CLAIMS RESERVING IN JAPANESE GENERAL INSURANCE

- PART2 -
Challenging tasks under the International Financial Reporting Standard on IBNR

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Present practices

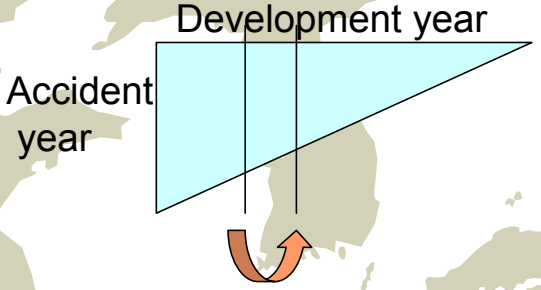
IBNR reserving techniques available in Japan

- Traditional Chain-Ladder
- Formula A
- Formula B
- FD Method
- Bornhuetter- Ferguson
- Benktander Method (*)

(*)The Benktander method estimates future cash flows of past claims by combining the empirical data (e.g. from the chain-ladder technique) and the prior information (e.g. from the Bornhuetter-Ferguson technique) under the credibility theory.

Traditional Chain-Ladder Method

The chain-ladder technique is a widely used method in practice to estimate future cash flows of past claims (i.e. claims outstanding including IBNRs).



Future cash flows are estimated by assuming that the past development patterns remain constant in the future.

D_{ik}: cumulative claims for the accident year "i" and the development year "k"

Estimator $\hat{f}_k$ of the loss development factor is an unbiased estimator of the true loss development factor f_k

$$\hat{f}_k = \frac{\sum_{j=1}^{N-k} D_{j,k+1}}{\sum_{j=1}^{N-k} D_{j,k}}, \quad 1 \le k \le N-1$$

Ultimate amount of the claims

$$\hat{D}_{i,N} = D_{i,N+1-i}\,\hat{f}_{N+1-i} \Lambda\, \hat{f}_{N-1}$$

Bornhuetter- Ferguson Method

The chain-ladder data sometimes cannot be directly applied to the estimation of cash flows of immature claims, because the actual experience in the earliest (i.e. less mature) development periods may represent just a few claims.

The fewer the claims, the more volatile the result, hence the lower the information content of the result. In such cases, it is preferable to reflect prior information on the estimation. In the Bornhuetter-Ferguson technique, the chain-ladder estimate of the ultimate claims is replaced by an alternative estimate based on external information and/or expert judgement as follows:

Ultimate Claims

= Cumulative Claims

*+Alternative Estimate * (1–Emergence Ratio by development year),*

Challenging tasks

Japanese actuaries who are in charge of reserving in general insurance business are facing challenging tasks under the International Financial Reporting Standard on accounting for insurance contracts

International Financial Reporting Standard (IFRS) on accounting for Insurance Contracts

Objective : To develop an International Financial Reporting Standard on Accounting for Insurance Contracts because

(a)there was no IFRS on Insurance Contracts, and insurance contracts were excluded from the scope of existing IFRS

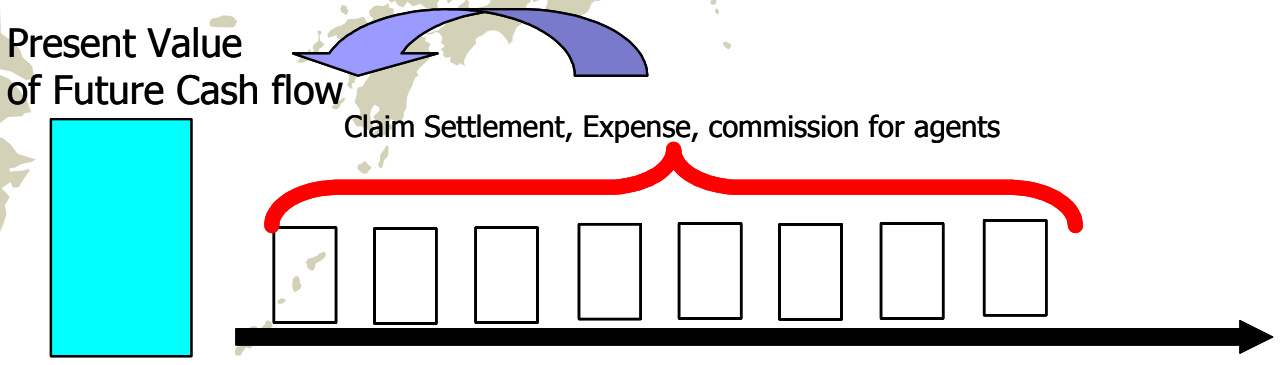
(b) accounting practices for insurance contracts were diverse, often differed from practices in other sectors.

