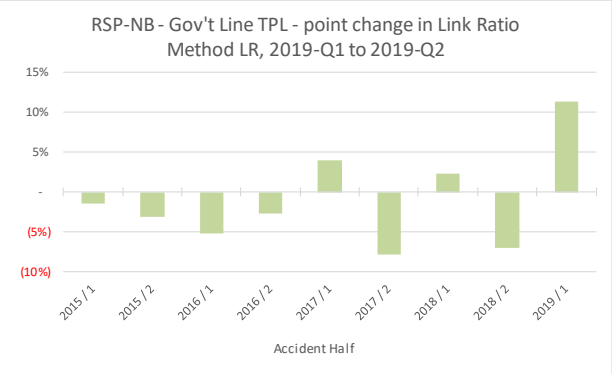


Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines, and for PAYs 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $770 thousand), followed by AccBen (increase of $150 thousand) then Other (decrease of $50 thousand). Link Ratio method loss ratios and the associated point changes are shown at the top of the next page for Government Lines TPL and AccBen. ***Note that the scales differ in each***

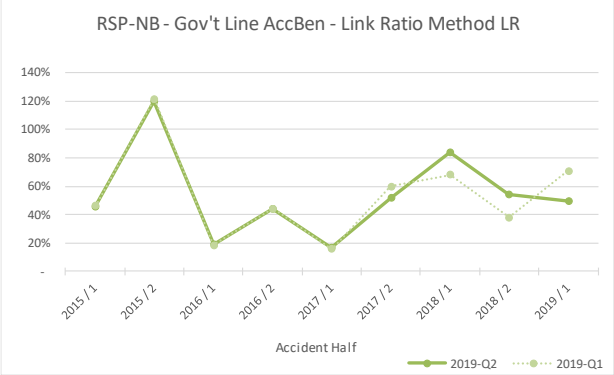
chart.

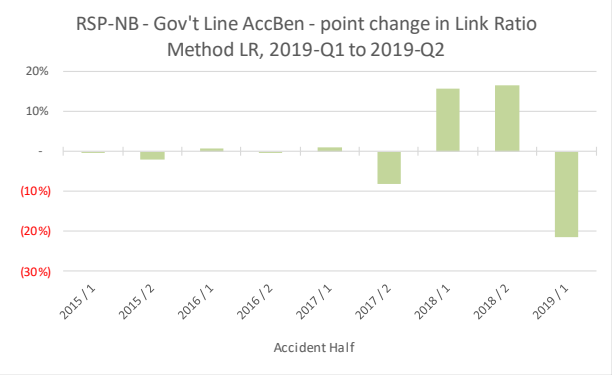
New Brunswick RSP –Gov't Line TPL – Link Ratio method loss ratio comparisons – levels (left) and point change (right)





New Brunswick RSP –Gov't Line AccBen – Link Ratio method loss ratio comparisons – levels (left) and point change (right)



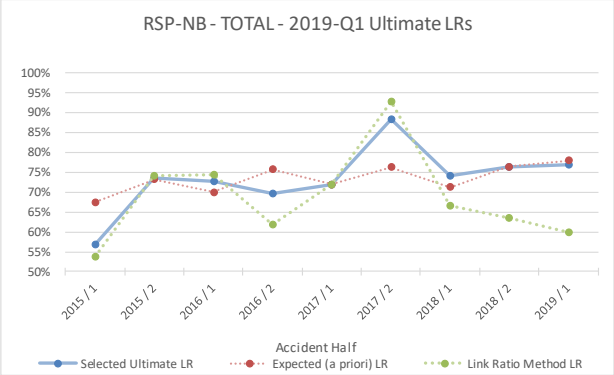


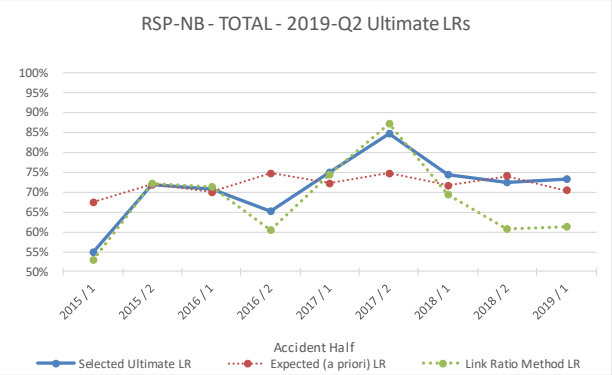
F.7 Current valuation IBNR / ultimate selections

Exhibit B.1.1 (see section L for all exhibits) summarizes the overall change in ultimate with this valuation and B.1.2 shows selected loss ratios over the most recent 4 valuations for comparison purposes on an all coverages basis. The B.2 exhibits provide information for third party liability, B.3 exhibits for accident benefits, and B.4 exhibits for the Other Government Line.

Using the a priori method and Link Ratio method as the primary methodologies, the Appointed Actuary will select from these methods, weighted averages of these methods (which include the B/F as a weighting methodology), or may choose a zero-IBNR selection. For the more recent accident halfs, weighted averages of the two primary methods are employed, as indicated below, where we show the prior valuation selections on the left and the current valuation selections on the right.

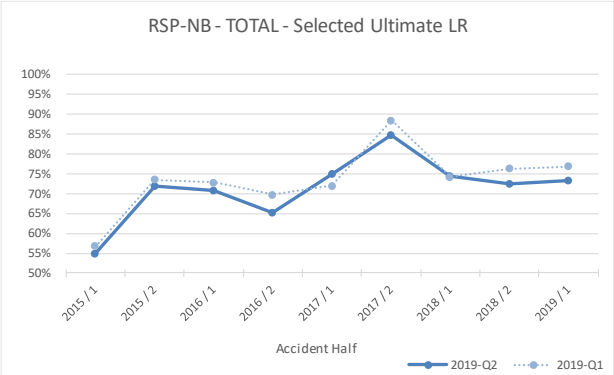
New Brunswick RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)

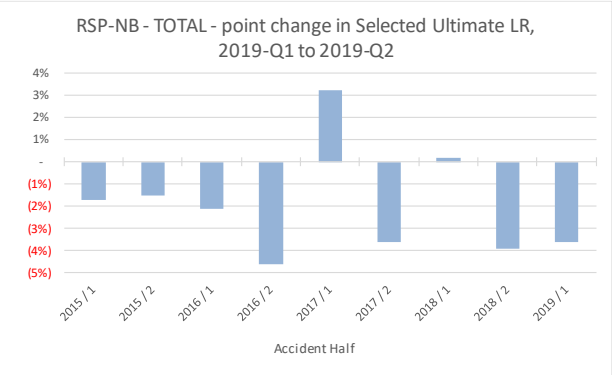




Focusing on the loss ratios based on selected ultimates, the left chart below shows the reduction in the total (all coverages) loss ratio selected from the 2019-Q1 valuation (dotted line) to the 2019-Q2 valuation (solid blue line). We show the loss ratio point change in the chart on the right, varying from an increase of 3.2 points (2017-H1) to a decrease of 4.6 points (2016-H2).

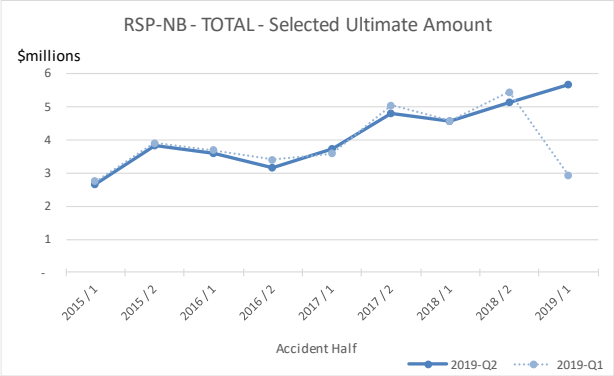
New Brunswick RSP – Selected ultimate loss ratios – level (left) and point change from prior valuation (right)

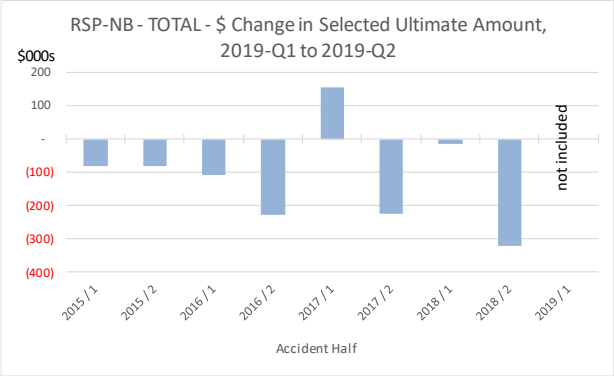




On average over the accident halfs shown, earned premium was approximately $5.8 million and as such, changes in several points of loss ratio translate to hundreds of thousands of dollars in ultimate estimate changes, as shown in the next charts. (Note that as 2019-H1 was only a partial half year at the 2019-Q1 valuation, the ultimate loss amount is not directly comparable to the amount selected at 2019-Q2 – hence, we do not include the associated change in the chart on the right). The total change shown in the chart on the right is a decrease of $0.9 million, accounting for over 80% of the $1.1 million total prior accident year changes during the quarter.

