Chasing the Tail: The Changing Life Cycle of a Short-Tail Claim and Impacts on Reserving
Sonia Tripolitano, Ryan Anderson

Key words: claims, reserving, reserving actuary, claims development, technology, disruption, short-tail, valuation

Purpose of your paper: To examine the life cycle of short tail claims and discuss how this impacts reserving now and in the future.

Synopsis: Short-tail actuarial reserving techniques typically rely on past experience as indicative behavior of future experience. Historical claim reporting patterns and incurred cost development provide key inputs to the valuation model selections and these are influenced by factors such as operational and technological changes. It is necessary for the reserving actuary to understand how changes and potential future changes to the claims process impact these trends so that appropriate judgement can be applied to modeled outcomes.

This paper aims to explore the changing life cycle of short tail claims and the impact this has on reserving valuations. Some of the key focus areas will include:

- What does the life cycle of a claim look like?
  - How has the life of a claim evolved over time?
  - How does the claim life cycle look now?
  - What could this look like in future?
- Rate of change in technology causing disruptions to pattern of lodgements, settlements and finalisations
  - The rate of technological change is quicker than at any time in observable claims history – how can actuaries respond to this in their reserving approach?
  - How equipped are we currently for responding to changes and is this adequate for the expected rate of change in the future?

By the nature of their work, reserving actuaries are strongly aligned with the claims function of an insurer. They also play a key role as a trusted business partner due to their in-depth understanding and influence on P&L movements and balance sheet results. With the technical toolkit the reserving actuary possesses we see significant value in actuaries maintaining strong relationships with claims and continuing to understand (and potentially influence) changes in the life cycle of a claim.

Ultimately the expectation is that the claim process will become better for an insured and the reserving process will stay as relevant and insightful for the business as possible.
The Future of Risk Modelling and Quantification
Steven Girvan, Melissa Yan

Key words: Claims, claims management, operational model, technology, customer, talent

Purpose of your paper:
This paper will address the changing requirements of claims management operations in response to that changing nature of claims.

Synopsis:
Claims operations of the future will be very different to that of today.

A number of external factors will mean that claim frequency and severity are changing in some lines business. For example, motor claims frequency and severity has been declining for a number of years as a result of better road, vehicle safety and driver training and driver assistance technology. Increasing penetration of connected sensor technology in homes will mean lower claims frequency than today and enable more effective monitoring of incidents. On the other hand, increased frequency of weather related events will mean that whilst overall frequency is likely to decrease there will be more examples of peak demand where operations will need to scale up.

Additionally, digital is transforming consumer behavior and demands. Many more customers will demand self-service for a range of tasks either as part of a multichannel experience or on a standalone basis. Customers will be prepared to self-serve for notification for less complex claims and they will demand timely accessible and transparent information about the status of their claims.

What does this mean for insurance claims operations? This paper will discuss:

- The role of technology including increased use of Robotic Process Automation
- The changing demand for claims operations talent
- The potential paradigm shift in claims value chain

Claim leaders should be thinking today about how to lay the foundations for the needs of the operational model to meet the claims of the future.
Insurance Fraud - Are we winning, or are the odds stacked against us?
Raj Kanhai, Jacob Mamutil, John Jeaitani

Key words:
Soft Fraud
Claims farming
Prevention
Detection
Cost
Collaboration
Technology
Analytics
Big Data

Purpose of your paper:
This presentation will examine the nature and extent of insurance fraud, consider the industry responses, appropriate mitigation strategies and the impacts of technology, both in increasing the opportunity for fraud and in boosting defensive measures.

Synopsis:
This presentation will examine the age-old topic of insurance fraud.

Insurance fraud can include the exaggeration of an otherwise legitimate claim, or the intentional misrepresentation of the facts, or manipulation of the claims process to gain a financial advantage where there has been no actual loss. Fraud is considered at law to be a serious indictable offence where the penalties can be imprisonment for up to 10 years (depending on jurisdiction) or a substantial fine or both.

The Insurance Fraud Bureau Australia estimates up to 10% of all claims could include some level of fraud. This presentation will examine how this figure is derived and whether it withstands scrutiny. On the basis that data collection in this area has been less than rigorous, we investigate whether these estimates ($2 billion per annum) reflect sound empirical evidence. We also look at some fraud crime statistics as part of our discussion.

