

Actuaries

DIGITAL



PUZZLES

The Critical Line - Volume 13

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IMPORTANT INFORMATION FOR CONTRIBUTORS

Actuaries Digital welcomes both solicited and unsolicited submissions. The Editorial Committee reserves the right to accept, reject or request changes to all submissions as well as edit articles for length, basic syntax, grammar, spelling and punctuation via actuariesmag@actuaries.asn.au

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Thinking about life insurance through a genetic lens

By Jessica Chen and Damjan Vukcevic

Reading time: 4 mins

Our ability to predict disease risk based on genetics is rapidly advancing. What does this mean for life insurance? Jessica Chen and Damjan Vukcevic share insights from their presentation at the Actuaries Summit 2017.

Genetic research is booming. Discoveries have led to greater understanding of genetic risk for common diseases, such as cancer and heart disease. We wanted to explore the implications of this for the life insurance industry. Here are eight interesting facts and conclusions we came to.

Genetics

1. The impact of 'nature' (genetics) vs 'nurture' (environment and lifestyle) on disease risk varies by disease.

For example, Alzheimer's disease, which has large societal impacts and is becoming more prevalent, is mostly driven by genetics. In contrast, the risk of stroke is mainly due to environmental and lifestyle factors.

Disease	Heritability
Type 1 diabetes	85%
Alzheimer's disease	80%
Coronary artery disease	50%
Prostate cancer	40%
Parkinson's disease	25%
Breast cancer	25%
Stroke	15%

Data: Do et al. (2012), rounded to nearest 5%. Heritability is a measure of the proportion of variation in disease prevalence that is explained by genetic factors. The numbers shown here are estimates of this quantity.

2. New research findings have led to the development of predictive genetic tests for common diseases.

Genetic testing is commonly used to confirm medical diagnoses or family planning (e.g. determining carrier status). These tend to be for diseases that are caused primarily by a defect in a single gene, such as Huntington's disease. Such diseases tend to be rare. In contrast, the risk of common diseases such as cancers and heart disease are affected by combinations of a large number of genetic variants. Recent innovations in research have led to the discovery of many of these variants, as well as a way to use them to calculate a ['polygenic risk score'](#) to predict an individual's disease risk based only on their genome. The predictive power of this approach will continue to improve over time as more variants are discovered.

3. Predictive genetic testing is expected to be more widespread in the future.

Will such tests become commonplace? Here are two reasons they might:

- Making preventative health programs more efficient.** These tests can identify high-risk individuals who can then be enrolled earlier for medical screening as well as targeted for other preventative measures. This allows for a more effective use of medical resources.
- Easy to obtain and relatively affordable.** As an example, the personal genomics company 23andMe

offers genetic testing kits online for around USD \$200 that includes reports of disease risks.

4. Predictive genetic tests can provide information additional to family history and lifestyle.

You may ask, "If I know my family history of a disease, what additional information can a genetic test tell me?"

Although family history can reflect the increase in risk due to shared (inherited) genetic variants between relatives, it is an imperfect proxy for your own actual genetic status, which would be measured directly by a genetic test. However, family history also carries information about shared environmental factors, making the two pieces of knowledge complementary. This can also be combined with a person's lifestyle factors to get an even more informative risk prediction.

Life insurance impact

5. Unlike other medical tests, the results of genetic tests are persistent, and can become more informative over time.

One characteristic that differentiates genetic tests from other screening tests, such as blood tests, is that the actual measurements won't change over time. However, their interpretation might, in light of any new advances in research. For this reason, some testing services provide updated risk reports to customers when they update their predictive models. This means that customers may only need to take one genetic test in their lifetime for their results to remain valid and useful. Therefore, even if the uptake of genetic tests in the early years is small, the number of people tested is cumulative over time. Any resulting potential impact on the life insurance industry would therefore appear quicker than for other medical advances.

In addition, for individuals who are prepared to undergo a predictive genetic test to understand their health risks, a key consideration may be the persistency of their results. In other words, once a person's genome is measured, would further advances in genetic research mean they have preemptively consented to all future results obtainable for them?

6. Insurers currently do not regularly make genetic disclosure requests.

Under the Financial Services Council, the genetic disclosure guidelines state that an applicant must disclose any genetic test results upon request by the insurer. However, they are not compelled to undertake a test if they haven't already done so.

Despite these guidelines, in practice life insurers do not regularly make genetic disclosure requests and rarely use them to assess the outcome or change a person's premium.

7. The current view that genetics is an emerging, but not immediate risk still holds.

Predictive genetic tests are currently a niche area, undertaken by a very small proportion of the population (less than 0.5%), and

so do not yet have a material impact. However, if more people were to undertake these tests, we showed this could lead to potential risks for insurance companies, including:

- Increased claims from new applicants of higher genetic risk to common diseases.
- Increase in lapses from existing policyholders that are of lower genetic risk as their perceived need for insurance may change.