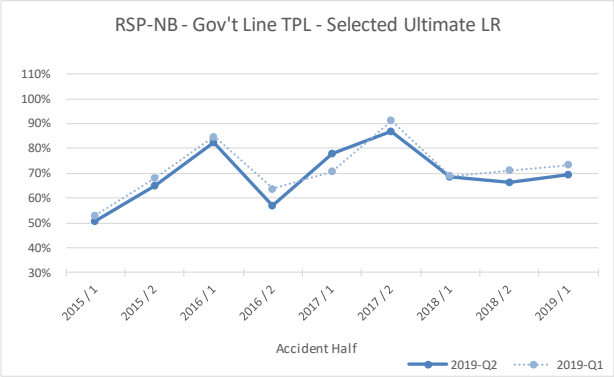
New Brunswick – All Coverages Selected ultimate amounts – level (left) and amount change from prior valuation (right)

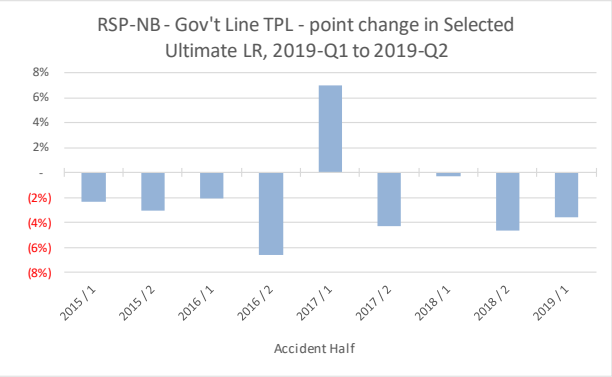




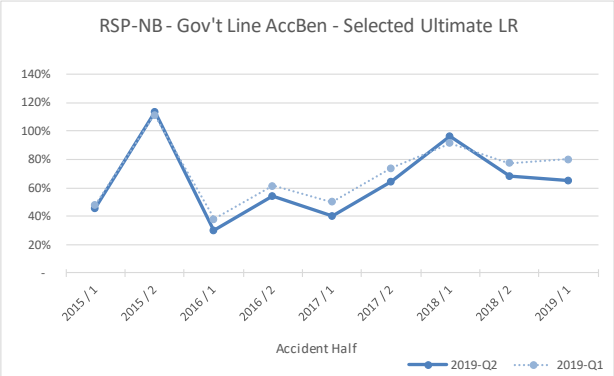
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for Prior Accident years 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $620 thousand), followed by AccBen (decrease of $220 thousand) then Other (decrease of $60 thousand). Selected ultimate loss ratios and the associated point changes are shown below for Government Lines TPL and AccBen. ***Note that the scales differ in each chart.***

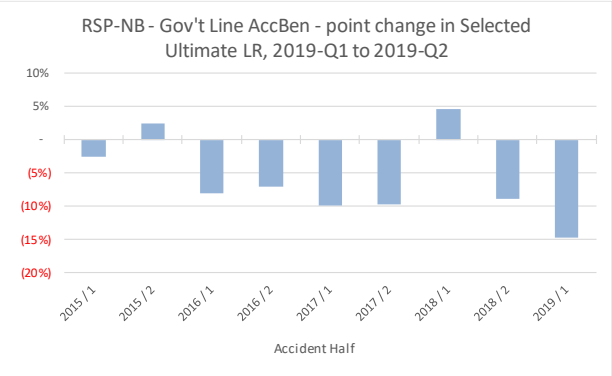
New Brunswick RSP –Gov't Line TPL – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





New Brunswick RSP –Gov't Line AccBen – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





F.8 Premium Liabilities / Future Accident Years

In order to provide a basis for estimating the full premium liability level for monthly statements (i.e. the level of premium deficiency liability / deferred policy acquisition cost asset to carry) we leverage the a priori loss ratios for the accident year underlying the unearned premium levels.

The test of recoverability leverages assumptions set by the Appointed Actuary. These include the Member expense allowances (taking into account the Board approved allowances) and policy administration / maintenance expense assumptions.

F.9 Actuarial Present Value Adjustments

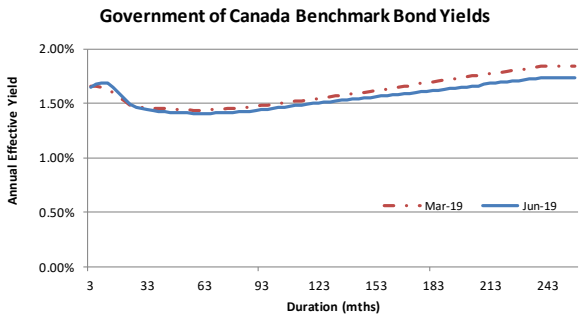
F.9.1 Selected Claims Payment Patterns

Payment patterns are selected through the emergence models (the same used for projecting future claims paid and recorded activity for the AvsP process), leveraging a paid to ultimate metric.

F.9.2 Selected Discount Rate

The projected future claims paid cash flow are matched to a simulated portfolio of Government of Canada benchmark monthly bonds (yields anchored to the valuation date), and 15 basis point investment expense is assumed.

A **discount rate of 1.41%** per annum was selected for the valuation of the claim liabilities and premium liabilities at June 30, 2019, **down from 1.44%** selected with the March 31, 2019 valuation. The chart to the right shows the Government of Canada benchmark bond yield curves at March 2019 and June 2019.



Sensitivity to the discount rate assumption is presented in Exhibit C (see section L).

F.9.3 Selected Margins for Adverse Deviations

The **margin for adverse deviation** (MfADs) **for investment income** was **maintained at 25 basis points** with the current valuation.

Selected **claims development margins were reviewed** for all coverages and accident half years and these are summarized in Exhibit D (see section L). The selected claims development MfADs for one older accident year was reviewed and judgmentally reduced to reflect the decreasing uncertainty over time. **The estimated implementation impact of updating the claims development MfADs was a decrease in the nominal claims PfAD of less than $0.1 million**.

F.10 Special IBNR Provisions / Adjustments

There were no special IBNR provisions or adjustments included with the current valuation.

G. NOVA SCOTIA RSP

G.1 Valuation Highlights

A summary of the valuation results through time is available in the A exhibit (see section L for all exhibits), with detail related to the current valuation provided in the B.1.1 and B.1.2 exhibits.

The **change** in selected ultimate for **prior accident years** was **$0.7 million favourable** with this valuation (**1.7%** of the unpaid estimate as at last quarter), bringing the **calendar year-to-date total unfavourable** to **$0.4 million** (**1.0%** of the unpaid estimate as at the beginning of the **2019 calendar year**). These changes are presented by accident year and Government Line in the tables below.

Nova Scotia RSP - valuation changes in selected ultimate (favourable) / unfavourable **during Quarter**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	100	15	(1)	114
2015	237	18	(3)	252
2016	(13)	(37)	(9)	(59)
2017	(273)	(34)	(12)	(319)
2018	(423)	(222)	(50)	(695)
TOTAL	**(372)**	**(260)**	**(75)**	**(707)**

Nova Scotia RSP - valuation changes in selected ultimate (favourable) / unfavourable **YTD**

Accident Year	Third Party Liability	Accident Benefits	Other Coverages	Total
2014 & Prior	215	22	(1)	236
2015	229	9	(3)	235
2016	187	(142)	(8)	37
2017	(154)	(84)	(25)	(263)
2018	(94)	(238)	505	173
TOTAL	**383**	**(433)**	**468**	**418**

The current valuation incorporates updated trend assumptions and industry loss development factors selected using Nova Scotia PPV AIX 2018-H2 data.

Caution must be exercised in reviewing the variances as this is a small pool and single claim transactions that are normal course for the business may look unusual and generate relatively significant variances that in nominal value terms are not that significant.

The Nova Scotia RSP favourable prior accident year development was driven by **favourable third party liability** recorded activity (bodily injury AY2017-AY2019).

The **selected loss ratio** for **accident year 2019** (current accident year; AY2019) decreased 0.9 points to 96.8% and for **accident year 2020** (future accident year; AY2020) decreased 0.6 points to 98.6%, with the changes impacted by updated a priori loss ratio selections as a result of using updated trend assumptions.

Summary descriptions of recent regulatory and legislative initiatives are available in section I.

The valuation process is described in more detail in section K, and a summary of changes to the process during this fiscal year is provided in section H.

Policy liability projected cash flows and June 2019 government of Canada bond yields were used to determine the applicable discount rate. The selected investment income margin for adverse deviation was maintained at 25 basis points with the current valuation.

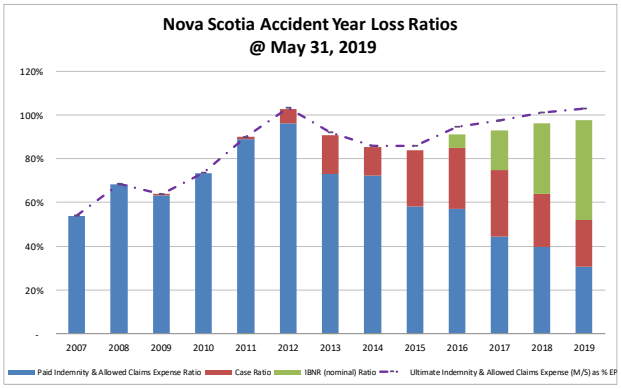
Selected claims development margins for all coverages and accident years were reviewed with the current valuation. In particular, selected claims development MfADs for on older accident year were reviewed and judgmentally reduced to reflect the decreasing uncertainty over time (see Exhibit D in section L for claims development margins).

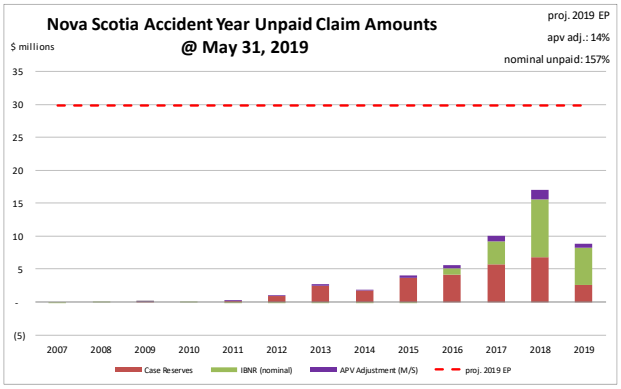
G.2 Booked results for the prior valuation implementation

It is helpful to consider how the portfolio looked after the **prior valuation** was implemented. In this

case, the **May 2019 booked results** were **based on** assumptions derived from **the prior (March 31, 2019) valuation** and were discussed in the associated monthly Actuarial Highlights.