The presentation will examine a range of issues, including:

- The nature and extent of the fraud problem, by reference to some recent case studies in these areas:
  - Accident compensation schemes
  - Property fraud

- The difference between ‘so-called’ hard and soft fraud. Regarding soft fraud, we look at the continuum from exaggerated claims through to gross exaggeration and outright fraud. The line between a bit of embellishment and gross exaggeration is often a difficult one to discern, whereas outright or ‘organised fraud’ may be easier to detect but carries a heavy burden of proof.

- The response by insurers - We consider insurers’ capability with respect to fraud detection and the extent to which insurers take a commercial approach to fraud (costs outweigh the benefits of fraud investigation). The use of claims farming techniques to ‘bombard’ insurers with multiple claims, has forced some insurers to compromise and settle small claims while tactically deploying resources on claims displaying higher indicia of fraud. Where each organisation regards that the line has been crossed is very much determined by its own tolerance levels, culture and resourcing priorities.
Robustness in Reserving
B. Avanzi, M. Lavender, G. Taylor, B. Wong

Key words: Reserving, Chain Ladder, Mack model, Outliers, Robustness, Influence functions

Purpose of your paper:

We consider robust (relatively immune to outliers) reserving. In particular, we focus on the Mack model, and extend existing statistical techniques to allow for typical properties of insurance data, such as skewness.

Synopsis:

Often, in actuarial applications, data sets display values that are potential outliers. Reserving is no exception (see, e.g., Verdonck et al., 2009 or van Wouwe et al., 2009, Verdonck and van Wouwe, 2011). It is sometimes impossible to determine whether those data are real outliers or mistakes. A robust method is one that balances the two extreme approaches of not taking the datum into account, or conversely, taking it into account as a normal datum. In other words, robustness refers to the ability of a model or estimation procedure to not be overtly influenced by outliers in the dataset under investigation and/or deviations from the underlying assumptions of the model.

Robust statistical techniques have existed for a long time, but recent developments encouraged us to revisit and extend the (relatively scarce) literature on robust reserving. To somewhat formalise what a robust procedure should strive for we refer to the three fundamental features outlined by Huber and Ronchetti (2009)

1. Efficiency: Optimal or nearly optimal efficiency under the assumptions of the chosen model.
2. Stability: small divergences from the model should only have a minor effect on its performance
3. Breakdown: Moderately greater divergences should not lead to a disaster

The first point means that to achieve an effective robust procedure we should not detract significantly from efficiency of the assumed model. The following two points go to the heart of the robustness issue and explain how the procedure should behave in the presence of outliers or deviations. It is this intuition that will be carried through this paper as we explore the robustness of classical reserving models and propose robust counterparts.

The chain ladder technique is highly susceptible to outliers due to the well known non-robustness of the mean (Verdonck et al., 2009). Verdonck and Debruyne (2011) highlight the vulnerability of these approaches by calculating the influence functions of the parameters, future claim estimates and reserves with respect to incremental claims under the Poisson generalised linear model (GLM) specification of the chain ladder approach. Importantly, these influence functions are shown to be unbounded. An unbounded influence function means that a small contamination of a single data point can have an arbitrarily large effect on the estimate. This result comes from the use of the maximum likelihood (and quasi-likelihood) estimation procedure of which the susceptibility to outliers has been shown by numerous authors (see for example Pregibon, 1982, Künsch et al, 1989). A robust procedure should have a bounded influence function. Similar results regarding robustness of the chain-ladder techniques are found in Venter and Tampubolon (2010), who explore the impact of incremental claims on final reserve estimates under a range of models and also look at the sensitivity of each fitted value to the corresponding initial observed value.

Importantly, if applied blindly, reserving models may lead to severely inaccurate reserve estimates and in tum final conclusions. Hence the extent to which the models employed to forecast future reserves are robust deserves considerable attention. We will initially give such attention to exploring the robustness of some classical reserving techniques.

We will then evaluate some robust multivariate loss reserving techniques and address some identified shortfalls. The issue of robustness in multivariate reserving has been somewhat considered in the
literature. Verdonck and van Wouwe (2011) have put forward a robust bivariate chain-ladder technique that employs two techniques to detect and adjust outliers. One of these techniques is based on the minimum covariance determinant (MCD, see Rousseeuw, 1984) robust estimation of location and scale of a data set. From here a robust distance measure (Mahalanobis distance) of each data point is calculated and those beyond a certain threshold are considered outliers. This approach relies on the assumption of elliptical symmetry of the underlying data which can be problematic when claims observations are skewed as is often the case in reality. The other technique is based on the bagplot (Rousseeuw et al, 1999) and is purely graphical. Furthermore, both these techniques rely heavily on the arbitrary selection of tuning parameters. We will discuss these issues.

