A Practical Guide to Commercial Insurance Pricing

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1. Abstract
Over the past 30 years, Personal lines pricing has been very attractive area of practice for pricing actuaries, as the characteristics of the portfolios align to the requirements of statistical analysis. These include a large amount of data, homogenous risks and a limited exposure to large losses. This has enabled actuaries to deliver significant value to Personal lines insurers through technical analysis and the development of sophisticated pricing structures.

The role of actuaries in Commercial insurance pricing is less established and there is an opportunity for the profession to become an integral part of the Commercial insurance industry. However this opportunity comes with challenges as a typical Commercial portfolio will

- Have a greater variety of the types of risks being insured
- Have poor, scarce or incomplete data
- Be heavily impacted by large losses

The purpose of this paper is to provide practical guidance to actuaries currently involved or looking to be involved in Commercial insurance pricing to ensure that their work is targeted so that it delivers more effective business outcomes. This includes recommendations on developing knowledge about the portfolio and the wider market, the need to engage with the business and the application of appropriate actuarial technical pricing methods to Commercial insurance.

Key Words: Commercial Insurance, Pricing, Underwriting, Data, Relationship Management, Technical Pricing Methods, Long Tail
2. Introduction
Over the past 30 years, actuaries have been heavily involved in the pricing of Personal lines portfolios but have found the Commercial insurance portfolios to be much less accessible. This is due to a number of characteristics of Commercial insurance including but not limited to

- The large number of complex products and covers
- Policies being highly heterogeneous even within the same product
- Poor, scarce or incomplete data
- High level of underwriting judgment applied to pricing of individual risks
- Be heavily impacted by large losses

There is a significant opportunity for actuaries to add more value in the pricing of Commercial insurance and this paper provides a holistic overview of how to approach the pricing of a Commercial lines portfolio. The paper focuses on providing the actuary with recommendations on how to positively influence the business outcomes of the insurer by producing targeted analytical outputs. The key recommendations in the paper are

- **That the Actuary builds an in depth understanding of the Commercial portfolio** so that they are able to set more informed assumptions, better understand the drivers behind the results of any analysis and be able translate the analysis into commercial insights. This will require
  - An understanding of the policy wording
  - Spending time on an ongoing basis with the Portfolio Managers, Case Underwriters and Claims Managers
  - Having clarity over the strategic plans for the portfolio
  - Understanding the overall dynamics of the market including the relationship with intermediaries and the market cycle
  - Understanding the impact that case underwriting has on the risks selected in the portfolio

- **That the Actuary works in partnership with the Portfolio Manager.** This will improve the quality of the analysis and the likelihood of the analysis being utilised to drive business outcomes and will require
  - Strong engagement with the Portfolio Manager throughout the technical pricing process
  - The Actuary being transparent over the assumptions made and provides justification to support the assumptions made
  - The Actuary being aware of the uncertainty around the result and providing a sensitivity analysis based on the variability of key assumptions
  - The Actuary to be proactive in presenting new ideas and analysis that could help the Portfolio Manager achieve the portfolio outcomes

- **That the Actuary builds an in depth understanding of the data within the portfolio** as the quality of data within Commercial insurance presents more challenges compared to Personal lines where actuaries have been using and improving the data over many years. Being able to understand and enhance the data asset
will enable the Actuary to ensure that their analysis is built on solid foundations. This will require

- Understanding the availability of key data fields and the quality of these fields
- Being proactive around improving the data asset for analysis by cleansing data available internally and accessing external data
- Taking a role as a data champion within the insurer

- That the Actuary adopts appropriate technical pricing methods which allow for the characteristics of the portfolio. Some of the key characteristics are
  - High proportion of large losses
  - The use of experience rating to price large accounts
  - The large number of industries
  - IBNR / IBNER
  - Level of Superimposed inflation
  - The legal environment including legislative changes
  - Latent Claims

The paper covers 7 main sections

- **An Overview of Commercial Insurance** – outlines the key concepts that the pricing actuary needs to know about the Commercial insurance market
- **Engagement with the Business** – highlights the importance of engagement with the business in being able to provide fit for purpose technical analysis and provide commercially actionable insights
- **The Commercial Insurance Pricing Actuary and Data** – provides the actuary with an overview of the key data issues within Commercial insurance and how they can make the best use of the data available both internally and externally
- **Technical Pricing Methods** - provides an overview of the key pricing methods that are used within Commercial insurance portfolios
- **Pricing of Long Tail Classes** – identifies the key additional complexities that underlie the pricing of the long tail classes
- **Complexities around Premium in Commercial Insurance** – highlights some key characteristics around how premium is treated and earned within Commercial insurance
3. An Overview of Commercial Insurance

This section aims to provide the pricing Actuary with an overview of the main features of Commercial insurance, including the roles of the Portfolio Manager and the Case Underwriter, the key differences between the Corporate and Small-Medium Enterprise segments of Commercial Insurance and the drivers behind the market price.

3.1. What is Commercial Insurance?

Commercial Insurance refers to insurance policies that cover any business or commercial activity and makes up around 40% of the insurance market with the remaining 60% being classed as Personal insurance.

Commercial insurance is sold to businesses of all sizes from small to medium enterprises such as the corner milk bar or a local building (typically referred to as Small-Medium Enterprise or SME) through to very large corporations such as the top 500 ASX companies (referred to as Corporate). We note that the definition of what fits into each category can vary significantly by insurer.

We have grouped the key Commercial portfolios in the below table into three segments - SME, Corporate and Speciality Classes based on the target customer for the portfolio. A portfolio that is not typically targeted towards either the SME or Corporate customers has been allocated to the Speciality Classes segment.

<table>
<thead>
<tr>
<th>Small-Medium Enterprise</th>
<th>Corporate</th>
<th>Speciality Classes</th>
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<tbody>
<tr>
<td>Commercial Motor</td>
<td>Fleet</td>
<td>Workers’ Compensation</td>
</tr>
<tr>
<td>Business Packages</td>
<td>ISR (Industrial Special Risks)</td>
<td>Professional Risks</td>
</tr>
<tr>
<td>Farm Packages</td>
<td>Stand Alone Liability</td>
<td>Marine</td>
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<tr>
<td>Crop</td>
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<td>Construction</td>
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<tr>
<td>Domestic Strata</td>
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<td>Extended Warranty</td>
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</tbody>
</table>

Some of the above portfolios are sold in the market as a number of distinct products. For example, the products within the Professional Risks portfolio include Medical Malpractice, Directors and Officers Insurance and Professional Indemnity. Some portfolios also may have a number of very distinct sections with different risk characteristics. For example, a single Business Package policy may include Fire, Public and Products Liability, Burglary, Machinery Breakdown, Consequential Loss, Tax Investigation, Theft and Money, Employee Dishonesty, Glass Breakage, Computer and Electronics and General Property sections.

**Recommendation 1:** That the Actuary reads the policy wordings and spends some time with the Case Underwriters, Claims Managers and Portfolio Managers to ensure they understand the products that they work on including the covers offered and the policy characteristics that drive claims. This additional understanding will enable the Actuary to set more informed assumptions, to better understand potential drivers of analytical results and to better translate the analysis into commercially actionable insights.
The large number of very distinct sections offered under some Commercial products can make it challenging for the Actuary to be across all of the analytical requirements of the portfolio. For example, an Actuary would require experience in natural perils, short tail commercial and long tailed commercial pricing to be able to fully deliver the pricing requirements for a business package portfolio.

**Recommendation 2:** That the Actuary is aware of the skills that are required across the portfolios that they have responsibility for, and seek specialist expertise as required in order to best support the portfolio. Where specialist expertise is not available, the Actuary should make the Portfolio Manager aware of the potential limitations in the analysis.

### 3.2. Key Roles in Commercial Pricing

In a typical Commercial insurer, there are three key roles which have responsibilities for the different aspects of the pricing process. These roles are:

- **Pricing Actuary** – has the responsibility for providing technical analysis to support the strategic direction of the portfolio. This includes:
  - Calculating the technical premium which is the amount required to meet the financial targets of the organisation at a granular level
  - Providing recommended book premium changes and assisting portfolio managers to understand the likely result of the proposed changes
  - Monitoring of the key performance metrics of the portfolio including the underlying profitability, movements in volumes and the impact of pricing changes

- **Portfolio Manager** – has the responsibility for looking holistically at the portfolio and uses financial and management information reports, actuarial advice and an understanding of industry trends to make business decisions about the strategy and pricing of the portfolio. The key responsibilities of the Portfolio Manager include:
  - Developing and driving the overall strategy for the portfolio
  - Setting the book premium for the portfolio; calculated by applying an algorithm based on a number of risk characteristics. The book premium takes into account the technical premium with an overlay based on underwriting judgement and the state of the market
  - Identifying target segments for growth
  - Setting underwriting standards and auditing individual policies to ensure that case underwriting is aligned with the standards
  - Providing advice to Case Underwriters in relation to difficult or high risk policies
  - Monitoring the overall performance of the portfolio

- **Case Underwriter** – considers the risks inherent in an individual policy and makes a judgement on whether the level of risk of the policy is acceptable, and if so then sets the actual charged premium based on:
  - The book premium set by the portfolio manager
• The individual characteristics of the risk based on analysis of historical information on the policy, an on-site investigation of the risks being insured or surveys performed by Risk Engineers
• The relationship with the intermediary

Case Underwriting is significantly more common on larger and more complex risks, with close to 100% of Corporate policies being case underwritten compared to only a small proportion of SME policies.

