

# **Bruin Mutual**

## **Executive Summary**

*Team 36*

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### **I. INTRODUCTION**

In an effort to conduct a reserving review for the three requested lines of business (personal auto physical damage, personal auto liability, and homeowners), we created a workbook to accept the provided claim data and output diagnostic triangles and reserving calculations. This included variations of paid and reported dollar, claim count, claim severity, and case outstanding triangles. With the generated data, we were able to utilize five reserving methods (paid chain ladder, reported chain ladder, expected loss, Bornhuetter-Ferguson, and case outstanding) to identify the recommended ultimate loss selections given a corresponding accident year.

### **II. DISCUSSION OF RESERVING METHODS**

#### **a. Paid Chain Ladder Method**

The chain ladder method computes the amount of reserves that are established for future claims from the results of past claims. The advantages of the paid chain ladder method is that it uses the latest information about the losses for the specified time period and produces accurate results when the ratio is changing. A disadvantage of this method is that payment patterns and link ratios from the chain-ladder cannot predict the liability for large claims, which have a significant impact on the outcome of an accident year. In other words, because it assumes historical patterns will repeat, this method can be over-responsive to changes in data.

#### **b. Reported Chain Ladder Method**

The chain ladder method computes the amount of reserves that are established for future claims from the results of past claims. An advantage for the reported chain ladder method is it uses all available information so inaccuracies in result cannot be related to the absence of any data. A disadvantage is that this method also uses case reserves, which are estimates, to develop estimates of ultimate losses. When estimates of ultimate losses are developed using estimated data instead of concrete numbers, the results can vary and ultimately contain lower accuracy.

#### **c. Expected Method**

The expected method is mainly used by the insurers to identify projected losses with reference to the premium earned and estimated amount of claims to be settled in future. A benefit of this method is estimation of risk for a preliminary estimate. With the help of a ratio and analysis, an insurer can determine in advance what amounts of claims or losses will be incurred, and set aside a portion of the premiums to settle the probable claims. A disadvantage of this

method is that the risk profile of clients is not considered. With regard to economic, social, and geographical diversity, each customer or type of customer has a different risk profile. That is not taken into account in this method of loss estimation probability.

**d. Bornhuetter-Ferguson Method**

The Bornhuetter-Ferguson method combines the expected method and the chain-ladder method. For a given accident year, the estimated ultimate loss is obtained by adding the reciprocal of the loss development factor (LDF) to actual reported losses. A benefit of this method is that it is more stable in response to changing data than the chain-ladder method. A disadvantage is that the method relies on the accuracy of the expected loss ratio.

**e. Case Outstanding Method**

The case outstanding method is also known as cash reserve. To put it another way, this method is appropriate when used with lines of insurance for which most claims are reported in the first accident period. As a result of this requirement, the case outstanding development method is especially strong for analyzing claims made for a given accident year and reporting on them. A benefit for this method is that it turns client information into usable data. A disadvantage of this method is that in most lines of business (LOB), the case outstanding does not provide sufficient information about pure IBNR.

### **III. RESERVING RECOMMENDATIONS**

**a. Personal Auto Physical Damage**

Out of the five methods used, four had similar estimates for ultimate losses: the paid chain ladder method, expected loss method, Bornhuetter-Ferguson method, and case outstanding method. The reported chain ladder method gives a comparatively high and extreme estimate, so it was ruled out for selection. The paid chain ladder method was ultimately selected since it relies on historical patterns. As the loss data shows relatively stable patterns year to year, it is reasonable to rely on historical patterns for reserving.

**b. Personal Auto Liability**

It can first be observed again that the reported chain ladder method gives a comparatively high and extreme estimate, so it was **ruled out** for selection. The total ultimate losses and the estimated ultimate losses are **unusually small** from 2018 to 2020, especially when using the expected loss method and the Bornhuetter-Ferguson method. Since the Bornhuetter-Ferguson and expected loss methods respond more to new data, it can be inferred that the anomalous data is **skewing and understating the losses**. This may be due to mandatory COVID-19 stay-at-home orders, which would decrease the number of drivers and thus the possibility for incidents to occur. Since the initial effects of the pandemic have since worn down and regulations have been loosened, **driving patterns should be expected to begin returning to historical patterns**. In addition, the past data shows relatively volatile changes, which typically indicates the use of the Bornhuetter-Ferguson method. However, the pandemic data will skew the reserving calculations and thus should be treated as outlier data. As such, historical patterns should be relied on and the paid chain ladder method should be used.

**c. Homeowners Property**

For homeowners property, the data for 2020 shows a small value for ultimate losses. Specifically the Bornhuetter-Ferguson method has a value of roughly 10.5 million while the expected loss calculates the ultimate loss at around 6 million which is relatively low when comparing the other methods. The best reasoning for decrease in losses would be the result of less insurance as people sold their houses during the pandemic. Conversely, the case outstanding method gives a relatively large number for expected loss cumulating to over 3.3 billion. Based on the organization of the data, the paid chain ladder gives the best estimate for the ultimate losses as this method depends more on past data and works best with well-organized data with a more predictable pattern.

**d. Recommendation on Standardizing Methods**

As an actuary with limited resources, we must choose a method to standardize that will help us save time in computing the values for the reserve analysis. To do this, we must select a line of business and methods that would best calculate the data. The appropriate line of business would be the auto physical damage line of business as this is the most organized, containing a small number of outliers and simple pattern of progression in data. Based on this preference, the best methods to calculate the data would be the paid loss method, the Bornhuetter-Ferguson method and the case outstanding method. The paid loss method is favorable to neatly organized data, such as the data exhibited in the physical damage line of business, which will help the data compile more accurate results. The Bornhuetter-Ferguson method would be useful as it relies on past data and new data, which means that this method is stable enough to find a reliable estimate of the ultimate loss. Finally, since the data is neatly organized, the ratio to find future values will be stable, making calculating future outcomes through the case outstanding method ideal for this data.

#### **IV. NOTE ON CATASTROPHIC RESERVING**

**a. Why is it done separately?**

As catastrophic reserving is specifically for extreme circumstances like earthquakes or a pandemic, this reserve is set aside to be available when a given event occurs. Furthermore, this helps to alleviate and control the long term agenda for cataclysmic events.

**b. Challenges of CAT Reserving**

A challenge specific to CAT reserving involves location and access. Based on the location and the scale of a catastrophe, the speed at which information can be gathered and communicated can be severely limited. Another challenge is the length of said event. The variable time frame of such an event can lead to a great deal of uncertainty, particularly for estimating business interruption claims. The legality is the final challenge unique to CAT reserving. If a claim settlement is disputed, where a trial takes place can vary. Based on the legal environment of the country that the claim is tried in, outcomes may be unexpected.

#### **V. CONCLUSION**

Using the workbook we created and the five reserving methods, our team was able to estimate the indicated ultimate loss for each method. By considering the characteristics of each

reserving method and analyzing the estimated ultimate loss figures, our team recommended a reserving method for each line of business. Furthermore, we standardized specific reserving methods (paid loss method, Bornheutter-Ferguson method, case outstanding method) to a specific line of business (auto physical damage) to save time and resources in completing the reserve analysis in future reserving periods.