The theoretical results and practical techniques presented in this paper will facilitate an understanding of the robustness of reserving techniques as well as provide viable methods to handle features of loss data that are known to occur in reality. Results will be illustrated with simulated and real data.

References:
Self-assembling insurance claim models
Greg Taylor, Hugh Miller & Gráinne McGuire

Key words: claim modelling, Additive Model, Generalized Linear Model, lasso, loss reserving, regularized regression

Purpose of your paper: Introduction of a simple and automated means of models of complex claim data sets

Synopsis:

The presentation considers claim data sets containing complex features, e.g. simultaneous irregular trends across accident periods, development periods and calendar periods. The literature contains contributions on the modelling of such data sets by various forms of multivariate model, such as the Generalized Linear Model.

Such modelling is time-consuming and expensive. The presentation investigates the automation of the modelling process, so that the model assembles itself in the presence of a given data set. This is achieved by means of regularized regression, specifically the lasso, of the claim data with a specified set of spline basis functions as regressors.

This form of modelling is applied first to a number of simulated data sets whose properties are fully known. The extent to which the model, applied in an unsupervised fashion, captures the known features embedded in the data is investigated.

Subsequently, the unsupervised modelling is applied to a real-world data set. Although this set’s properties are, therefore, strictly unknown, the authors have some 15 years’ experience with it, and are therefore familiar with many of its features. It has been modelled for many years with a Generalized Linear Model, the results of which are compared with those from the self-assembled model.

The use of regularized regression in this context requires careful consideration of the tuning parameter(s). This is discussed in some detail. Throughout the exposition, emphasis is also placed on the investigation of forecast efficiency of the self-assembled models, and on comparison between candidate models.
The Future of Liability Insurance
By Alice Huang, Estelle Pearson

**Key words:** Liability, commercial lines pricing, reserving

**Purpose of your paper:** To take stock of the current Liability insurance industry in Australia and to provide a thought piece on the changes ahead for Liability insurance products, claims, reserving and pricing, as well as how the role of actuaries can progress in this space

**Synopsis:**

More than 10 years ago, Liability insurance was the talk of the town – the liability crisis was fresh in people’s minds, and with that, the uncertainty around the effectiveness of tort reforms.

Now with more than 10 years of benign claims environment behind us, it’s time to take stock of the current situation for Liability insurance in Australia and, more importantly, consider what changes tomorrow might bring.

Our paper will address topics such as:

- How is the landscape of Liability insurance changing in response to the (sometimes rapid) economic, social, structural and technological changes? How do these changes affect customers’ liability insurance needs, the insurance cover provided and the types of claims that insurers can expect.
- Is it time to change our view of superimposed inflation in pricing and reserving for Liability portfolios? Is superimposed inflation still a relevant concept?
- What are the key risk factors for Liability insurance to keep an eye out for?
- A look at where actuarial pricing for Liability insurance may be headed in the age of data analytics
- How can we progress the role of actuaries in this space?
Insuring Cyber Risk - Intro & More
Actuaries Institute Cyber Working Group - Peter Yeates, Susie Amos, Dean Marcus, Andrew Kwok, David Xu, Jeremy Waite

Key words: Cyber, Insurance, Data, Product, Underwriting, Pricing, Exposure, Market, Australia

Purpose of your paper: To provide a comprehensive introduction of the risks and opportunities of insuring cyber insurance in Australia. It attempts to demystify how cyber insurance fits in to the business and insurance market. The paper focuses on the perspective of the General Insurer offering cyber insurance. It is relevant for actuaries, underwriters, product and claims managers, as well as anyone interested in understanding cyber insurance in Australia.

Synopsis:

Cyber risk is now seen at the top of the list of concerns facing businesses and governments around the world. Given this digital world we now live in, different types of risk, namely cyber, are emerging and insurers are well placed to provide protection to businesses against these risks. In Australia, the cyber insurance market is in its infancy and there is little data or consistency in the way businesses and insurers are managing cyber risk. There are many questions and concerns for those insuring cyber - Is cyber risk insurable and what is the exposure potential? What is the best way to provide cover? How do we price and underwrite and what data is available?

The Actuaries Institute Cyber Working Group provides an introduction to insuring cyber risk in Australia and explores the risks and difficulties this creates for General Insurers. The paper touches on the current state of the market, available data, product design, underwriting and pricing, aggregation, claims and reserving.

Australia is at the start of the journey towards understanding and insuring cyber risks. Insurers will need to work through the concerns and difficulties of insuring cyber risks to remain relevant in the digital world.