To successfully implement a portfolio strategy, the three above roles need to have a strong transparent relationship to ensure that there is a consistent view on the strategic direction of the portfolio.

**Recommendation 3:** That the Actuary who is working on a portfolio that has a high level of case underwriting spends some time shadowing a Case Underwriter to get a better understanding of how the case underwriting process works. In particular, what the Case Underwriter considers on an individual policy level as part of the risk acceptance process. This will provide the Actuary with a better understanding of the risk drivers of the portfolio and an end to end understanding of the pricing process.

**Recommendation 4:** That the Actuary considers the level of discounting in the portfolio when recommending changes to book premiums based on technical work.

### 3.3. What is the Small-Medium Enterprise Segment?

A portfolio in the Small-Medium Enterprise (SME) segment of the market is likely to have a number of characteristics which are similar to the standard Personal insurance portfolios. These characteristics include

- Large amounts of data
- Reasonable data quality
- Automatic Premium Rating
- Limited Case Underwriting
- Limited Facultative Reinsurance
- Standard product wordings that may be customised by distributor or to the target market rather than to each individual insured

As such, many of the standard actuarial pricing concepts and techniques that are used for personal lines are also be able to be applied to the SME commercial portfolios with only minor modification.

For some SME portfolios, a strategic decision may be made, in alignment with the insurer’s risk appetite, to case underwrite a small sub-set of policies which exhibit a high level of risk typically identified by the industry or geographic location of the policy. As the Case Underwriter is likely to select the better risks in the segment, the loss ratio performance of the segment may be better than expected based purely on the risk characteristics.
**Recommendation 5:** That the Actuary work with the Portfolio Manager to form a shared understanding of how the level of case underwriting on a segment has impacted the historical performance of the segment and that this is taken into account in their pricing recommendations. For example, it may not be viable to grow a highly case underwritten segment of a portfolio without relaxing the underwriting standards applied to the segment, potentially resulting in a significant deterioration in the loss ratio of the segment.

**Recommendation 6:** That the Actuary encourages the capture of data which identifies whether a policy has been case underwritten, who has case underwritten each policy and their level of underwriting authority at the time they underwrote the policy. This information can be used to

- Enable the monitoring of case underwritten vs. automatically rated business with regards to business performance and renewal rates
- Allocate more expenses to policies that have been case underwritten to enable sharper technical prices.
- Identify the correlation between discounting and portfolio performance at a Case Underwriter level
- Understand if there is a differential in performance by Case Underwriter which may be due to a skill gap
- Understand whether the Case Underwriters are discounting within their underwriting authority

### 3.4. What is the Corporate Segment?

The Corporate segment relates to the Commercial insurance policies sold to very large corporations such as the top 500 ASX companies. The insurance needs and the risk exposures of these businesses can be very different and coupled with large insurance premiums has meant that insurance companies typically offer more tailored products and adopt a different underwriting and pricing approach for the Corporate segment. Some of the key differences between the Corporate and the SME segments which have a significant impact on the pricing and the financial performance of this segment are:

- **A very high level of case underwriting** for Corporate businesses, which can result in exclusions or high deductibles for risk exposures which are considered to be undesirable. This may mean that two large businesses of similar size operating in the same industry may have a very different insurance risk, depending on the coverage, limits and exclusions placed on each policy. This also may be reflected with a significant premium adjustment from the standard book premium to allow for the individual risk of the insured. As such, the performance of a portfolio is heavily driven by the skill of the Case Underwriters.
The quality of the data is significantly worse for the Corporate segment than for the SME segment for the following reasons:
- The limitations of the core insurance system to record all of the relevant risk information
- Corporate risks are manually rated, so missing or incorrect information will not have a direct impact on the premium charged
- The large number of individual risks that could be insured under a single Corporate policy making it administratively expensive to enter all of the information

Corporate businesses generally have a lot more capital and hence are able to retain more insurance risk which is reflected in greater claim deductibles or aggregate deductibles. For some Corporate portfolios, the majority of claim costs are therefore likely to come from infrequent large claims with the insured retaining the smaller or working claims.

A range of complex and unique businesses which mean that the type of claims observed in the past are often not reflective of the types of claims which may occur in the future. It is therefore challenging to form a view about price by analysing portfolio level historical claims experience.

Some Corporate policies will have a gross written premium in excess of $1 million. Thus the writing of a single policy may have a material impact on the overall size and viability of the portfolio. When the market premium is at an unprofitable level, the insurer needs to balance whether it is better from a long term perspective to retain the business and potentially take a loss during a soft market cycle, or to reduce the size of the portfolio thus reducing the expense base for the portfolio.

A high level of reinsurance on Corporate portfolios. On some individual policies, this could be in excess of 90% of the gross premium and can mean that there is a significant difference between the net and gross performance of the portfolio.

Recommendation 7: That the Actuary understands the dynamics of the Corporate insurance market and the implications on actuarial pricing. Section “6.5 Adding Value to a Corporate Insurance Portfolio” provides some examples of Corporate specific pricing techniques

3.5. Product Distribution and Policy Wordings
Only a small proportion of the Commercial SME market is sold direct to the insured, with around 80% sold through brokers, authorised representatives, underwriting agencies and other intermediaries. Over the past 20 years, the consolidation of brokers and the growth in the broker cluster groups has resulted in brokers having a greater influence over the products they offer their customers.

Recommendation 8: That the Actuary is aware of the market dynamics of selling insurance through an intermediary and how this impacts the ability of the insurer to make pricing changes or to collect additional information about the risk.
Most of the broker cluster groups and major brokers have drafted policy wordings for the larger portfolios and require insurers to comply with the wordings in order to simplify the processes of the broker and to provide the broker with a competitive advantage. The differences in the policy wordings can have a significant impact on the overall claims cost of the policy. To illustrate the point, we have compared the wording around peak period increases or seasonal increases in cover from the Money section in the Business Package policy for ANZ\(^i\) to the Steadfast policy cover\(^iv\) both underwritten by QBE.

- The clause in the ANZ policy wording increases the sum insured taken out on the section by 50% for 60 days before Christmas Day, 30 days before Easter Sunday, for bank holidays and a few days after each of these periods up to the next banking day.
- The clause in the Steadfast policy wording has a 50% increase on at least 126 days around Christmas and Easter, with an additional 49 days for a festive, religious or ethnic celebration as well as the lesser of an extra 100% or an extra $75,000 for bank holidays up to the next banking day.

This example only relates to a single clause on a small section of the policy, but illustrates the differences that do exist and which, over a whole policy wording, can have a material impact on the overall claims cost. Similar differences also occur in the wordings between different insurers.

**Recommendation 9:** That the Actuary

- Understands the proportion of the portfolio insured under each of the different wordings and where this information is captured in the system
- Has discussions with the Portfolio Manager to gain an understanding of the most significant differences between the wordings and the expected impact of these differences on claims costs
- Includes a flag into any modelling to identify the different wordings

Intermediaries can also create schemes which are typically tailored to meet the specific insurance needs of companies in a particular industry or members of a profession or organisation. Schemes are available across most of the Commercial lines of business but are very common in the Professional Risks product where professional organisations will often set up a scheme for their members. In general schemes will have some or all of the following

- Specific policy wordings to ensure that the policy is more applicable to the target group
- Preferential pricing over a similar standard product sold by the insurer due to the collective buying power of the scheme
- A strong oversight from the intermediary limiting pricing changes and impact to the end customer
- Guaranteed acceptance of cover for end customers who meets predefined guidelines
**Recommendation 10:** That the Actuary understands whether the difference in the policy wordings, price and risk acceptance of each scheme to the remainder of the portfolio is such that the scheme should be excluded from the analysis of the portfolio to ensure that the scheme does not skew the analysis of the portfolio.

**Recommendation 11:** The actuary should also be proactive around being involved in the pricing of the larger schemes including understanding of their underlying experience and contribution to expenses.