The charts below show the associated levels of claim liabilities[29] booked by accident year. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated dollar amounts for the components of the claim liabilities and the then-current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	28,136	55.2%
ibnr	18,782	36.8%
M/S apv adjust.	4,089	8.0%
M/S total	51,007	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	15,043	94.1%
prem def/(dpac)	(63)	(0.4%)
M/S apv adjust.	1,004	6.3%
M/S total	15,984	100.0%

policy liabilities ($000s)

	amt	%
claim	46,918	70.0%
premium	14,980	22.4%
M/S apv adjust.	5,093	7.6%
M/S total	66,991	100.0%

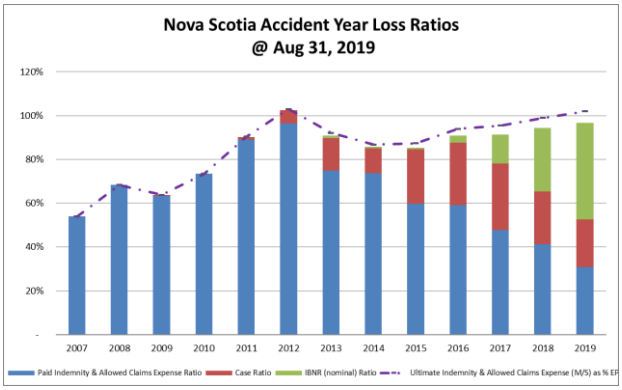
G.3 Booked results for the current valuation implementation

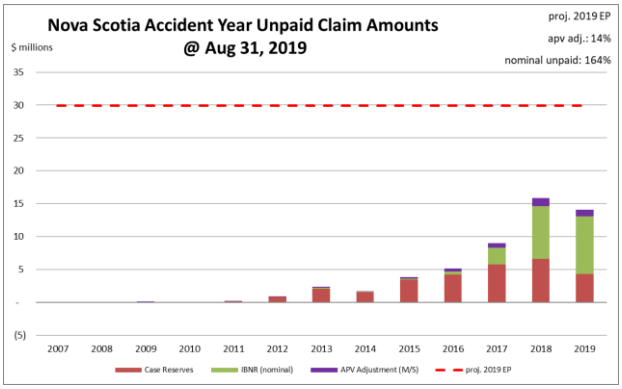
The **August 2019 booked results** were **based on** assumptions derived from **the current (June 30, 2019) valuation** and are discussed in the associated monthly Actuarial Highlights.

The charts at the top of the next page show the levels of claim liabilities booked by accident year on that basis. The left chart displays life-to-date payments, case reserves, IBNR, and the total including actuarial present value adjustments against accident year earned premium. The right chart shows the associated

[29] *Claim liabilities refer to provision for unpaid indemnity and allowed claims expenses. Allowed claims expenses are first party legal and other expenses as listed in the RSP Claims Guide. Claims expenses paid through the Member company expense allowance are NOT included in this discussion.*

dollar amounts for the components of the claim liabilities and the current projected amount of 2019 full year earned premium (the red hash-mark line) to provide some perspective.





"M/S" refers to "Member Statement" values – that is, actuarial present value adjustments at the selected discount rate.

The tables below show the associated Member Statement (M/S) policy liabilities.

claim liabilities ($000s)

	amt	%
case	29,040	54.5%
ibnr	20,035	37.6%
M/S apv adjust.	4,191	7.9%
M/S total	53,266	100.0%

premium liabilities ($000s)

	amt	%
unearned prem	16,350	94.4%
prem def/(dpac)	(142)	(0.8%)
M/S apv adjust.	1,106	6.4%
M/S total	17,314	100.0%

policy liabilities ($000s)

	amt	%
claim	49,075	69.5%
premium	16,208	23.0%
M/S apv adjust.	5,297	7.5%
M/S total	70,580	100.0%

G.4 **Actual vs Projected (AvsP)**

Variances in projected recorded and paid emergence and the associated actual emergence is presented in the two following tables.

Recorded Emergence

Nova Scotia RSP

	Third Party Liability			Accident Benefits			Other Coverages			Total		
	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected	Projected Recorded Claims in 2019-Q2	Actual Recorded Claims in 2019-Q2	Actual Less Projected
Accident Year	[1]	[2]	[3] =[2]-[1]	[4]	[5]	[6] =[5]-[4]	[7]	[8]	[9] =[8]-[7]	[10] =[1]+[4]+[7]	[11] =[2]+[5]+[8]	[12] =[11]-[10]
2014 & Prior	-	100	100	-	14	14	-	-	-	-	114	114
2015	40	328	288	19	-	(19)	1	-	(1)	60	328	268
2016	157	293	136	20	(20)	(40)	3	-	(3)	180	273	93
2017	503	(49)	(552)	72	89	17	5	(9)	(14)	580	31	(549)
2018	1,102	144	(958)	221	(85)	(306)	(43)	(103)	(60)	1,280	(44)	(1,324)
2019	2,765	1,402	(1,363)	177	442	265	1,310	1,424	114	4,252	3,268	(984)
Total	**4,567**	**2,218**	**(2,349)**	**509**	**440**	**(69)**	**1,276**	**1,312**	**36**	**6,352**	**3,970**	**(2,382)**
2018 & prior	1,802	816	(986)	332	(2)	(334)	(34)	(112)	(78)	2,100	702	(1,398)

*projected recorded claims based on Recorded to Ultimate emergence model as at 2019-Q1

As indicated above, total recorded emergence at $4.0 million was $2.4 million (37.5%) less than the $6.4 million projected.

We have previously reduced selected a priori loss ratios to address the continuing **CAY actual less projected variance** (**paid and recorded** projections have continued to exceed actual experience), and will continue to monitor developments as they arise.

Paid Emergence

Nova Scotia RSP

Accident Year	Third Party Liability			Accident Benefits			Other Coverages			Total		
	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected	Projected Paid Claims in 2019-Q2	Actual Paid Claims in 2019-Q2	Actual Less Projected
	[13]	[14]	[15] =[14]-[13]	[16]	[17]	[18] =[17]-[16]	[19]	[20]	[21] =[20]-[19]	[22] =[13]+[16]+[19]	[23] =[14]+[17]+[20]	[24] =[23]-[22]
2014 & Prior	1,231	421	(810)	8	5	(3)	-	-	-	1,239	426	(813)
2015	214	409	195	119	14	(105)	-	-	-	333	423	90
2016	194	630	436	17	28	11	1	-	(1)	212	658	446
2017	424	586	162	120	31	(89)	3	10	7	547	627	80
2018	364	278	(86)	192	114	(78)	23	8	(15)	579	400	(179)
2019	923	1,071	148	163	111	(52)	1,256	1,492	236	2,342	2,674	332
Total	**3,350**	**3,395**	**45**	**619**	**303**	**(316)**	**1,283**	**1,510**	**227**	**5,252**	**5,208**	**(44)**
2018 & prior	2,427	2,324	(103)	456	192	(264)	27	18	(9)	2,910	2,534	(376)

*projected paid claims based on Paid to Ultimate emergence model as at 2019-Q1

As indicated above, total paid emergence at $5.2 million was $44 thousand (0.8%) less than the $5.3 million projected.

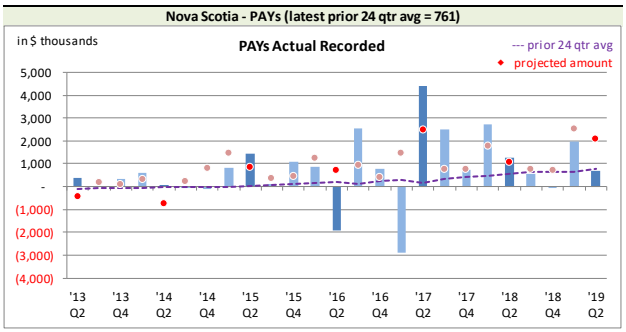
Claims transaction activity is generally volatile and differences between actual and projected claims emergence are anticipated due to this natural process variance (this is particularly true where volumes are low), caution must be exercised in reviewing the variances as this is a small pool and single claim transactions that are normal course for the business may look unusual and generate relatively significant variances that in nominal value terms are not that significant.

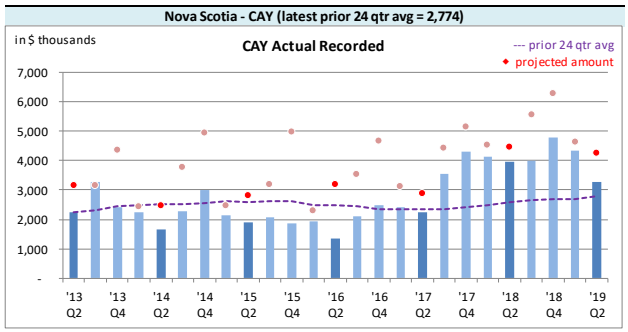
Additional detail and summary charts akin to those found in the monthly Actuarial Highlights are presented in the sections that follow.

G.4.1 AvsP: Recorded Indemnity & Allowed Claims Expense

Actual **recorded** activity (**paid** and case reserve changes) over the last 25-calendar quarters is shown in the charts below, including the "prior 24 quarter average" level.

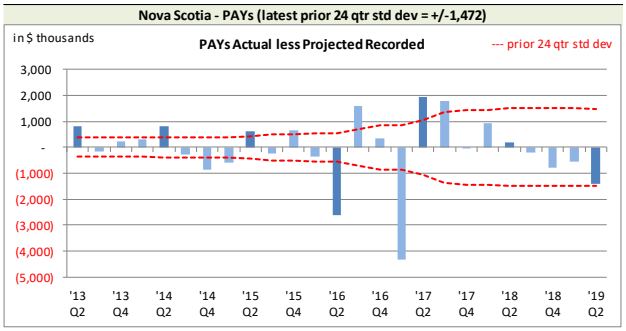
*Nova Scotia RSP Actual **Recorded** by Calendar Quarter*

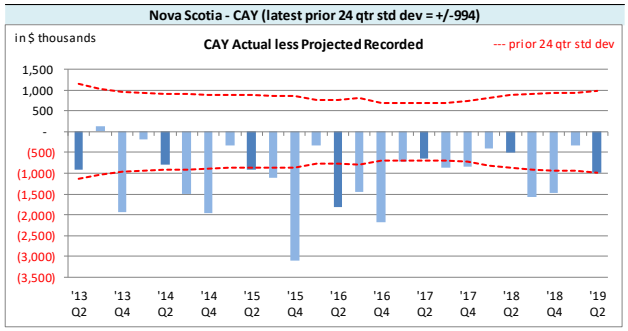




Recorded activity variances from the previous quarter's projections are shown in the charts at the top of the next page, including the "prior 24-quarter standard deviation" levels.

*Nova Scotia RSP Actual vs Projected Summary: **Recorded** Variances by Calendar Quarter*





On Latest $ thousands		
Recorded	PAYs	CAY
Actual less Projected Recorded	761	2,774
std dev	1,472	994
A-P <> std dev	11	14
% <> std dev	44.0%	56.0%
norm <> std dev	31.7%	31.7%

With respect to **recorded** indemnity & allowed claims expense activity, the prior accident years' (PAYs) variances (left chart above) do not indicate a projection bias[30]. However, with 44% of variances outside of one standard deviation, the results suggest that the projection process has performed worse than simply projecting the prior 24-quarter average amount. At this time, we attribute this to the difficulty in projecting results for a small, relatively immature, RSP.