International Financial Reporting Standard (IFRS) on accounting for Insurance Contracts

Phase II

May 3 2007: Issues Discussion Paper
Preliminary Views on Insurance Contracts
late 2008 : Exposure Draft
2010？ : Final Standard

Insurance liabilities - Estimates of future cash flows



Three Building Blocks

The Board's preliminary view is that an insurer should measure all its insurance liabilities using the following three building blocks:

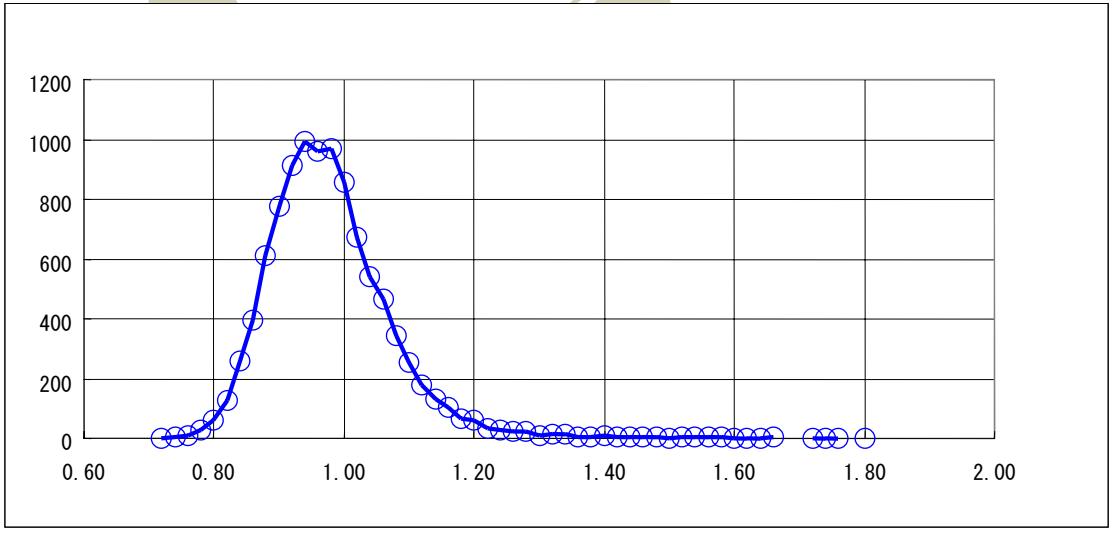
(a) explicit, unbiased, market-consistent, probability-weighted and current estimates of the contractual **cash flows.**

(b) current market **discount rates** that adjust the estimated future cash flows for the time value of money.

(c) an explicit and unbiased estimate of the **margin** that market participants require for bearing risk (a risk margin) and for providing other services, if any (a service margin).

Stochastic Claims Reserving

- (1) Mack's Model
- (2) Bayesian Method
- (3) Random Walk Model
- (4) Over-dispersed Poisson Model　etc



Example of Stochastic Claims Reserving

Over-Dispersed Poisson

In claims reserving, the over-dispersed Poisson model assumes that the incremental claims ($C_{i,k}$) for the origin year [i] and the development year [k] are distributed as independent over-dispersed Poisson random variables with mean and variance

$$E\left[C_{ij}\right] = m_{ij} = x_i y_j \qquad Var\left[C_{ij}\right] = \phi x_i y_j$$

$$\eta_{ij} = \log(m_{ij}) = c + \alpha_i + \beta_j$$

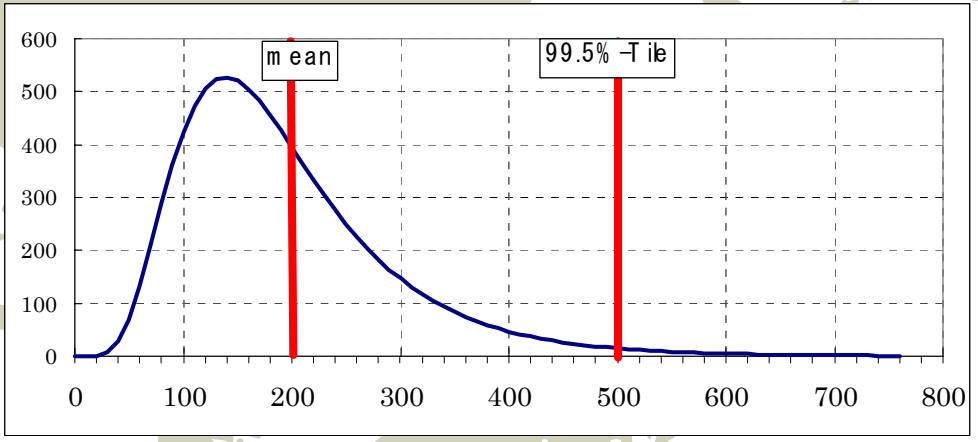
The over-dispersed Poisson model is a bridge between traditional and stochastic methods

Bootstrapping - Method

Replicating the claims by simulations such as Bootstrapping may be more practical solution. Bootstrapping revolves around sampling with replacement from the observed data sample to create a large number of sets that have the same underlying distribution.

- **Re-sampling (with replacement) from data to create new sample**
- **Calculate measure of interest**
- **Repeat a large number of times**
- **Take standard deviation of results**

Outline of Calculation – image -



(1) The distribution of present value of future cash flow can be made by Bootstrapping Method as above.

(2) Expectation and 99.5%-Tile (VaR) can be derived from this distribution.

(3) Risk margin and Claim Reserve can be evaluated by capital cost rate, risk-free rate, expectation and VaR as follows;
Risk Margin = (VaR – Expectation) * (risk-free rate + capital cost rate)
= (500 - 200) * (2% + 8%) = 30
Claim Reserve = Expectation + Risk Margin = 200 + 30 =230