### 3.6. The Dynamics of Pricing in the Market

The actual premium that is charged for a Commercial insurance policy is typically based on a combination of analytics, relationships and judgements by the Actuary, Portfolio Manager and Case Underwriter and the amount charged can vary significantly depending on how insurers approach the pricing process. Some of the factors that drive this variation include:

- **Different assessment of profitability:** Different methodologies used by insurers to measure the profitability of a portfolio such as:
  - Using the profit and loss account
  - The actual current year experience, or
  - An assessment of the underlying experience.

  These methods can provide a different view of the profitability of a portfolio due to a difference in the treatment of:
  - Prior Year Releases which have had a significant impact over the last 10 years on the Commercial long tail classes
    - Profit and Loss – Included.
    - Current Year Experience – Excluded
    - Underlying Experience – Excluded
  - Natural Peril Events and Large Claims where the actual experience is typically very volatile and is likely to be significantly different to the underlying experience in any one year.
    - Profit and Loss – Actual experience
    - Current Year Experience – Actual Experience
    - Underlying Experience – Long term average view

  Thus two insurers with the same experience may then have a very different view of the profitability of a portfolio depending on the methodology used. This different view is likely to then lead to different pricing decisions.

- **Different assumptions in technical pricing:** There are a number of factors which can result in different but valid assessments of the technical premium. These reasons can include:
  - Differences in Corporate Strategy – the level of capital adequacy, target return on capital, investment strategy and level of expenses will all impact the premium charged to the end customers
  - The heterogeneity in most Commercial portfolios and the highly fragmented market can result in two insurers having seen significantly different profitability in the same portfolio
• Different assessments of the frequency and size of infrequent events such as large claims, natural peril events or latent claims.
• Policy wording differences between insurers or in the level of case underwriting can result in differences in the claims experience.
• The allocation of IBNR/IBNER, expenses and reinsurance costs to a portfolio requires a high level of subjectivity. A different allocation methodology may change the perceived profitability of the portfolio.

• **Growth targets:** It is much easier for front line staff to understand and influence the achievement of targets based on written premium compared to targets based on profitability. This can result in unprofitable business being bound to achieve gross written premium targets.

• **Insurance Pricing Cycle:** The market price of Commercial insurance is highly driven by the Insurance Pricing Cycle.

The Insurance Pricing Cycle is much more apparent in the Corporate portfolios in part due to it being easier for capital to enter this market either via an overseas insurer or through Lloyd’s syndicates. When the market is soft, the insurer may focus on retaining market share to the detriment of profitability. This may be an explicit business decision as moving in and out of the market with the cycle is likely to impact relationships with intermediaries.

• **Product Strategy:** The strategy developed by the Portfolio Manager can have a high level of influence on the setting of the price for a portfolio. For example, a Portfolio Manager may have a strategy where a product is sold as a loss leader in the market.

• **Existing Relationships:** As Commercial insurance is typically sold by intermediaries, the intermediaries can often place pressure on insurers to provide discounts on premium either on an individual policy basis or across a group of policies. The insurer will consider the size of the intermediary and the strength and length of the relationship before agreeing to any discount.
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**Recommendation 12:** That the Actuary understands and communicates to senior management how the overall technical premium and thus the competitiveness of the organisation is impacted by the differences in corporate strategy between the insurer and their competitors.

**Recommendation 13:** That the Actuary have a strong understanding of the different metrics that are being used to measure profitability across the organisation, what each metric is showing and to explain to senior management the reasons for the difference. This will promote a consistent view of profitability across the insurer and provide a basis for informed decision making.

**Recommendation 14:** That the Actuary works with the Portfolio Manager to develop a philosophy for the pricing of the portfolio which is then agreed with senior management to provide a clear direction as to how the different parts of the market cycle will be addressed. This will need to include:

- How profitability will be measured for pricing and monitoring purposes
- The target profitability over the whole insurance cycle and the minimum target profitability at the softest part of the cycle
- The minimum level of underwriting standards that will be maintained across the cycle and will not be breached to achieve written premium targets in the softest part of the cycle
- Identifying the profitable segments to retain and the unprofitable segments to shed as the market softens in price
- A clear customer value proposition which is communicated to Business Development Managers and Case Underwriters so that they are aware of what value the insurer can bring to the intermediary and end client rather than purely focusing on price
- Understanding whether there is the opportunity to improve the offering to an end customer by providing an additional section or cover at a discounted premium instead of a reduction in price.
4. Engagement with the Business

For a pricing Actuary to maximise the business value achieved from their analysis, they need to have strong relationships across the insurer. This will enable them to better support the business strategy by providing relevant and fit for purpose technical advice, improve the quality of the technical analysis by incorporating information from the wider business and translate the technical analysis into commercially actionable insights.

4.1. Translating Technical analysis into Business Outcomes

A key part of the role of an Actuary working in pricing is to be able to translate technical analysis into commercially actionable insights and to help drive business decisions which lead to profitable outcomes. This can be challenging to achieve due to the nature of the Commercial portfolios as discussed in the earlier sections. The following recommendations detail specific actions that actuaries can take to maximise the value that the organisation is able to obtain from their skill set.

**Recommendation 15:** That the Actuary spends time on an ongoing basis with the Portfolio Manager to understand the concepts around the portfolio, the strategy for the portfolio, the competitive environment and the portfolio target outcomes to ensure any analysis completed is fit for purpose.

**Recommendation 16:** That the actuary engages with the Portfolio Manager throughout the technical pricing process, soliciting input and feedback in relation to the claims, premium and business mix trends that have been observed in the portfolio. As part of the engagement, when commencing any analysis the Actuary should have a detailed kick off meeting with the Portfolio Manager to cover:

- Business outcomes that are to be achieved out of the analysis
- Known data quality issues
- Changes in the business mix of the portfolio
- Unusual accounts in the portfolio which may distort the results
- Significant changes in either policy wordings or case underwriting standards over the analysis period
- Changes in the insurance environment that could impact the product
- Correlations between segments in the portfolio

**Recommendation 17:** That the Actuary appreciates that the nature of Commercial insurance means that any analysis is not an exact science and that they are aware of the limitations and uncertainties of their analysis and do not over sell the results as the one true answer.

**Recommendation 18:** That the Actuary is transparent on all assumptions made in the analysis, provides justification to support the decisions made and clearly identifies the assumptions which have the most impact on the final result. This will give the Portfolio Manager the opportunity to challenge the assumptions behind the analysis and will not only lead to a better quality of output but will also improve the likelihood of the analysis driving business decisions.
Recommendation 19: That the Actuary provides the Portfolio Manager with a sensitivity analysis of the final result based on the variability of key assumptions. Examples of key assumptions may include:

- The level of superimposed inflation
- The frequency of large losses
- The impact of an economic downturn.

Recommendation 20: That the Actuary provides the Portfolio Manager with actionable insights such as identifying profitable and unprofitable segments rather than just a high level view of profitability.

Recommendation 21: That the Actuary is proactive in presenting new ideas and analysis which could help the Portfolio Manager to be successful in achieving the portfolio outcomes. It is likely that the Portfolio Manager will not have a full awareness of what business decisions can be enhanced through the use of technical analysis and the Actuary should take a lead role in identifying and suggesting where they could add most value.

4.2. Relationship with Claims

In addition to having a strong relationship with the underwriting side of the insurer, it is also valuable for the Actuary to have a close relationship with the Claims team. Key areas where claims can impact the technical analysis include:

- Changes in Claims Management: Changes in claims processing can have a significant impact on claims trends. As such, it is very important for the Actuary to be aware of the changes and to make appropriate allowances for them in any pricing analysis. Some examples of claim processing changes that may impact the pricing analysis include:
  - Changes in case estimation procedures which can have a particularly significant impact on the analysis of Long Tail portfolios. For example, a move from estimating based on a most likely outcome to the mean of all outcomes could be extremely significant for a claim undergoing litigation.
  - Changes in claim staff can impact indemnity costs as experienced Claims Managers are better at minimising the overall cost of claims.
- Qualitative Feedback: Provide qualitative insights as to what may be driving the portfolio level trends. For example Claims Managers may be able to assist in
  - Estimating the impact of legislation changes – forming a view about the cost increases/savings as a result of a legislation change by sense checking the actuaries modelling assumptions against their experience.
  - Identifying drivers of inflation and superimposed inflation – identifying drivers of claim costs which are not recorded in the data such as an increase in medical costs in a Workers’ Compensation portfolio due to the increased use of a particular medical procedure.
• Sense checking technical analysis – Claims Managers may be able to provide insights about the drivers of the claims trends, for example why certain industries have a large number of certain type of claims

• **Understanding the impact of post-catastrophe claims inflation** – both for claims directly caused by the catastrophic event and for those not part of the catastrophic event as these claims costs may increase due to the diversion of resources towards the catastrophic event.