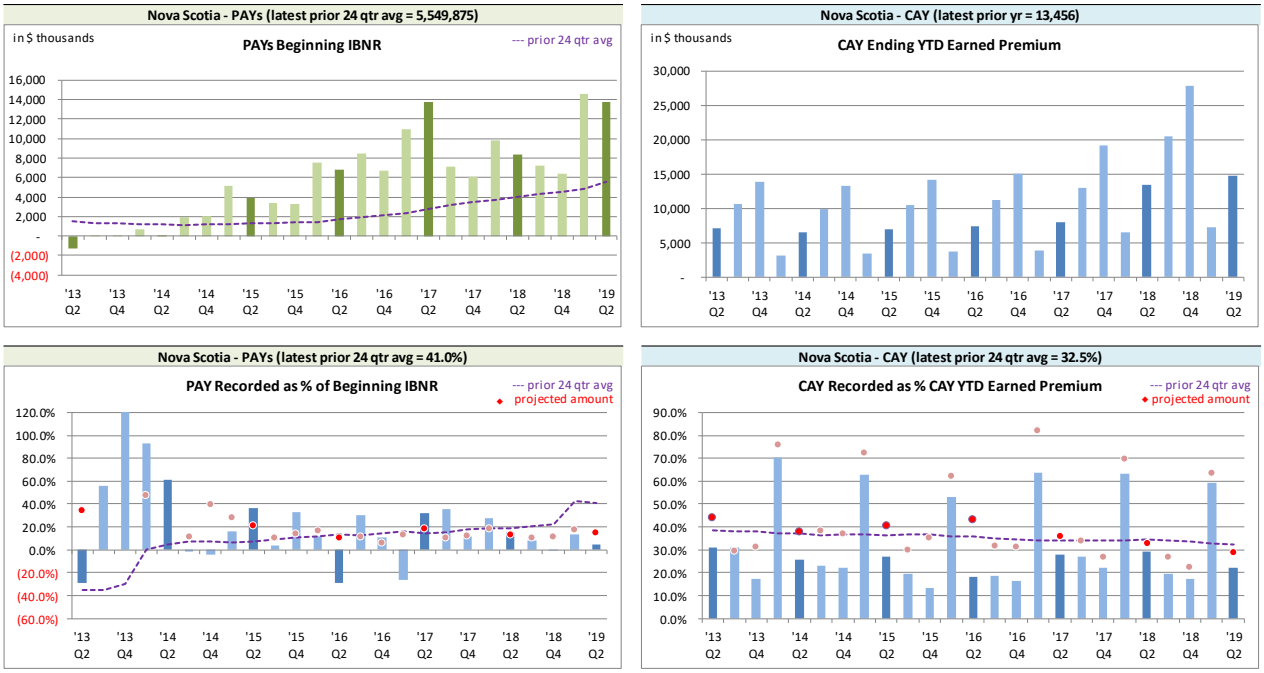
The current accident year (CAY) **recorded** variances (right chart above) fell outside of one standard deviation 56% of the time, suggesting that the projection process has performed worse than simply projecting the prior 24-quarter average amount. In addition, bias is evident, as only 1 quarter has had actual recorded indemnity higher than projected which is outside of a 95% confidence range, although the magnitude of the variances have not necessarily been extremely high. The high projected recorded to ytd-earned-premium ratios (bottom right chart at the top of the next page) compared to historical ratios suggest some shortcoming of the emergence model currently used which appears to project too high on CAY recorded activities.

The CAY **recorded** variance fell outside of the one standard deviation band during the latest quarter. The variance was reviewed and confirmed, with the variance attributed to a poor projection in retrospect.

We have included, for reference, additional charts at the top of the next page related to levels influencing **recorded** activity.

[30]*For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the recorded projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

Nova Scotia RSP Levels that influence[31] ***Recorded*** *activity by Calendar Quarter*



(Note: The PAYs ratio relative to beginning IBNR is overwhelmed by 2013 Q4 where low levels of beginning IBNR were followed by recorded activity that were multiples of the IBNR level; the axis in the left chart above was limited to focus the discussion)

We track beginning PAYs' IBNR as **recorded** activity comes out of IBNR. Changes in the PAYs' beginning IBNR (see upper left chart above) occur for several possible reasons:

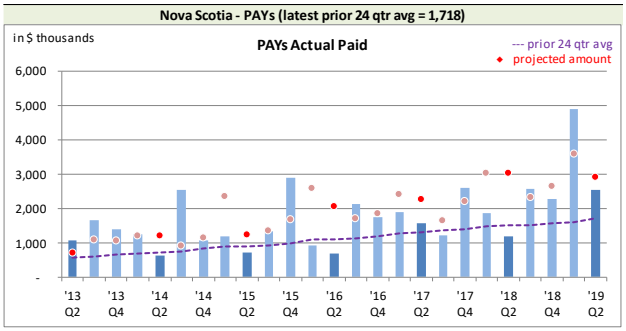
- to offset actual **recorded** activity (through loss ratio matching);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

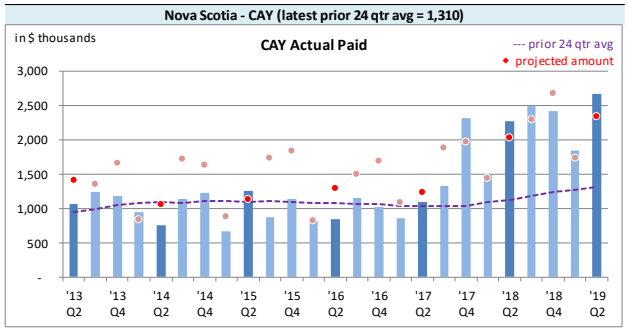
G.4.2 AvsP: Paid Indemnity & Allowed Claims Expense

The charts at the top of the next page show actual **paid** activity in each of the most recent 25 calendar quarters, along with a "prior 24-quarter average" to show how each quarter's actual compares with the average amount of the preceding 24 calendar quarters.

[31] *Our recorded activity projections are based on selected ratios of life-to-date recorded activity to ultimate, converted to a "recorded to beginning IBNR" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*

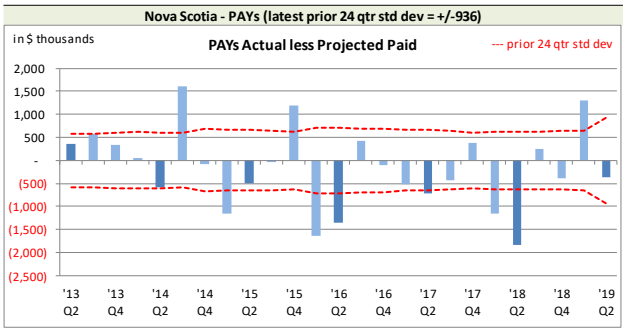
*Nova Scotia RSP Actual **Paid** activity by Calendar Quarter*

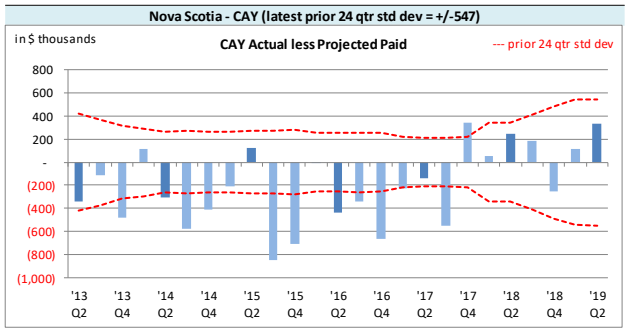




The charts below show the actual less projected **paid** variances for the last 25 calendar quarters, along with bands for the "prior 24-quarter standard deviations" to show how the variances from projection compare with historical standard deviations.

*Nova Scotia RSP Actual vs Projected Summary: **Paid** Variances by Calendar Quarter*





On Latest $ thousands		
Paid	PAYs	CAY
Qtrly Avg Paid (prior 24 qtrs)	1,718	1,310
std dev	936	547
A-P <> std dev	10	12
% <> std dev	40.0%	48.0%
norm <> std dev	31.7%	31.7%

With respect to **paid** indemnity & allowed claims expense prior accident years variances (left chart above), 40% of the variances have fallen outside of one standard deviation, suggesting the projection process has performed worse than projecting simply based on the preceding 24-quarter average, although bias[32] has not been indicated. Like **recorded** activity, we currently attribute the poor projection results to uncertainty related to the post-reform period and the small, immature nature of this RSP.

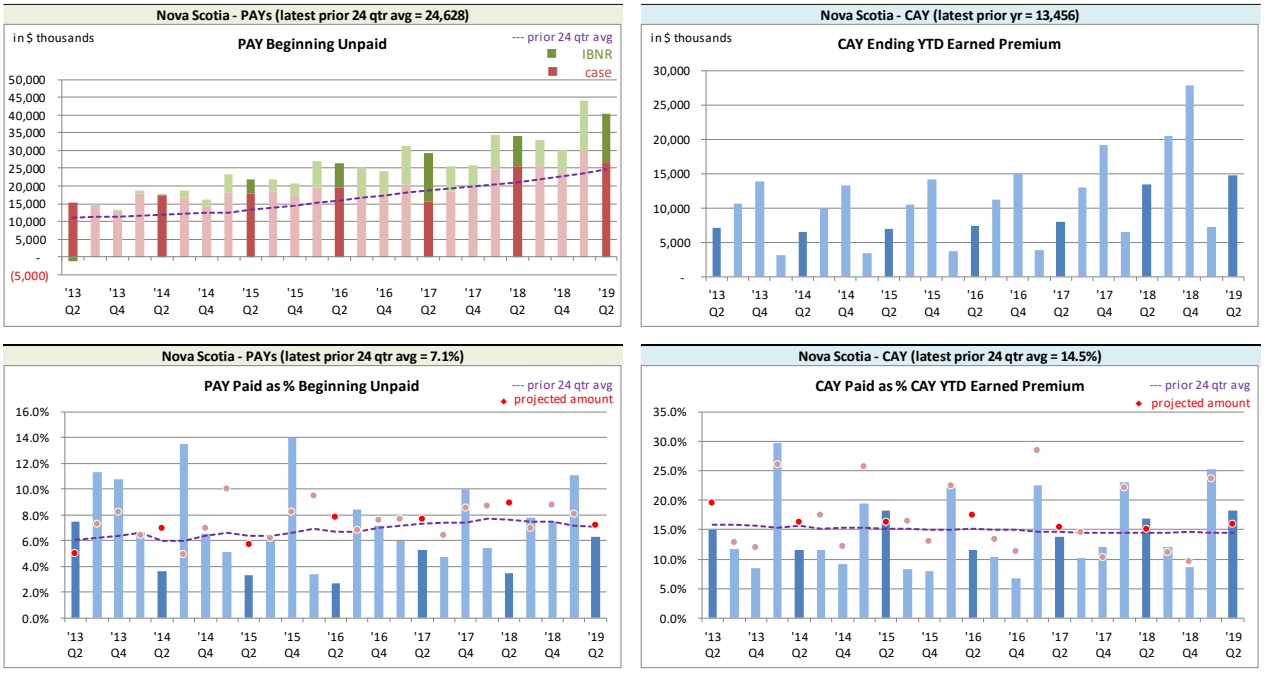
The current accident year (CAY) **paid** projection variances had 48% outside of one standard deviation, suggesting the projection process has performed worse than simply projecting the prior 24-quarter average amount. Bias has not been indicated, with 8 times in the past 25 quarters where actuals were higher than our projections for the CAY **paid** amount. The high projected paid to ytd-earned-premium ratios (bottom right chart at the top of the next page) compared to historical ratios suggest some shortcoming of the emergence model currently used which appears to project too high on CAY **paid**

[32] *For the binomial distribution with 25 trials and an assumed 50% success probability, the 95% confidence range is 8 to 17. That is, for the 25 quarters presented, if the paid projection was unbiased, with a 95% confidence, we would expect between 8 to 17 variances above 0. Less than 8 variances above 0 would indicate that our projections are biased high, and greater than 17 variances would indicate that our projections are biased low.*

activities.

