

RESERVING CLAIMS IN TWO STEPS

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Abstract

To estimate IBNR reserve standard actuarial methods apply development factors to claims paid to date and reported to date. The separate estimate of pure IBNR (Incurred But Not Reported) and IBNER (Incurred But Not Enough Reported) can be addressed in a number of ways. We define “pure IBNR” to mean the estimate of ultimate claims for claims not yet reported; “IBNER” or “development on known claims” to mean the estimate of ultimate claims for known claims, less currently reported amounts; and “total IBNR” to mean the total of these two amounts. We applied several methods to calculate estimates that ultimately proved to be more accurate than traditional triangle methods.

Key words: *Claims reserve estimation, IBNR, IBNER, Development factor*

Introduction

Hereunder, we shall observe the elaboration of the evaluation of the pure IBNR and IBNER individually. The developments factors to claims paid and reported are usually applied in the standard actuarial methods as regards to the reservation. They are used to calculate an evaluation of ultimate claims that results in the estimation of IBNR.

The individual evaluation of these two values can be analyzed in multiple aspects, we shall apply a method almost much similar to the traditional claim development methods that is based on triangles, but with the due modifications, that facilitates the calculation of these individual values.

By the definition, “pure IBNR” we refer to the evaluation of ultimate claims for those claims not yet reported. By the definition “IBNER” or “further elaboration and progress on known claims” we refer to the evaluation of ultimate claims for known claims, less currently reported amounts and by the definition “total IBNR” we refer to the total of these two values. The outcome of these two individual processes can be combined into one factor/projection by using the below common methods:

- The development of the claims that are already reported to their final value
- The evidence of claims that were not reported earlier (which then later on progresses to their finale amounting).

So, the incentives for the reserve analyses are:

- Exactness of reserve evaluation: The method used enables us to monitor individually the two specific changes that were being materialized in the database that we are interpreting: the changes in the legal provisions impacted directly on the late claims reporting; the outcome is that models were deflected only for pure IBNR but there was no effect on IBNER.

The court verdicts did affect the progress of the claims registered; a large number of the registered claims belonging to accidents that occurred on different years recently developed unreasonably and above any expectation that could be repeated in the future.

- Presentation of our reserve evaluation: The management had certain expectations on the future development of the reported claims, and of course intended to compare to the estimation focusing on the actuarial analysis; for this purpose, we required individually evaluations of the two sources of “total IBNR.”

The three aspects of the development factors

We present a third aspect (accident reporting date) aiming to the completing of the analysis, whereas the standard development methods use triangles in two aspects, normally accident years in rows and evaluation ages in columns. In order to develop only the registered claims, a large quantity of data is necessary and as well, an extended organization of the data needs to be performed.

Accident year	Development year				
	0	1	2	n-1
1	C_{10}	C_{11}	C_{12}	...	$C_{1,k-1}$
2	C_{20}	C_{21}	C_{22}	...	
3	C_{30}	C_{31}	C_{32}	...	
⋮	⋮	⋮	⋮	⋮	
n-1	$C_{k-1,0}$	$C_{k-1,1}$			
n	$C_{k,0}$				

Figure 1: Claims triangle

The development factors (DFs) can be elaborated for all historical accident years from a single triangle, by applying the standard chain ladder methods. To elaborate only registered claims, it is required a different triangle for the development of a factor for each of the historical accident years.

$$DF = \frac{C_{i,k}}{C_{i,k-1}}$$

Anyway, such analysis is much more inconvenient comparing to a traditional analysis. As we already know, in the traditional analysis it is utilized one claim triangle and $(n - 1)$ DFs, where n is the number of years of development. A three-aspect analysis has $(n-1)$ triangles and $n*(n - 1)/2$ development factors which is generated by setting up different individual triangles for each phase of the development. DFs are selected as normal, utilizing simple or weighted averages similar to those that are used for standard methods, and the actuarial consideration starts to have its effect if those averages are not considered referential for future expected evolution. By using this method as described, we can evidence essential weaknesses:

- the credibility can be diminished if segmentations are added to the data.
- the extent of judgment necessary is much higher due to the large number of DFs that must be selected
- generally, the method requires materially more data and data organization strives than standard methods.

Utilizing a mathematical function to configure the development

Apart from the methods used, which are based on triangles, another method was used to estimate the development on known claims called “development curve”.

The aim was to obtain a function to be implemented to claims at every phase of development to measure an absolute value for the claims.

The development factor was calculated $f(\alpha-\beta,\beta)$ using the ratio of $(X) / (Y)$ where:

X = the total amount paid for all claims within “ β ” quarterlies (years) of occurrence

Y = the total amount paid for all claims within “ α ” quarterlies (years) of occurrence

Conclusions

These methods enable the opportunity to provide additional interpretation to management of the fundamental reasons for development. For example, a divergence in the figures of unreported claims from the predicted number probability is not as the consequence of claims handling methods (regarding our particular example for the MTPL, we focused on our study, it was the consequence of a particular law change), even though unpredicted development on known claims could identify a matter of claims handling/reserving. Tail factors can be calculated and would mostly use the same actuarial reasoning as conventional methods. The development of the triangles crucial for our method was highly reliant on the use of report date, boosting the level of data validation – if the report date is registered accurately and persistently in the data systems.

References

1. Shnieper, R. (1991). Separating true IBNR and IBNER Claims. *ASTIN Bulletin*, Vol 21, No. 1.
2. Verrall, R., Nielsen J.P. and Jessen A.(2010) Prediction of RBNS and IBNR claims using claim amounts and claim counts, *ASTIN Bulletin*, 40(2), 871-887
3. Schlemmer D. D., Tarkowski, T. (2013) Reserving in Two Steps: Total IBNR = Pure IBNR + IBNER, *Casualty Actuarial Society E-Forum*
4. Liu, H., Verrall, P. (2009). Predictive distributions for reserves, which separate true IBNR and IBNER claims. *ASTIN Bulletin*, 39(1), No. 35-60.