• **Early Trend Identification:** Help to identify claim trends before the trends are clearly evident in the data to enable the insurer to address the issue early and respond through case underwriting, policy wording or pricing changes. For example
  
  • An increased volume of similar type of liability claims from a particular legal firm may indicate a new focus area for litigation
  
  • An increased number of claims incurred due to a particular clause of the policy wording

  This is particularly relevant for long tail portfolios as it can take many years before trends are visible in the data.

In addition, analysis undertaken by the Actuary may add value to claims. For example significant changes to the portfolio mix may have an impact on the number and type of claims that the Claims Managers would expect to see in the future.

**Recommendation 22:** That the Actuary invests time in developing a strong ongoing relationship with the Claims Managers in order to provide both better technical pricing and better decision support for the insurer.
5. The Commercial Insurance Pricing Actuary and Data
The aim of this section is to highlight why data quality in Commercial insurance is a key issue for the pricing Actuary and how to make the best use of the available internal and external data.

5.1. Why is Data Quality a Key Issue for Commercial Insurance?
Historically, there has been a limited focus on the quantity and the quality of data that has been collected on Commercial portfolios. This can result in limitations around the analysis as well as the pricing Actuary needing to spend a significant amount of time addressing data issues. The poor data quality in Commercial insurance is due to a number of factors which include:

- Commercial insurers tend to run on legacy systems which may not have data validation rules resulting in erroneous or missing entries
- A large proportion of Commercial insurance policies are sold through brokers who aim to minimise their administrative cost and any inconvenience for their end client and will push back on the collection of any additional fields or the clarifications of data errors
- As any investment in analytics and management information has not been a priority for Commercial insurance, there has been less incentive for the insurers to have had a focus on data quality
- A long lag time between implemented improvements in data collection and the ability to see clear business outcomes, resulting in a lack of urgency in making any improvements

Although data governance is not a core skill of an Actuary, they are heavy users of information and delivering more detailed and accurate analysis is likely to require an investment of time in this area.

**Recommendation 23:** That the Actuary takes a role as a data champion for the organisation. They should not own the data issues but instead take an active role in driving improvements in the quality of the data collected. This may include:

- Building a strong relationship with the area that has ownership of data governance in the organisation. If this is not clear, then it is worthwhile facilitating the formation of a data governance committee
- Justify the importance of a new data field by presenting analysis which shows a clear business outcome that could be achieved if the data was collected. This could be achieved by collecting information on a sample of policies and showing a link between the rating factor and claims
- Building support at an executive and senior management level around the value of having a credible data asset
- Identify and agree key fields with senior management to focus on from a data quality perspective. Including statistics on the collection and accuracy of data in the KPIs of the staff who collect and process the information is a suggested way of driving change.
The level of involvement that the Actuary will have in ensuring that the data asset enables detailed analysis of Commercial portfolios, will depend on the overall maturity of the business intelligence function. In an insurer with a highly mature business intelligence function, built considering the needs of the Actuary, the Actuary will be mainly a customer of the data asset. In an insurer with a lower level of maturity, the Actuary may need to spend a significant amount of time ensuring that a data asset exists which meets their needs.

**Recommendation 24: That the Actuary balances any necessary investment in data against their key role in pricing**

### 5.2. Key data quality issues

Poor data quality can have a significant impact on the credibility of any pricing analysis. This section highlights some of the key data issues that are common in Commercial insurance portfolios and how to identify them in the data.

- **Bulk entered policies or claims** – where policy and claims information is aggregated before being entered into the system. These bulk entered policies and claims can distort any models built on the portfolio. They can sometimes be identified by:
  - Checking for policies which have a much larger sum insured or premium than the average across the portfolio
  - Checking for policies with an abnormally large number of claims
  - Investigating large claims to ensure that they are from a single source
  - Asking the Portfolio Managers and the distribution area if they are aware of any bulk policies or claims

- **Late processing of policies** – where there is a delay in processing policies and they are not entered onto the system for up to 3 months following their attachment date. This delay is more apparent for larger risks and can result in a distorted view of the business attaching in the past 2-3 months. For example, the policies attaching in the June quarter as at July will look like they have a significantly lower average premium compared to the previous year.

- **Structured data fields not being available** – for key factors such as industry code, excess, sum insured or limits of indemnity. This information may be included as a free form text field or not entered in the system

- **Data entry not being at an individual risk location** – resulting in an inability to understand the total number of locations, the sum insured at each of these locations, the level of concentration of risk or the susceptibility of these locations to natural peril events

- **No Policy Wording Indicator** – providing a clear means of identifying the specific terms and conditions that are covered by the individual policy

- **No Case Underwriter flag** – identifying that the risk has been case underwritten

- **No Notification flag** – identifying open claims that are only notifications. Open notifications are particularly relevant for the Liability, Professional Risks and Workers’ Compensation portfolios
Recommendation 25: That the Actuary spends some time prior to conducting any pricing analysis on understanding the data quality of the portfolio. This may include excluding any policies or segments of the portfolio which have poor data quality.

Recommendation 26: That the Actuary documents any material limitations of the analysis resulting from any data quality issues identified and sense checks any analysis against the Portfolio Manager’s understanding of risk exposures.

Recommendation 27: That the Actuary is careful in considering any form of analysis which incorporates policies with a policy attachment date in the most recent 3 months as there could be policies which have not yet been entered in the system which could result in the analysis being incorrect.

Recommendation 28: That the Actuary is heavily involved in the implementation of any new policy or claims systems in the organisation to ensure that the necessary fields are collected for analysis and have the appropriate levels of data quality checks on entry.

5.3. Making Best Use of the Available Internal and External Data
The current quality and volume of data available for many Commercial portfolios may limit the complexity and credibility of the pricing analysis that is able to be performed. However, there are many ways that the Actuary can enhance the existing data asset through the better use of internal data or the sourcing of data from an external resource. Some examples of approaches to improve the data asset are

Internal Data
- **Portfolios which have similar characteristics** can provide a starting point for assumptions. For example, a claim size distribution for the bodily injury claims from the liability section of a small portfolio could be based on the claim size distribution for the bodily injury claims for the whole insurer.
- **Text mining techniques** can be used to extract structured data from the free form data. This could include
  - Extracting information about the policy wording or sub limits on the policy from the free form entry fields
  - Extracting information around the cause or nature of loss for each claim
  - Splitting Liability claims into Bodily Injury and Property damage claims
  - Identifying Liability claims coming directly from labour hire or being recovered from one of the Workers’ Compensation schemes
  - Splitting property water damage claims into those caused by flood and those caused by burst pipes
- **Information captured on systems other than the core system**
- **Risk Engineers** are often engaged in Corporate insurance to assess the risk of different accounts and provide information back to the Case Underwriters. This information is typically kept on a paper file but could be converted into a series of subjective scores to be used to aid pricing and monitoring of the portfolio.
External Data

- **Using external industry data** to enhance the volume of information available. This may include the APRA National Claims and Policy Database or the ISA database and will provide the insurer with a wider base of data in order to
  - understand market share by key segments
  - model large claims
  - compare overall profitability to the market
- **ABS Statistics** around the financial state or overall size of each industry. Census data can also provide information about regional characteristics to support geospatial analysis
- **Reinsurers and reinsurance brokers** will often provide additional services to their clients that may include information around large claims or natural peril experience.
- **External data providers** such as Veda and Dun and Bradstreet have information available for sale for each business in Australia including
  - Industry code
  - Number of employees
  - Time in business and Incorporation date
  - Business size
  - Turnover
  - Financial behaviours including credit profile

This information can be used to cleanse existing fields, to providing additional factors or even as a database to auto-fill factors in the rating calculations. In addition, the external data providers have detailed information around the demographics of particular areas or the characteristics including total number of businesses and total turnover by ANZSIC.

- **Geographic data exists** in commercially available databases which contain over 200,000 fully geocoded points of interest which could be combined with the address data on each individual risk to create additional factors which have been hypothesized as a driver of claims experience – for example the distance to the nearest fire station or the number of pubs located within in a 1 kilometre radius.

**Recommendation 29:** That the Actuary considers what additional information may be available both within the insurer and in the external market to improve their analysis and to obtain further insights that may support the business strategy.
6. Technical Pricing Methods
There are a number of technical pricing methodologies that can be used by a pricing Actuary in a Commercial insurer. This section aims to provide an overview of the concepts behind each of the key methodologies, how they can be implemented in practice and any key issues that are relevant to the Commercial insurance portfolios.

6.1. Generalised Linear Modelling
Generalised Linear Modelling (GLM) is a standard technique that is used by Actuaries working in the pricing of Personal lines. This technique can also be used to model working losses in the Commercial SME space. However, GLM modelling is both data and time intensive and therefore may be less suitable for small portfolios, small insurers or Corporate portfolios with limited homogenous data.