We have included, for reference, additional charts below related to levels influencing **paid** activity.

Nova Scotia RSP Levels that influence[33] ***Paid*** *activity by Calendar Quarter*



We track beginning PAYs' unpaid balance (case and IBNR) as **paid** activity comes out of the unpaid balance. Changes in the PAYs' beginning unpaid balance (see upper left chart above) occur for several possible reasons:

- to offset actual **paid** activity (may reduce case or IBNR or both);
- the annual switchover as a CAY becomes a PAY (occurs in January); and
- IBNR levels potentially change with each new valuation.

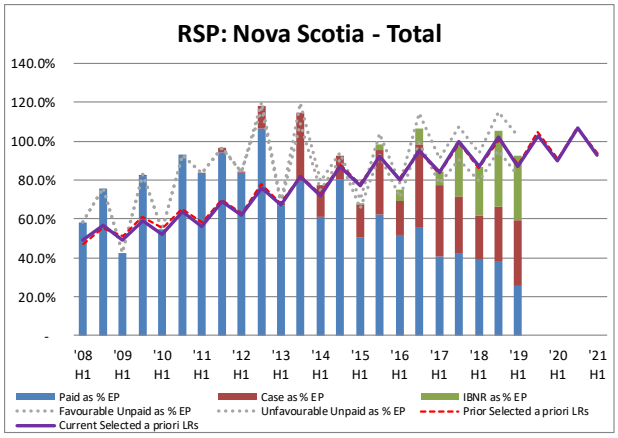
G.5 a priori method

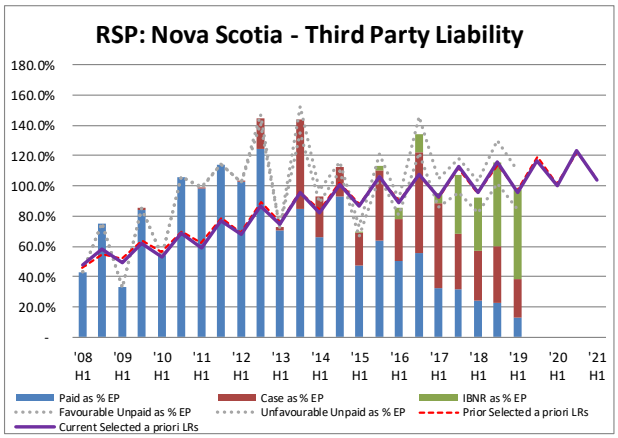
FA leverages the a priori method as one of the primary valuation methodologies, estimating ultimate by multiplying earned premium by a selected a priori loss ratio.

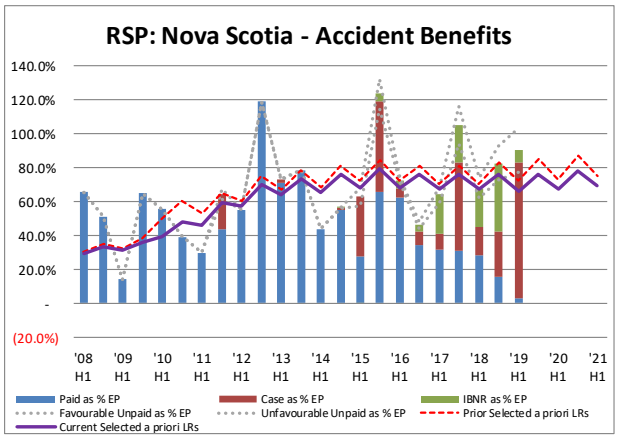
The Nova Scotia RSP a priori loss ratios were updated as discussed below and are presented in the B.1.4, B.2.3, B.3.3, and B.4.3 exhibits in section L.

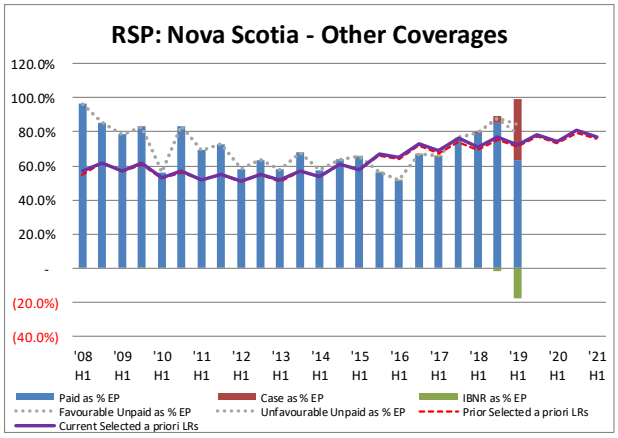
This valuation's a priori loss ratios are summarized in the charts and the table at the top of the next page (by Government Line and accident half-year), with a comparison to the last valuation a priori loss ratios.

[33] *Our paid projections are based on selected ratios of life-to-date paid activity to ultimate, converted to a "paid to beginning unpaid" ratio, where ratio selection is based on our review of historical results. We find it helpful to show CAY emergence relative to earned premium for the purposes of the AvsP discussion.*









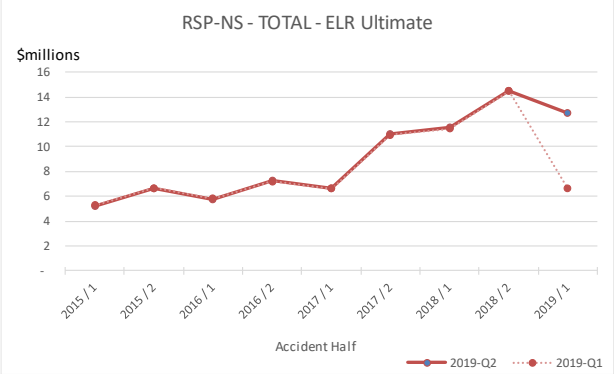
Accident Period	CURRENT Third Party Liability	CURRENT Accident Benefits	CURRENT Other Coverages	CURRENT Total	PRIOR Third Party Liability	PRIOR Accident Benefits	PRIOR Other Coverages	PRIOR Total	CHANGE Third Party Liability	CHANGE Accident Benefits	CHANGE Other Coverages	CHANGE Total
2014 / 1	82.0%	65.0%	54.0%	72.0%	84.0%	68.0%	54.0%	73.0%	(2.0%)	(3.0%)	-	(1.0%)
2014 / 2	101.0%	76.0%	61.0%	87.0%	102.0%	81.0%	61.0%	88.0%	(1.0%)	(5.0%)	-	(1.0%)
2015 / 1	87.0%	68.0%	58.0%	77.0%	88.0%	72.0%	58.0%	78.0%	(1.0%)	(4.0%)	-	(1.0%)
2015 / 2	106.0%	79.0%	67.0%	92.0%	106.0%	84.0%	66.0%	92.0%	-	(5.0%)	1.0%	-
2016 / 1	89.0%	68.0%	65.0%	80.0%	90.0%	72.0%	64.0%	81.0%	(1.0%)	(4.0%)	1.0%	(1.0%)
2016 / 2	108.0%	76.0%	73.0%	95.0%	107.0%	81.0%	72.0%	95.0%	1.0%	(5.0%)	1.0%	-
2017 / 1	93.0%	67.0%	69.0%	84.0%	92.0%	70.0%	67.0%	83.0%	1.0%	(3.0%)	2.0%	1.0%
2017 / 2	113.0%	76.0%	76.0%	100.0%	112.0%	81.0%	74.0%	99.0%	1.0%	(5.0%)	2.0%	1.0%
2018 / 1	96.0%	67.0%	71.0%	87.0%	95.0%	70.0%	69.0%	86.0%	1.0%	(3.0%)	2.0%	1.0%
2018 / 2	116.0%	76.0%	77.0%	102.0%	114.0%	83.0%	75.0%	101.0%	2.0%	(7.0%)	2.0%	1.0%
2019 / 1	96.0%	66.0%	72.0%	87.0%	97.0%	72.0%	71.0%	88.0%	(1.0%)	(6.0%)	1.0%	(1.0%)
2019 / 2	117.0%	76.0%	78.0%	103.0%	119.0%	85.0%	77.0%	105.0%	(2.0%)	(9.0%)	1.0%	(2.0%)
2020 / 1	100.0%	67.0%	74.0%	90.0%	101.0%	73.0%	73.0%	91.0%	(1.0%)	(6.0%)	1.0%	(1.0%)
2020 / 2	123.0%	78.0%	81.0%	107.0%	122.0%	87.0%	79.0%	107.0%	1.0%	(9.0%)	2.0%	-
2021 / 1	104.0%	69.0%	77.0%	93.0%	105.0%	75.0%	76.0%	94.0%	(1.0%)	(6.0%)	1.0%	(1.0%)

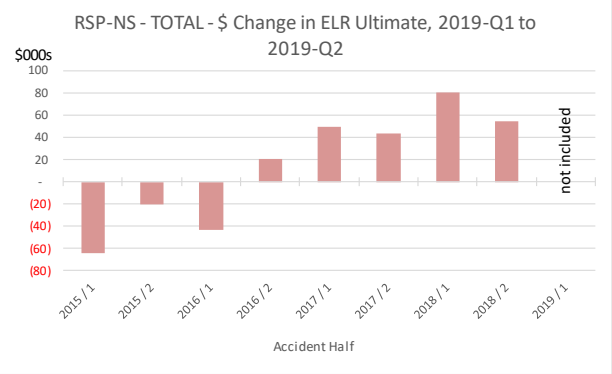
The valuation results used to form the basis of the a priori estimates for the June 30, 2019 valuation were updated to use selected ultimates from the March 31, 2019 valuation. Trend structure models based on industry indemnity results as at December 31, 2018 were used (for the prior valuation a priori loss ratio assumptions, trend structure models based on industry indemnity results as at June 30, 2018 were used).