**Recommendation 30:** That the Actuary considers whether a GLM is the appropriate modelling methodology for the Commercial portfolio, taking into account the following complexities

- **Modelling structure** – how to best segment the portfolio for modelling purposes, including understanding the covers and claim types that are covered under the product and the types of risks written. For example:
  - For Commercial Property, the Actuary may want to consider separate claim type models (Fire, Theft, Accident and Weather) for each of the covers (Buildings, Stock and Contents).
  - For Commercial Motor, the Actuary may build a separate GLM for sedans and utes but develop a simpler model for large trucks due to the low frequency, high severity nature of the claims on this segment of the portfolio.

The Actuary needs to also consider the current and proposed book rating algorithm and how the insurer will implement the findings from the statistical model in modifying the book premiums.

- **Model fit** – the nature of Commercial insurance means that the impact of risk drivers on the claims performance is often less evident and the model does not fit experience as well as would be generally seen in a model on Personal lines. As such, it is very important to not just have the data drive the modelling decisions but to utilise judgement and underwriting input. This could involve including factors in the model even if they are not statistically significant if the results are consistent with those from a qualitative perspective.

- **Business mix changes** – particularly if the modelling period is long and the company has had a strategy to actively change their business mix in response to new information
6.2. **Experience Rating**

Experience rating refers to the practice of setting the price of a policy based on its previous claims experience and is applied to large policies or for portfolios where the claims frequency is very high. As such, this method is heavily utilised in the Corporate space particularly for Fleet and larger Workers’ Compensation policies, although it may also be used in some high frequency Liability and Commercial Property policies. Except for very large policies, the final premium will be based on a blend between the

- **Pure Experience** – based on the historical claims experience of the specific policy
- **Exposure** – based on applying portfolio level assumptions to the exposure mix of the policy

Typically, the weighting towards the Pure Experience will be higher for policies which have higher exposure and more years of experience.

**Recommendation 31:** That the Actuary considers the following when implementing an experience rating methodology

- The impact that the following factors have on the choice of the weighting between the Pure Experience rated premium and the Exposure rated premium for a particular policy:
  - Stability of the claims experience over time
  - Number of years of available data - a minimum of 3 years of claims data is required with 5 years being preferable
  - Size of the account
  - Changes in the type of risks being covered under the policy
  - Account composition – if there segments of the portfolio that generally experience large infrequent losses then these segments should have a higher weighting towards being exposure rated rather than based on the actual experience
  - Consistency of the policy wording over time particularly with regards to the level of excess on the policy
  - Current market practice – currently the market practice adopts a higher weighting towards the claims experience of the portfolio than can be justified using statistical theory
  - Due to the low frequency and high severity of large losses, Exposure rating should be used to allow for the losses above the large loss limit. As such, the choice of the large loss limit can have a significant impact on final quoted price
  - How to include claims from natural perils in the model
  - The weighting in the model for the different years of experience. In particular, should there be a higher weighting towards the more recent years
  - Allowance needs to be made for incurred but not reported claims, noting that the renewal pricing is likely to be provided around 6 weeks prior to the expiry of the policy
6.3. **Industry Rating**

Industry or occupation is a key rating factor across a large number of Commercial portfolios including Commercial Property, Liability and Workers’ Compensation and has a large impact on the cost and frequency of claims. Examples of the impacts of industry include:

- **Property** - a glass manufacturer utilises fire in the manufacturing process, hence there is a proximate cause for fire
- **Liability** - a shopping centre or a supermarket has a significant amount of people traffic hence there is a high frequency of Liability claims
- **Workers’ Compensation** - the employees at a construction site or a mine are much more likely to be seriously injured compared to those working in an office

As a large proportion of industries in the Australian market are small in size, the historical claims experience that is available even at an industry level does not necessarily reflect their underlying risk. This can make it very difficult for a Commercial insurer to appropriately rate by industry.

The current book rating structure typically used in the market is:

- Each insured company is classified under the Australian and New Zealand Standard Industrial Classification (ANZSIC). Some insurers split individual ANZSICs into sub-industries that they believe have different risk characteristics.
- Each industry is assigned to a hazard level based on an assessment of the relative risk of different industries. There are generally 10 – 20 hazard levels in a typical rating structure.
- A different premium rate or relativity is assigned to each hazard level. Workers’ Compensation portfolios tend to apply a separate premium rate for each ANZSIC rather than grouping up to a hazard level.

There are a number of approaches used by actuaries to allow for the industry of the insured in the technical rates. An overview of some of the main approaches, including the pros and cons of each method are described below.
Underwriting Judgement
- The Portfolio Manager sets the hazard level for each industry based on their assessment of risk.
- Advantages
  - Requires no data or analytics and thus can be used by small insurers with limited historical experience, Corporate insurers or insurers who have made a limited investment in analytics
  - The Portfolio Manager is able to reflect their understanding of risk in the pricing structure
  - Can be used to pro-actively price emerging risks.
- Limitations
  - Is highly subjective
  - It is difficult to develop granular pricing structures with a large range of hazard levels and it is difficult to justify the pricing structure to intermediaries
  - Has a strong key person risk with the decision and knowledge around the decision sitting with the Portfolio Manager.

Modelling 2-digit ANZSIC Code
- A technical hazard level is developed for each 2-digit ANZSIC by incorporating it in the modelling process
- Advantages
  - Makes use of the data and analytics to form a view about the risk
  - Enables the pooling of claims experience of similar types of businesses
- Limitations
  - Assumes that ANZSICs which share the first two digits have similar claims experience which is not necessarily the case
  - No assessment of risk is formed at a 4-digit ANZSIC level thus not using all of the available information on the portfolio

Hierarchical Credibility Modelling
- A rate is developed for each ANZSIC by blending the performance of the ANZSIC with that of the higher levels of the ANZSIC hierarchy with a credibility factor based on the volume of data that is available at each level of the hierarchy.
- Advantages
  - Some weighting is given to the performance of each individual ANZSIC based on the volume of experience available
  - Enables the pooling of claims experience of similar types of businesses
- Limitations
  - Assumes that 4-digit ANZSICs in the same hierarchy exhibit similar insurance risk which is not necessarily the case
Credibility Modelling combined with Underwriting Judgement

- A technical hazard level is developed for each ANZSIC by blending the experience of the ANZSIC with the experience of similar ANZSICs identified through underwriting judgment
- Advantages
  - Businesses are grouped based on perceived risk rather than a hierarchy which was not developed for insurance risk
- Limitations
  - Relies heavily on underwriting judgment as very few ANZSICs are large enough for the claims experience to be credible
  - A strong key person risk with the knowledge around the allocation of industries into distinct groups being with the Portfolio Manager.

Attribute driven occupation rating

- A method based on grouping industries based on their risk characteristics. This method has the following steps
  - A number of industry attributes that may drive risk are identified. For example, industries which hire sub-contractors or labour hire and industries which are exposed to high volumes of non-employee traffic are more exposure to Liability claims
  - Classify each industry in an insurer’s rating structure as having a high, medium or low exposure to the attribute. For example, shopping centres and supermarkets have high exposure to crowds while electricians would not as they would generally not own a property
  - Modelling all the non-industry specific rating factors in a GLM framework and then testing each of the industry attributes by incorporating them in the model to identify which ones drive risk
  - Blending the actual experience of each ANZSIC with the underlying risk implied by the industry attributes
- Advantages
  - The experience of each ANZSIC is blended with the experience of other ANZSICs which share common insurance risk characteristics
  - Easier to explain the drivers of the hazard assessment for each ANZSIC
  - The results of the technical analysis can be an input into both pricing and underwriting
- Limitations
  - Developing the attributes and then classifying an industry into high/medium/low exposure to each risk takes time and resources
  - Relies on underwriting judgement to make an assessment of each industry against each risk characteristic.
  - This approach would be more suitable for a large SME portfolio which has significant amounts of data

Recommendation 32: That the Actuary adopts the approach for industry rating that is most suitable for each portfolio based on the characteristics of the portfolio.
6.4. Alternatives to Competitor Analysis

As Personal lines portfolios are typically sold direct to customers, it is possible for an insurer to get information on the rating structures of their key competitors by performing a number of quotes. The insurer can then use a combination of the competitor premium and the technical premium to identify segments of the portfolio which require immediate action.

However it is more difficult for the insurer to understand the premium charged by their key competitors as it is primarily distributed through intermediaries. In spite of this, the insurer can get an indication of how their premium compares to the market by using two internal metrics:

- **Renewal Rate** – the number of policies renewed divided by the number of policies offered for renewal
- **Strike Rate** – the number of new policies written divided by the number of policies quoted

For example, a segment of the portfolio with

- A low Renewal Rate / Strike Rate – suggests that the insurer premiums are significantly higher relative to their competitors premium
- A high Renewal Rate / Strike Rate – suggests that the insurers premiums are significantly lower relative to their competitors premium

This assumes that pricing is a key driver of volumes and does not allow for

- The strength of the relationship that the insurer has with their intermediaries
- The attractiveness of the policy wording, where differences in wordings exist
- The strength of the brand of the insurer including its size and expertise in the market, credit rating and reputation for paying claims

However, analysis performed on these metrics will give the insurer a better idea of how they are placed in the market and will aid in understanding the likely impact of pricing changes.

In comparing the Strike Rate and the Renewal Rate metrics, we note that

- The strike rate will tend to react faster to differences between the pricing of the insurer and the wider market than the renewal rate as it is easier for intermediaries to not place new business with an insurer than to move significant volumes of existing business from that insurer
- The strike rate can be overstated if the insurer is known to be significantly overpriced in a particular segment as intermediaries may not spend the time to even get a quote

**Recommendation 33:** That the Actuary develops renewal rate and strike rate analysis for each portfolio to better understand the market positioning of the insurer by segment.
6.5. Adding Value to a Corporate Insurance Portfolio

The nature of the Corporate portfolio can make it very difficult for an Actuary to utilise standard analytical techniques to provide input into business decisions. As such, actuaries have struggled to gain a strong foothold in the pricing of the Corporate segment and many companies purely rely on Case Underwriters and Risk Engineers delivering good risk selection and individual risk pricing to achieve profitability targets. The lack of analytics has contributed to the following market dynamics:

- The pricing and profitability of the overall segment has historically been very cyclical, with super-profits followed by the entry of significant capital into the market driving the price down to highly unprofitable levels
- Insurers may focus on risk selection and selecting policies with lower risk exposure in a segment regardless of the market price which may be very unprofitable particularly during the soft market
- Insurers may focus on writing high hazard risks for the high premium charged. Due to the typical low frequency and high severity claims for a typical Corporate portfolio, the high hazard risks can make super profits for a number of years but are susceptible to large losses which can result in a significant loss occurring 1 in 10 years being larger than all of the achieved profits over the period.

Although, standard actuarial techniques such as GLM modelling cannot be directly applied to a Corporate portfolio and the results of any technical analysis are less conclusive, we suggest that technical analysis can still add value to the pricing and portfolio management process of this segment. Some examples are outlined below:

- **Natural peril pricing** - in pricing a large ISR account, it can be difficult for a Case Underwriter to assess the weather related risk as some weather related events will have a return period of more than 1 in 50 years. Utilising natural peril models to assess both the exposure and the expected cost of these type of losses can help the Case Underwriter both charge an appropriate price for this exposure as well as manage their aggregate exposure in high risk areas
- **Pricing adequacy framework** - an Actuary can develop a framework which provides a view of the appropriate price that should be charged for an individual policy. At the most basic level, the framework can provide the Case Underwriter with an understanding of the total non-claims related costs such as administration expenses, reinsurance expenses, commission and profit margin. The Actuary can further enhance the framework by including claims costs based either on portfolio level data or the historical claims experience of the actual policy, with appropriate allowances for IBNR and IBNER claims, inflation and large losses.
- **Optimising reinsurance arrangements** - reinsurance arrangements are used more actively in the Corporate space. Actuaries can develop a model to compare the impact of the different reinsurance arrangements on the expected profitability and the volatility of the profitability of the portfolio.
• **Analysis of portfolio level historical claims experience** – even though the available historical claims experience may be limited, analysis of this data can still provide outputs which can enhance the underwriter’s understanding of claims drivers. These insights may include:
  - The different types of claims that impact different industries
  - Which industries have been most impacted by large losses?
  - Have historical reinsurance arrangements been effective in reducing the volatility in the profitability of the portfolio?
  - Are there policies that have performed poorly over a number of years?

The insights may lead to recommendations around policy wording changes, case underwriting standards or changes in the strategic direction of the portfolio.

**Recommendation 34:** That the Actuary working on a Corporate portfolio segment be innovative in identifying areas where they can add value to this segment.

### 6.6. Large Loss modelling

Large losses can have a very significant impact on the performance of a Commercial portfolio and typically are much larger than those observed by Personal Lines portfolio. The Corporate segment will typically have a very high proportion of the total claims cost being made up of large losses. A typical ISR portfolio will have the largest 2% of claims can make up more than 70% of total costs. Some examples of commercial large losses that have occurred in Australia are:

- **Professional Indemnity – Directors and Officers** – The class action on Aristocrat estimated at a cost to the insurer of $100 million dollars
- **Commercial Fire** – The fire at the warehouse for Lombard, The Paper People at an estimated cost of $25 million
- **Commercial Fire** – The Canberra bushfires in 2003 which destroyed Mt Stromlo at a total cost to the three insurers of $34.39 million with an additional $27 million awarded to ANU cost against AON for not ensuring that the cover provided was appropriate
- **Liability / Workers’ Compensation** – Kendrick v Bluescope Steel (Workers’ Compensation) and Australian Steel Mill Services (Liability) with a total cost of over $16 million

The key challenge that the Actuary will face is the lack of credible data to make an accurate estimate of large losses for pricing purposes. The key reasons for the lack of data include

- The frequency of large losses is very low
- The large loss experience can be heavily impacted by the skill of the underwriter or changes in underwriting standard
- Business mix changes may mean that some types of historical large losses may not re-occur in the future as the insurer may no longer insure the particular type
of policy that has caused the claim. Conversely, the insurer may be exposed to new risks which it was not exposed to historically

- Improvement in risk management processes can lead to reductions in the underlying large loss risk of certain segments

**Recommendation 35:** That the Actuary in estimating the cost of large losses for pricing purposes, supplements the actual experience of the insurer with the following:

- Discussions with the portfolio manager to gain an understanding of what caused the historical large losses and whether they are reflective of future underlying experience
- Review of the business mix by industry and gain an understanding whether the portfolio has shifted towards high hazard risks
- Review of industry level large loss data, this may be available from reinsurers
- External industry data (ISA, APRA NCPD) or court judgements

In developing a technical price for large losses the Actuary needs to be able to

- Estimate the frequency and the severity of large losses leading to an overall portfolio level large loss loading
- Allocate large losses by segment with allowance for the fact that some segments of the portfolio are more prone to large losses than others.

**To estimate the frequency,** the typical approach is to

- Consider the actual experience over a long term period. This period should be at least 5-10 years but longer periods may be necessary for either small or long-tail portfolios
- Make adjustments to the frequency based on any known changes in underwriting standard or business mix. For example, adjustments will need to be made to the frequency if a significant proportion of the claims historically occurred in an industry that the insurer is no longer writing.
- For portfolios where there are only a limited number of large claims, the Actuary can estimate a claims frequency and then use a Poisson distribution in order to estimate the likelihood of the actual experience being in line with the assumption.

**To estimate the average claim size** of Large Losses, a typical approach is to

- Fit a distribution to the historical experience of large claims. Distributions such as the LogNormal, Pareto or Extreme Value are commonly used to estimate the underlying claim size of large losses in Commercial Property and Liability insurance. The selection of the distribution should be based on the characteristics of the portfolio and the how the distribution fits against the existing experience.
• An allowance has to be made to allow for extreme large losses that have not been observed in the available data
• Where possible, the Actuary should check the selected assumptions against available industry data. The Actuary, in collaboration with the Portfolio Manager, will need to form a view on whether the differences between the industry data and the data of the insurer are fortuitous or due to differences in the portfolio mix or underwriting standards

When allocating the large losses by segment, the Actuary should consider

• That the standard methods for working losses such as GLMs and multi-way segmentation do not work well because the number of claims is small
• Allocating large losses in line with working losses may not be appropriate particularly for portfolios or segments within a portfolio whose primary exposure is low frequency, high severity events.
• Sum Insured – policies with sums insured below the large loss limit cannot incur a large loss. In addition, the larger the sum insured, the larger the average claim size will be
• Industry – some industries are known to have a higher risk and the insurer may already have a classification which identifies high hazard industries. A larger proportion of the large loss costs could be allocated to this segment

Recommendation 36: That the Actuary understands the impact that a small change in the assumptions around large losses can have on the assessment of profitability.