The impact of changes in the a priori (expected) method loss ratios are shown across all coverages in the charts at the top of the next page. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a

$120 thousand increase in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

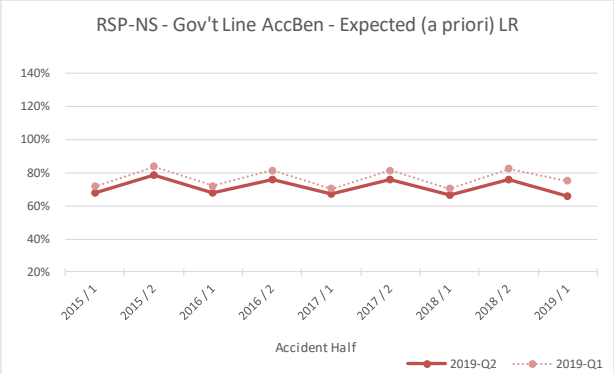
Nova Scotia RSP – TOTAL - a priori method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

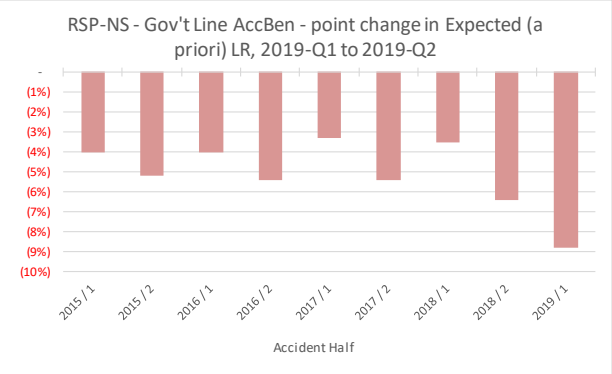




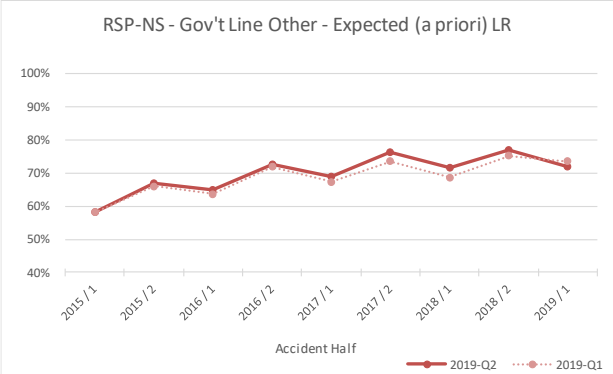
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for PAYs 2015-2018 inclusive, AccBen accounted for the largest overall change (decrease of $380 thousand), followed by Other (increase of $290 thousand) then TPL (increase of $210 thousand). A priori method loss ratios and the associated point changes are shown below and at the top of the next page for Government Lines AccBen and Other. ***Note that the scales differ in each chart***.

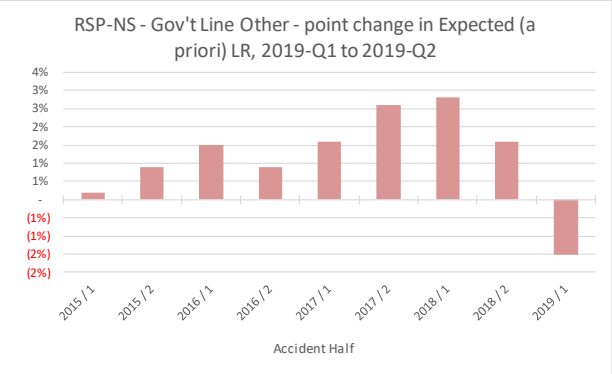
Nova Scotia RSP –Gov't Line AccBen – a priori method loss ratio comparisons – levels (left) and point change (right)





Nova Scotia RSP –Gov't Line Other – a priori method loss ratio comparisons – levels (left) and point change (right)



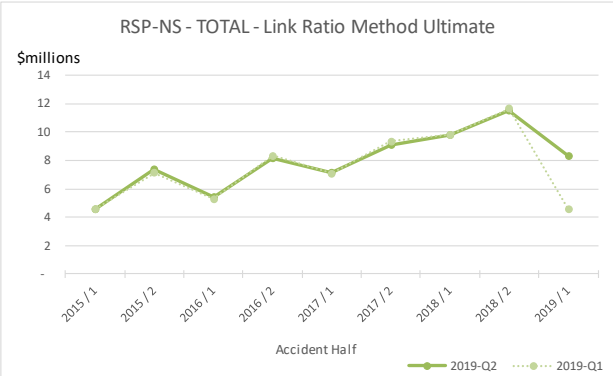


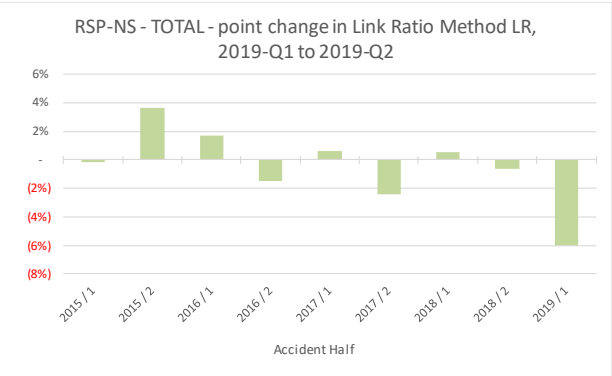
G.6 Link Ratio method

FA leverages the link ratio (also referred to as the chain ladder) method as one of the primary valuation methodologies, estimating ultimate by multiplying recorded claims amounts by development age selected link ratios (also referred to as development factors). Development age link ratios are selected taking into account historic values and other information as deemed appropriate. Changes in estimates of ultimate via this method can arise because of differing emergence relative to emergence implied by previous link ratio selections, as well as updated link ratio selections.

The impact of changes in the Link Ratio method loss ratios are shown across all coverages in the charts below. While the chart on the left does not indicate significant changes relative to total amounts by accident half, the actual dollar changes in amounts in the right chart sum to a $160 thousand decrease in relation to PAYs 2015 to 2018 inclusive only. (Note: as 2019-H1 was a partial accident half as at 2019-Q1, the change is not shown in the chart on the right.)

Nova Scotia RSP – TOTAL – Link Ratio method ultimate estimate amounts – level (left) and amount change from prior valuation (right)

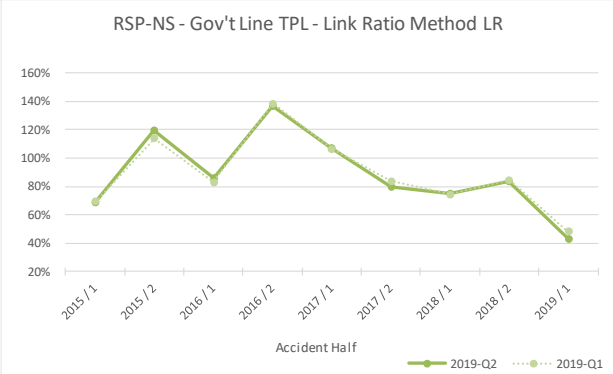


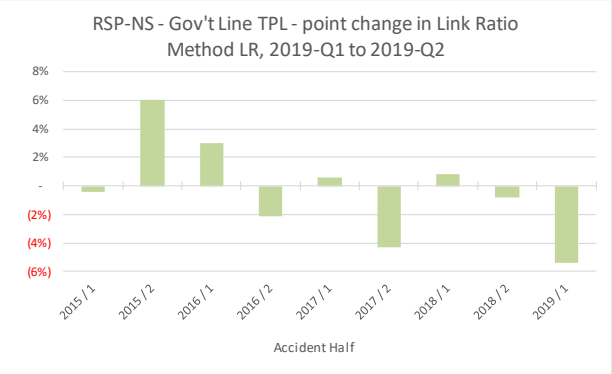


Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines, and for Prior Accident years 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $110 thousand), followed by Other (decrease of $40 thousand) then AccBen (decrease of $2 thousand). Link Ratio method loss ratios and the associated point changes are shown on the next page for Government Lines TPL and Other. ***Note that the scales differ in each chart***. For

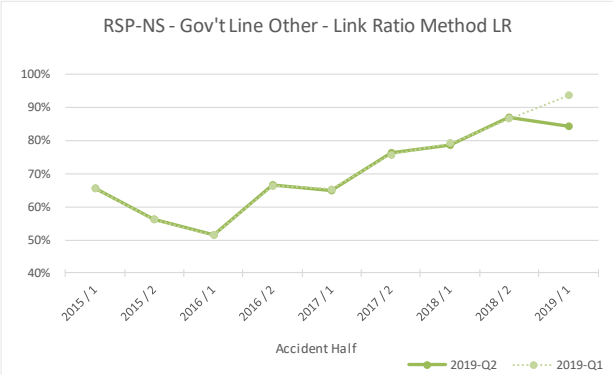
Government Line AccBen, the almost 20 point reduction in the loss ratio for accident half 2016-H2 was influenced by changes to the period structure of the FA selected trend models for the sub-coverages / coverages making up the Government Line.

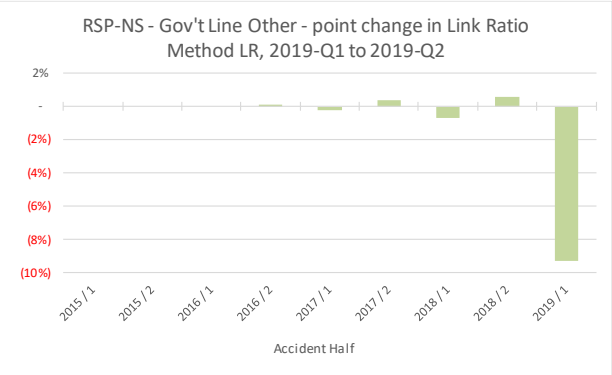
Nova Scotia RSP –Gov't Line TPL – Link Ratio method loss ratio comparisons – levels (left) and point change (right)





Nova Scotia RSP –Gov't Line Other – Link Ratio method loss ratio comparisons – levels (left) and point change (right)



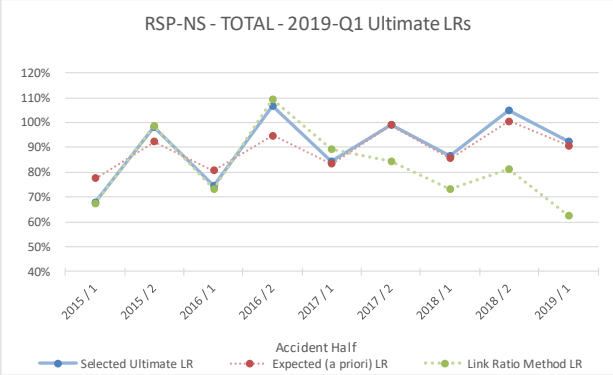


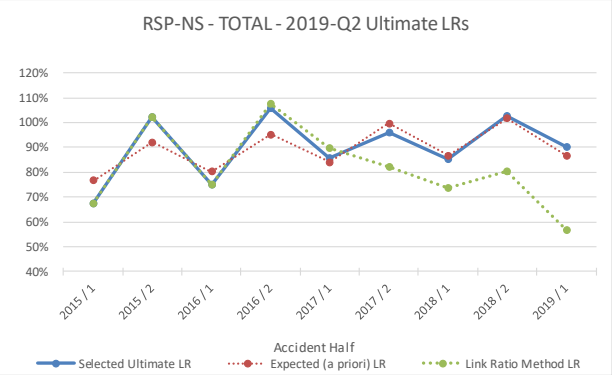
G.7 Current valuation IBNR / ultimate selections

Exhibit B.1.1 (see section L for all exhibits) summarizes the overall change in ultimate with this valuation and B.1.2 shows selected loss ratios over the most recent 4 valuations for comparison purposes on an all coverages basis. The B.2 exhibits provide information for third party liability, B.3 exhibits for accident benefits, and B.4 exhibits for the Other Government Line.

Using the a priori method and Link Ratio method as the primary methodologies, the Appointed Actuary will select from these methods, weighted averages of these methods (which include the B/F as a weighting methodology), or may choose a zero-IBNR selection. For the more recent accident halfs, weighted averages of the two primary methods are employed, as indicated in the chart on the top of the next page, where we show the prior valuation selections on the left and the current valuation selections on the right.

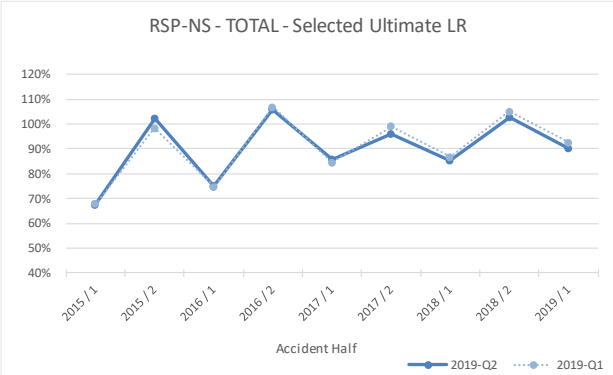
Nova Scotia RSP –Ultimate loss ratio comparisons – 2019-Q1 (left) and 2019-Q2 (right)

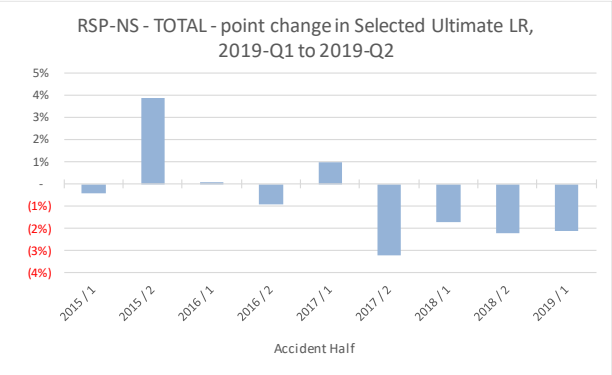




Focusing on the loss ratios based on selected ultimates, the left chart below shows the reduction in the total (all coverages) loss ratio selected from the 2019-Q1 valuation (dotted line) to the 2019-Q2 valuation (solid blue line). We show the loss ratio point change in the chart on the right, varying from an increase of 3.9 points (2015-H2) to a decrease of 3.2 points (2017-H2)

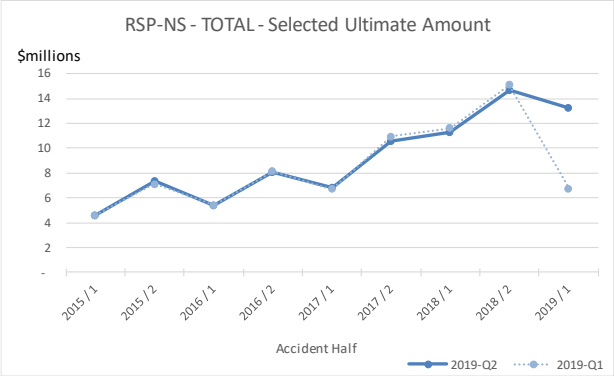
Nova Scotia RSP – Selected ultimate loss ratios – level (left) and point change from prior valuation (right)

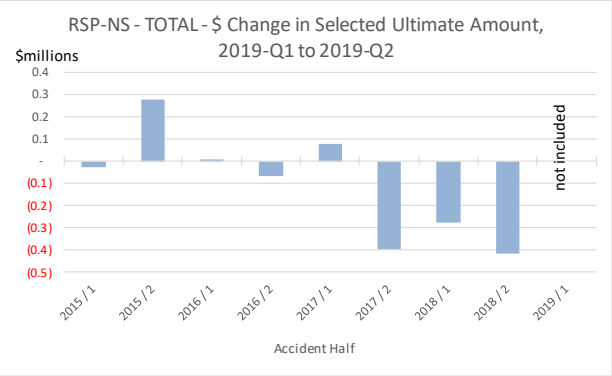




On average over the accident halfs shown, earned premium was approximately $10 million and as such, changes in several points of loss ratio translate to hundreds of thousands of dollars in ultimate estimate changes, as shown in the next charts. (Note that as 2019-H1 was only a partial half year at the 2019-Q1 valuation, the ultimate loss amount is not directly comparable to the amount selected at 2019-Q2 – hence, we do not include the associated change in the chart on the right). The total change shown in the chart on the right is a decrease of $0.8 million, accounting for over 100% of the $0.7 million total prior accident year changes during the quarter.

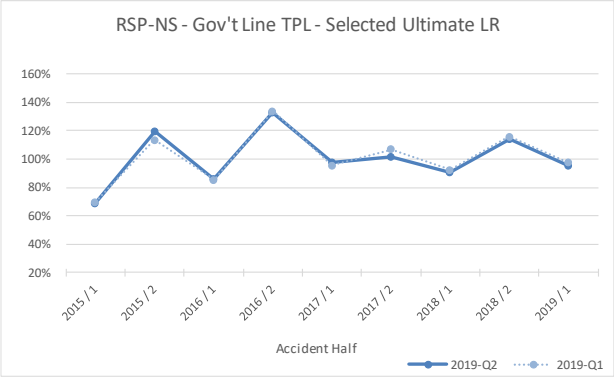
Nova Scotia RSP – All Coverages Selected ultimate amounts – level (left) and amount change from prior valuation (right)

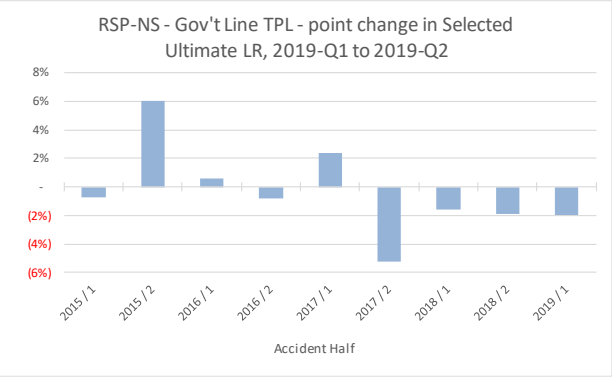




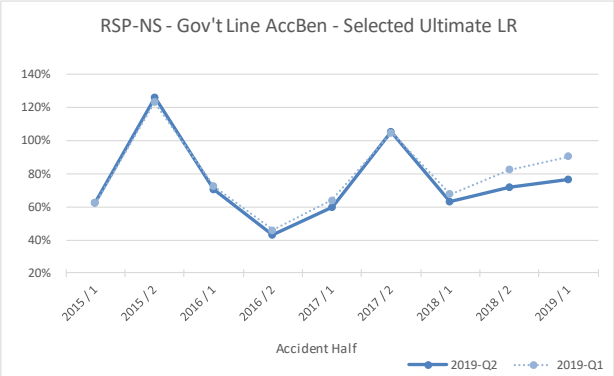
Coverage level results are summarized to three Government Lines (TPL, AccBen, and Other). Of the three Government Lines and for Prior Accident years 2015-2018 inclusive, TPL accounted for the largest overall change (decrease of $470 thousand), followed by AccBen (decrease of $270 thousand) then Other (decrease of 70 thousand). Selected ultimate loss ratios and the associated point changes are shown below for Government Lines TPL and AccBen. ***Note that the scales differ in each chart.***

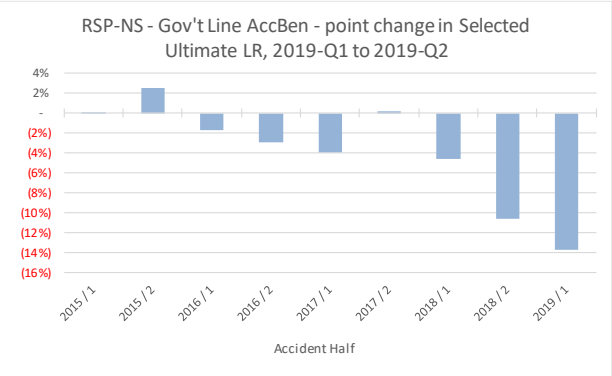
Nova Scotia RSP –Gov't Line TPL – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





Nova Scotia RSP –Gov't Line AccBen – Selected ultimate loss ratio comparisons – levels (left) and point change (right)





G.8 Premium Liabilities / Future Accident Years

In order to provide a basis for estimating the full premium liability level for monthly statements (i.e. the level of premium deficiency liability / deferred policy acquisition cost asset to carry) we leverage the a priori loss ratios for the accident year underlying the unearned premium levels.