6.7. Rate Index
The rate index is the ratio between the actual premium charged and the technical premium. This measure is a lead indicator of profitability as an assessment can be made when the business is written rather than when the claims experience emerges. Rate index has the potential to be used as a key metric by the insurer but to do so requires

• A significant level of investment from the Actuary to develop the metric at a detailed level
• Updating of the metric on a regular basis
• The Actuary to promote the value of the metric across the organisation

Basing the rate index on the technical premium will provide the insurer with a clear understanding of any movements in profitability due to changes in premium and changes in mix of business. We note that as the metric is based on actuarial judgement and assumptions, changes in the assumptions can result in restatements in the historical rate index. These changes will require careful communication to ensure portfolio managers have a clear understanding of the reason for these changes and that they do not impact the credibility of the metric.
**Recommendation 37:** That the Actuary invest time to develop a regular metric which compares the actual premium and statistical premium which is then used as a lead indicator to

- Identify unprofitable segments of the portfolio
- Identify emerging trends in profitability
- As an organisational KPI
- Identify unfavourable movements in business mix

**6.8. Machine learning**

Machine learning has been used extensively in the recent years in Personal Lines portfolios to enhance and supplement standard GLM analysis. Unlike GLMs, machine learning does not require the specification of the claim drivers or the interactions between them but instead it allows the data to speak for itself by finding patterns between characteristics within the data. The method is much faster in producing actionable results in comparison to GLMs.

Machine learning is likely to be best used on SME portfolios for insurers with a larger volume of business as the method requires significant amounts of data, a reasonably stable performance and a large range of rating factors.

**Recommendation 38:** That the Actuary puts together a pilot to test the value of machine learning on a large homogenous SME portfolio such as Business Packages or Commercial Motor. Possible areas for a pilot may include:

- **Predictive Modelling** – to detect significant risk drivers and interactions which have not been factored into the GLM by analysing model residuals.
- **Analysis of Volumes** – Machine learning can be used as an efficient method to track movements in portfolio mix particularly after the implementation of a rating change.
- **Achieved to Book Monitoring** – to identify segments of the portfolio which are showing a high level of deviation between the actual and the book premium.
- **Book premium optimisation** – to identify segments of the portfolio where the book premium deviates significantly from the technical premium
- **Profitability and Volumes analysis** – machine learning has the capability to segment the portfolio taking into consideration multiple metrics and thus can identify segments of the portfolio which are growing and unprofitable as well as segments which are profitable and shrinking. The approach is able to differentiate persistent trends as compared to general volatility and hence once segments of the portfolio are identified, the case for pricing corrective action is compelling as the approach considers both the profitability and volumes at the same time.

**6.9. Other Modelling**

This section provides an overview of some of the other modelling techniques that can be used by the Actuary in order to address the additional business problems that can arise in a Commercial lines portfolio.
Recommendation 39: That the Actuary considers whether stochastic modelling, simple portfolio segmentation or credibility analysis are relevant methods to solve a specific business problem

- **Stochastic modelling for aggregate deductibles** – Some larger Corporate policies may have an aggregate deductible where the insurer will only cover the claims costs for the policy which exceed the aggregate deductible limit. Calculating a price without using stochastic modelling can be extremely difficult particularly if the policy covers a number of heterogeneous risks. Instead, the Actuary can simulate a large number of scenarios and provide the Portfolio Manager with an understanding of the expected reduction in claims cost that would eventuate from different levels of aggregate deductible.

- **Simple Portfolio Segmentation** – Due to the limited homogenous data, it may be not possible to apply sophisticated pricing techniques to small commercial SME or Corporate portfolios. However, significant value can often be gained from relatively simple analysis such as frequency, average claim size and loss ratio portfolio segmentation which can provide insights into the underlying drivers of the claims performance. Given the simple book rating structure used in each section of a portfolio in Commercial insurance the results of this analysis can often significantly increase the sophistication of the pricing approach utilised.

- **Credibility analysis** – This can be used to refine technical premium at either a vehicle, postcode or industry level. In addition, credibility analysis can be used when analysing a portfolio with limited data to test the likelihood of emerging trends being persistent or purely fortuitous. When using credibility analysis, the actuary needs to ensure that hierarchy that is used is appropriate for the metric being modelled.
7. Pricing of Long Tail Classes
The long tail classes of Liability, Workers’ Compensation and Professional Risks make up over 35% of the total Commercial insurance portfolio. The long development patterns in long tail portfolios results in additional uncertainty for the pricing Actuary in constructing the technical premium and understanding whether there is consistency between the emerging performance and the technical premium.

7.1. Estimation of Ultimate Claims Incurred
As a large proportion of claims in the long tailed portfolios take many years to be reported and finalised, the claim count and incurred cost to date for the most recent years is only a very small proportion of the ultimate incurred cost. An error in the IBNR/IBNER can result in the insurer losing volumes due to being too expensive or making a significant loss due to under-pricing of the risk. Furthermore, the long tailed nature of the portfolio will mean that it is likely to take a number of years before it is clear that the emerging experience of the claims differs significantly from the technical model.

Recommendation 40: That the Actuary develop a framework which enables the monitoring of the emerging experience of claims reported and incurred against the undeveloped projection, calculated by combining the technical model with the development factors.

The typical steps in projecting the claim cost over the underwriting year for pricing purposes are
- Estimate the IBNR/IBNER over the modelled period. Some methods that can be used include
  - Allocation of reserving IBNR/IBNER to the portfolio – although the Actuary needs to understand whether the assumptions behind the modelling are suitable for pricing
  - Develop separate IBNR/IBNER Models for pricing – using standard IBNR modelling techniques such as the chain ladder, PPCI, PPCF or PCE methods. The Actuary should understand the drivers of any significant differences between the pricing IBNR/IBNER and that calculated in the reserving models.
- Calibrate the modelled cost to the actual experience
- Project the model forward to the underwriting year allowing for future inflation and any expected underwriting or environmental changes including tort temperature that will impact the claims cost.

Recommendation 41: That the Actuary understands and communicates the level of uncertainty that exists in the technical premium due to the estimation of IBNR and the projection to future underwriting years.
7.2. Superimposed Inflation
There is a tendency for both medical costs and court awards for personal injury claims to increase significantly faster than inflation. This results in the need for a superimposed inflation assumption for the pricing of Liability, Workers' Compensation and some segments of Professional Risks. This assumption should be based on a long term horizon and needs to take into account the mix of claims between property damage, bodily injury and economic loss as well as the state and federal legislative environment. Historical experience has suggested that the increases in claims costs which exceed inflation do not occur consistently over time but tend to be very erratic and occur in bursts.

Recommendation 42: That the Actuary is transparent about the superimposed inflation assumptions adopted in the analysis and takes into account the legislative environment, the characteristics of the portfolio, the long term trends in superimposed inflation in both insurer and industry data and any information available on the assumptions adopted across the industry.

7.3. Latent Claims
A latent claims event results in a large number of claims which are reported many years after the event and are able to be attributed to a single exposure which was not known to be a significant risk when the policy was initially written. Latent claims are typically related to bodily injury and thus mainly impact the Liability, Workers Compensation and Professional Risks portfolios. As there is a significant lag period between the claimant being exposed to the cause and the onset of the symptoms, the insurer may not identify this additional cause of loss for many years and thus will not make underwriting or pricing changes to reduce their exposure to this risk.

The most prominent example of a latent claim event is asbestos where the total cost is expected to be in the order of $10 billion* in Australia in current dollars. In addition to asbestos, there have been a number of other smaller latent claim events including sexual molestation, silicosis and prolonged exposure to loud noise. Potential future latent claims events that have been discussed in the industry include nano-technology, genetically modified foods and mobile phones. However, it is likely that the next latent claim will arise from a cause that is yet to be identified.

Recommendation 43: The Actuary needs to be able to set a price for latent claims and develop monitoring tools which assist to identify emerging latent claims so that appropriate pricing and underwriting action are taken as early as possible. This monitoring should include

- Investigation of all claims which are reported more than 10 years after the exposure occurs
- Ensuring that there is regular communication between claims, underwriting and actuarial across the key long tail classes
- Keeping up to date around the emergence of latent claims in other countries
- Reviewing advances in the legal and medical community
7.4. Legislative Changes and Precedence

Liability, Workers’ Compensation and Professional Risks all cover the insured for a legal liability which results in the incurred amount being based on legislation and either a direct result of a court judgement or through precedence.

As such, significant changes to the legislation or trends in judicial decision making can have a significant impact on the incurred amount and the frequency of claims. Examples of recent changes in legislation or precedence include:

- Liability tort law reforms in each state following the Ipp Report, implemented mainly in 2003
- Changes in Worker’s Compensation law in Western Australia in 2011
- The Bridgecorp decision which even though it was made in NZ is also relevant in NSW, ACT and NT

**Recommendation 44:** That the Actuary working in the long tailed classes needs to be aware of all legislative changes or significant court decisions that will impact the portfolio. This will require:

- Attending industry events and reading actuarial and industry publications
- Having regular and open discussions with underwriting and claims
- Reading and reviewing legislation when it is changed
- Reading advice provided by legal firms around legislative changes and recent court judgments

When there is a significant change in the legislative environment identified, the insurer will need to establish a cross-functional project team combining claims, underwriting and actuarial functions to determine the best assessment of the likely changes in the claims cost for the portfolio. As part of this review, the project team will need to:

- Provide a detailed review of the legislation both pre and post change
- Review of available industry publications from insurance bodies, law firms and actuarial consultancies
- Identify whether the changes will impact each segment of the portfolio consistently
- Review a sample of existing claims and have experienced claims staff assess the expected cost under the new legislation
- Define the ongoing monitoring which will follow the implementation of the reforms to refine the assessment of the impact if the experience emerges differently than expected

**Recommendation 45:** That the Actuary drives the formation of a cross functional team to review the potential impact of legislative changes. The team should continue to work together following the implementation of the legislative changes to monitor the actual impact of the changes.
8. Complexities around Premium in Commercial Insurance
There are a number of complexities that exist in how premium is treated and transacted within Commercial insurance. These complexities are discussed in this section and are typically a combination of how the policies are sold, the seasonality of claims and the needs of the insured.