The test of recoverability leverages assumptions set by the Appointed Actuary. These include the Member expense allowances (taking into account the Board approved allowances) and policy administration / maintenance expense assumptions.

G.9 Actuarial Present Value Adjustments

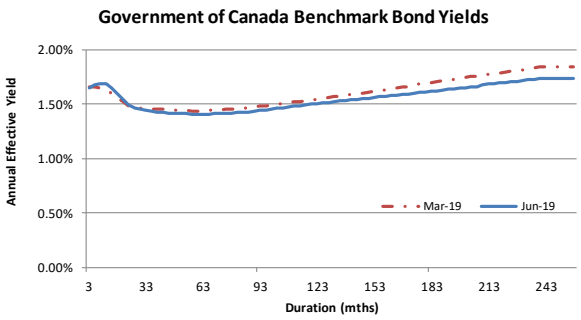
G.9.1 Selected Claims Payment Patterns

Payment patterns are selected through the emergence models (the same used for projecting future claims paid and recorded activity for the AvsP process), leveraging a "paid to ultimate" metric.

G.9.2 Selected Discount Rate

The projected future claims paid cash flow are matched to a simulated portfolio of Government of Canada benchmark monthly bonds (yields anchored to the valuation date), and 15 basis point investment expense is assumed.

A **discount rate of 1.41%** per annum was selected for the valuation of the claim liabilities and premium liabilities at June 30, 2019, **down from 1.43%** selected with the March 31, 2019 valuation. The chart to the right shows the Government of Canada benchmark bond yield curves at March 2019 and June 2019.



Sensitivity to the discount rate assumption is presented in Exhibit C (see section L).

G.9.3 Selected Margins for Adverse Deviations

The **margin for adverse deviation** (MfADs) **for investment income** was **maintained at 25 basis points** with the current valuation.

Selected **claims development margins were reviewed** for all coverages and accident half years and these are summarized in Exhibit D (see section L). The selected claims development MfADs for one older accident year was reviewed and judgmentally reduced to reflect the decreasing uncertainty over time. **The estimated implementation impact of updating the claims development MfADs was a decrease in the nominal claims PfAD of less than $0.1 million**.

G.10 Special IBNR Provisions / Adjustments

There were no special IBNR provisions or adjustments included with the current valuation.

H. Appendix 1: Changes in process introduced since the September 30, 2018 valuation

The September 30, 2018 valuation supported the October 31, 2018 fiscal year-end financial statements. There have been no significant changes to the valuation process since that valuation.

A more detailed description of the current valuation process is presented in section K.

I. Appendix 2: Recent Regulatory and/or Legislative Initiatives

Consideration and assessment of potential impacts of legal decisions and changes in legislation / regulation constitutes a regular part of the valuation process. Descriptions of some of the more recent changes are provided below.

I.1 Ontario

Ontario Bill 91 (Building Ontario Up Act (Budget Measures), 2015) was introduced into the Legislature by the Minister of Finance on April 23, 2015 and **received Royal Assent on June 4, 2015**. Bill 91 announced a number of amendments to regulations made under the Insurance Act, including: updating the Catastrophic Impairment Definition and changes to the standard benefit level under the Statutory Accident Benefits Schedule (SABS); restrictions on insurance premium increases and lowering of the maximum interest rate charged on monthly auto insurance premium payments; and adjustments to the monetary threshold beyond which the tort deductible does not apply to reflect inflation (adjustments to reflect inflation in the associated tort deductible were undertaken via an update to regulation 461/96). On August 26, 2015, the Ontario government filed Ontario regulations 250/15 and 251/15 implementing reforms set out in Bill 91. With the most recent valuation (June 30, 2019), reform adjustments (originally introduced with the September 30, 2015 valuation) specifically related to changes to the SABS impacting the bodily injury and accident benefits coverages, were included with the updated industry trend analysis (completed using industry data as at December 31, 2018), impacting the selection of ultimates.

I.2 Alberta

In the **Alberta Treasury Board and Finance Notice 04-2018** (Clarification of Minor Injury Regulation), dated **May 17, 2018**, the Alberta Superintendent of Insurance advised that clarifying amendments have been made to the definition of minor injuries under the Minor Injury Regulation (MIR). With the most recent valuation (December 31, 2018), adjustments have been made to our valuation estimates to reflect our estimates of the impact of these amendments, including a one-time adjustment of -10.0% applied to account for MIR change effective June 1, 2018, reflected in the most recent updated industry trend analyses completed using industry data as at June 30, 2018.

The **Minister of Treasury Board and Finance issued Ministerial Order 14/2018**, on **October 31, 2018**, which states unless otherwise directed by the Minister, the AIRB may not approve filings from insurers for cumulative rate increases on private passenger vehicles greater than +5.0% during the period between December 1, 2018 and August 31, 2019. At the current time, no explicit adjustments have been made to our valuation estimates or views based on this order.

I.3 Harmonized Sales Tax

In the fiscal 2016-17 provincial budget released February 2, 2016, the **New Brunswick** Finance Minister announced a 2 percentage point increase in the provincial component of the harmonized sales tax ("HST") effective July 1st, 2016 increasing the combined HST rate in the province from 13% to 15%.

With the most recent valuation (December 31, 2018), HST adjustments were no longer explicitly taken into account with the updated industry trend analysis (completed using industry data as at June 30, 2018), on the assumption that the HST adjustments are reflected in the data.

I.4 Harmonized Sales Tax Class Action - Ontario

Since the end of October 2018, class action lawsuits have been brought against multiple insurers related to HST and limits / sub-limits of benefits per the Statutory Accident Benefits Schedule and FSCO's Professional Services Guideline as part of claims settlement practices in Ontario.

At the current time, no adjustments have been made to our valuation estimates, but in conjunction with FA's Appointed Actuary, FA management continues to review and consider the implications of the potential outcomes related to the class action lawsuits. Please contact Shawn Doherty at sdoherty@facilityassociation.com if you need further information.

J. Appendix 3: Court Decisions

J.1 Nova Scotia Court of Appeal

The **Nova Scotia Court of Appeal** confirmed, in a unanimous decision released on **January 18, 2019** in relation to **Sparks v Holland** (**2019 NSCA 3**), that future Canada Pension Plan (CPP) disability benefits are deductible from future income loss awards in motor-vehicle accident claims in that province. Sparks sustained injuries as a result of a motor vehicle accident in Nova Scotia and sought damages for personal injuries and loss of income. The decision supported an earlier decision (Tibbets v Murphy, 2017 NSCA 35) that both past and future CPP disability benefits are deductible under section 133A of the Insurance Act. At the current time, no adjustments have been made to our valuation estimates as a result of this decision.

K. Appendix 4: General description of the RSP valuation process

1) select a priori loss ratios
   a. start with prior valuation a priori model
   b. update with prior valuation final selected ultimates
   c. update with trend / rate as available
   d. final selection approved by Appointed Actuary
2) collect / prepare / reconcile / validate valuation data
   a. results presented for review and acceptance by Appointed Actuary
3) complete Actual vs Projected process
   a. prepare exhibits and metrics
   b. share with Appointed Actuary for review and consideration
4) calculate ultimate estimates based on incurred link ratio method
   a. prepare triangles and link ratio averages
   b. prepare estimates based on pre-determined default link ratio selections
   c. final link ratio selections reviewed and accepted by Appointed Actuary
5) calculate ultimate estimates based on a priori loss ratio method
   a. prepare estimates
   b. final estimates reviewed and accepted by Appointed Actuary
6) calculate ultimate estimates based on Bornhuetter / Ferguson method
   a. prepare estimates
   b. final estimates reviewed and accepted by Appointed Actuary
7) final IBNR selection
   a. prepare summary of IBNR estimates underlying each valuation method at coverage / accident half-year level
   b. Appointed Actuary selects final IBNR by coverage and accident half-year, taking into consideration IBNR estimated from valuation methods employed and other information
8) complete paid emergence and apv factor models (coverage / accident half-year)
   a. load triangles, selected ultimates, current yield curves into model
   b. select initial emergence ratios (currently using initial paid / ultimate ratios to determine emergence ratios) and calculate associated payment / cash flow estimates
   c. select discount rate and investment rate margin
   d. select development margins

   e. final selections reviewed / accepted by Appointed Actuary

9) select expense ratios for premium liabilities
   a. initial selections prepared
   b. Appointed Actuary selects final ratios
10) present results to Actuarial Committee
   a. prepare and post analysis package
   b. implementation impact estimated
   c. update analysis and selections based on discussion and review
   d. post updated analysis package (as necessary)
11) summarize valuation assumptions
   a. Appointed Actuary reviews and signs off
   b. assumptions given to Facility Association for implementation
12) present results to Audit & Risk Committee
   a. prepare and post valuation summary and implementation impact package
   b. present / review / discuss results
13) complete recorded emergence models (coverage / accident half-year)
   a. load triangles, selected ultimates
   b. select initial emergence ratios (currently using recorded / ultimate ratios to determine emergence ratios) and calculate associated recorded emergence
   c. final selections reviewed / accepted by Appointed Actuary
14) implement valuation
15) prepare summary of year-on-year change in process and liabilities for review by Accounting Committee (annual only – occurs in November to align with October Statement preparation)
16) prepare summary of year-on-year change in process and liabilities for review by Audit & Risk Committee (annual only – occurs in November to align with October Statement preparation)
17) prepare Appointed Actuary Report (annual only – occurs in February/March to align with release of Board approved Financial Statements)

L. Appendix 5: Exhibits

The exhibits are split by RSP. Exhibits are posted separately on the FA website.
Within each RSP exhibit group are found:

Exhibit A changes in ultimate selection over time

Exhibit B.1 ("**total**" Government Line/coverage level)

- **B.1.1** Summary
- **B.1.2** Loss Ratios over time
- **B.1.3.1** Government Line Ultimates
- **B.1.3.2** Selected Weights
- **B.1.3.3** IBNR by Method
- **B.1.4.1** a priori LRs

Exhibit B.2 (same as B.1 exhibits, but for **TPL** Government Line)

Exhibit B.3 (same as B.1 exhibits, but for **Accident Benefits** Government Line)

Exhibit B.4 (same as B.1. exhibits, but for Other Government Line)

Exhibit C interest rate sensitivity

Exhibit D claims development margins