8.1. Seasonal Trends around the Sale of Policies
A large proportion of businesses will purchase their Commercial insurance policies towards the end of their financial year which will typically be the end of June. This results in the June quarter being extremely busy for all staff involved in the selling of policies including Portfolio Managers, Case Underwriters and Business Development Managers. An additional complexity is that a very high proportion of large Corporate policies are written during the June quarter. This results in both the total gross written premium as well as the average gross written premium per policy being higher for policies attaching in the June quarter than in the rest of the year.

Recommendation 46: That the Actuary recognises that the business written in any particular quarter is not reflective of the overall portfolio mix. For example, to determine portfolio level premium growth the Actuary should compare the premium to the same period in the previous year or to explicitly adjust for the different risks written by quarter.

Recommendation 47: That the Actuary has a strong understanding of the annual business cycle of the insurer and when pricing analysis needs to be provided to be implemented prior to the June volumes

There is a high level of seasonality for the Crop portfolio where all business is initially attached around August with the insured having the ability to make changes to the expected yield and price of the crop until mid-October. The overall yield and price will depend on the weather and can vary significantly from year to year resulting in premium volumes varying by up to 100% from year to year. In addition, some insurers will defer payment of the premium until after the harvest.

Recommendation 48: That the Actuary considers whether the volume and the seasonality of Crop business will have an impact on any analysis of the insurer.

8.2. Premium Adjustments at Policy Expiry
The premium charged for Workers’ Compensation is typically based on a rate applied to the wages bill for the insured. At the start of a year, the insured is required to estimate the expected wage bill of the company and is charged an upfront premium. At the expiry of the policy, the company is required to provide the actual wage bill for the year and then an adjustment is made to the premium. This can result in a significant change to the premium for the overall portfolio particularly if there was a significant change in the economic environment. Similar premium adjustments do occur for some other portfolios such as Construction.
Recommendation 49: That the Actuary understands the typical adjustments that are made to the policy premiums at the end of the year and, if the premium adjustment is significant, develops the written premium to an expected ultimate premium. This development will need to take into account any changes in economic conditions.

8.3. Earnings Patterns
For most general insurers within Australia, there is some seasonality around the occurrence of claims with a larger proportion of claims occurring between December and April, particularly if the insurer has significant exposure in areas exposed to cyclones. Typically, even with this seasonality, Insurers will adopt a pro rata earnings pattern which will result in the loss ratio performance between May and October expected to be slightly better than that between November and April. This will typically be allowed for in the phasing of the budget but only limited explicit allowance will be made in reporting or analysis for this seasonality.

There are some sections of some Commercial portfolios where the seasonality is significantly more pronounced than in the overall book. One such example is the Machinery Breakdown section of Country Pack - where the machinery insured has limited use during the winter months but is heavily used during the summer months resulting in the loss ratio during the summer months being around twice that of the winter months.

Another example of an unusual earnings pattern is that of extended motor warranty insurance for commercial vehicles. The extended warranty policy is not on risk until the expiry of the manufacturer’s warranty period. For most new motor vehicles the manufacturer’s warranty is time based with a kilometre limit. When setting the earning pattern, the insurer is likely to assume that the time limit will expire before the kilometre limit – to exceed the kilometre limit first the vehicle will need to be driven on average 100 kilometres a day. Commercial motor vehicles such as trucks will easily be driven more than 100 kilometres a day and thus be on risk much earlier than would be suggested by the time based manufacturer’s warranty period. The emergence of claims well before the policy was thought to be on risk will result in an overstated loss ratio potentially leading to an incorrect business decision. The Actuary needs to develop an earning pattern to allow for some vehicles being on risk earlier than the time limit for the manufacturer’s warranty.

Recommendation 50: That the Actuary appreciates the differences between the true earning pattern and what is used in both financial and management information reporting to ensure that the business has clarity over the underlying performance of the portfolio so that they are able to make effective business decisions.
8.4. Insurance Taxes

There are a number of taxes or levies that are currently applied to Commercial insurance these include the Fire Services Levy, GST and Stamp Duty. Currently for a Victorian Rural business, if the insurer is charging $100 for the basic premium, there is an additional $80 for Fire Services Levy, $18 for GST and $19.80 in Stamp Duty leading to a total cost of $217.80 to the end customer - the total amount of taxes exceeds the original policy premium.

We note that the Fire Service Levy percentage varies from year to year and that if the Fire Service Levy is not excluded from the premium, that an increase in the Fire Service Levy charged will cause a reduction in the loss ratio as well as an increase in the written premium potentially leading to an incorrect understanding of the trends in the underlying business.

**Recommendation 51:** That the Actuary excludes all taxes including Fire Service Levy from all analysis and performance measures.

We note that the impact of having higher taxes on the property sections, results in insurers being more comfortable in the liability portfolio cross-subsidising a property portfolio. This is particularly the case for the package products where a reduction of $100 in premium in the liability section offset by an increase in premium of $100 for the fire section in the rural area of Victoria would result in an additional cost to the insured of $96.8.

We note that for Victoria from 1 July 2013, the Fire Service Levy will be replaced by a fairer and more equitable property based levy and that the NSW government is currently undertaking a review which is currently expected to result in a recommendation to a move to a property based charge. Tasmania is the only other state who currently uses a Fire Service Levy.

**Recommendation 52:** That the Actuary is aware of the level of cross subsidy and that the existing tax regime is likely to mean that companies are more comfortable with a higher level of cross subsidisation.

8.5. Terrorism Reinsurance Cover

Following the terrorist events in the United States of America on September 11, 2001, both insurers and reinsurers started to exclude terrorism from their policy wordings. This resulted in it being difficult for end customers to find insurance cover for terrorism risk at an affordable cost. In reaction to this, the Australian government introduced the **Terrorism Insurance Bill 2002** which rendered the terrorism exclusions in insurance contracts ineffective but had no impact on reinsurance contracts. To support the insurers, the government introduced the Australian Reinsurance Pool Corporation (ARPC) which provides reinsurance cover for terrorism risk. As the ARPC is a government run organisation, some insurers have treated the premium charged by the ARPC, as an additional levy on premium. The ARPC, however, states that their “reinsurance premium is the same as any other reinsurance cost. Consequently, we would prefer that it is treated in the same manner and not shown separately on the
original insurance policy.” xi We note that the insurer is not required to take up the ARPC cover and has the option of either reinsuring terrorism risk elsewhere or retaining the risk. The ARPC covers Commercial Property, Business Interruption and Public Liability but currently does not charge any reinsurance premium for the Public Liability cover.

**Recommendation 53:** That the Actuary treats the premium collected by the ARPC in the same manner as a typical reinsurance premium.

### 8.6. Burning Cost Premium Model

Insured companies with a large workforce may have the option of taking out a Burning Cost or Retro Paid Loss policy. This enables the insured to be charged a premium that is based on their own claims performance, subject to a set minimum and maximum. This model can be popular with both the insurer and the insured as it provides the insured with a direct link between the success of their Operational Health and Safety program and their insurance premium. Typically, the burning cost model requires an upfront payment of premium with a number of adjustments based on the emerging claims experience in the years following the expiry of the policy. Burning Cost policies can provide significant difficulties for the analysis of a Workers’ Compensation portfolio as premium adjustments may occur up to 5 years following the expiry of the policy.

**Recommendation 54:** That the Actuary separate Burning Cost Policies in all analysis and reporting.
9. Conclusion

In conclusion, the pricing of Commercial insurance is a challenging but rewarding area for an Actuary to develop a career. The key recommendations of this paper as to how the Actuary can be most effective in being able to influence business outcomes in Commercial insurance are:

- That the Actuary builds an in-depth understanding of the Commercial portfolios, the market and the external environment
- That the Actuary works in partnership with the Portfolio Manager
- That the Actuary develops a detailed understanding of the data and its limitations
- That the Actuary adopts appropriate technical pricing methods which allow for the characteristics of the portfolio.

http://www.arpc.gov.au/?/qanda#premiums