Our modelling of trauma insurance suggested that if 2% to 5% of the population were to take undertake predictive genetic tests, this may be a critical point at which companies should re-consider their pricing, product and underwriting practices.

8. There is a tension between inclusivity and sustainability.

As individuals become better informed, for example via genetic tests, over time this would impact the concept of large pooling of risk, which currently underpins the design and pricing of insurance. However, life insurance supports the social need for financial security. Therefore, there is a fundamental ethical tension between the desire to be inclusive and not discriminate applicants based on genetic information (particularly when one's genetics are determined at birth), and the desire to protect the integrity of insurance companies' business models in the presence of information asymmetry and potential anti-selection.

For further details of our research, please consult our [paper](#) and [presentation](#).

The opinions outlined in this paper are the authors' own and do not necessarily represent the views of their employers.

References

Do CB, Hinds DA, Francke U & Eriksson N (2012). Comparison of Family History and SNPs for Predicting Risk of Complex Disease. *PLoS Genetics* 8 (10), e1002973.



2017 Volunteer Cocktail Parties – Melbourne and Sydney

By Lily Meszaros

Committee and Volunteer Engagement Manager, Lily Meszaros reports on the annual Volunteer Cocktail Parties hosted by the Institute in Melbourne and Sydney this June, featuring stand-out recipients of the inaugural Volunteer of the Year Awards.

Firstly, a big thank you to our 600+ volunteers – your contributions to the profession and the Institute are greatly appreciated!

For such a small profession, I am always inspired by the pride our members take in their profession and their willingness to contribute back to their profession. I was delighted this year to be able to attend both the annual Volunteer Cocktail Parties the Institute hosted in Melbourne on 8 June and Sydney on 21 June.



We had 30 volunteers turn up for the Melbourne event and although this was quite a small group, the evening went exceptionally well and it was great to see our volunteers connecting and enjoying each other’s company. President Jenny Lyon and Institute CEO David Bell also welcomed the opportunity to meet and personally thank our Melbourne volunteers for their ongoing support of the profession and the Institute. The evening also coincided with my first-year work anniversary at the Institute.

At the Sydney event two weeks later, with 80 volunteers in attendance, I was reminded of a conversation I had with one of our volunteers the year before when I had just commenced in my role. Following our introductions and during our chat I mentioned that until I started preparing for my interview I had very little knowledge of the profession and that I didn’t actually know what an actuary was... Fast forward to this year’s event

and the same volunteer followed up with me to enquire whether I was better informed now that I had worked with the Institute for just over a year! I was both surprised and delighted that he had remembered our conversation and genuinely cared about the work of the Institute and the HQ Team.



CEO David Bell at the Sydney Reception

For me personally, meeting so many volunteers who contribute in so many ways and hearing about their volunteer experience, reminds me why I love what I do. Working with highly intelligent people who are so generous with their time and always willing to support the profession and the Institute through their volunteering efforts, makes my role very enjoyable and worthwhile.

The main highlight at the Sydney Cocktail Party was the launch of the Volunteer of the Year Awards. Prior to the announcement of the 2017 winners by President Jenny Lyon, we showed the volunteer videos which had everyone chuckling. The atmosphere was very convivial and everywhere you looked, people were talking and laughing and enjoying the evening.

As the awards ceremony got underway, President Jenny Lyon and CEO David Bell paid tribute to the calibre of the winners in each category.

“We had a record number of nominations this year and the quality was very strong. It was a difficult process for the Volunteer Award Selection Panel to shortlist the three finalists in each category, and equally difficult to select a winner. Each nominee demonstrated incredibly high standards of commitment and contribution to their volunteering area.

“It was particularly pleasing to have one of our winners travel from Melbourne to receive his award.”

2017 Volunteer Awards



Volunteer of the Year Awards recipients with President Jenny Lyon at the Sydney reception



2017 Volunteer Young Achievement Award – **Avanti Patki**

Avanti received this award for her leadership ability and her contribution to the Institute’s Young Actuaries Program since commencing her professional working career. She was also a member of the 2016 GI Glimpse Organising Committee, Climate Change Working Group and 2017 YAP Conference Organising Committee which attracted more than 100 attendees and received a lot of positive feedback from those who attended.



2017 Distinguished Service Award – **Gae Robinson**

Gae has been an active volunteer in many capacities since 1991. As Convenor of the ECC, Gae ensures the Institute’s education system is effective, she has been instrumental in driving the change in the Institute’s education system despite the operational challenges presented. Her commitment to, and time contributed to, the Institute’s Education Strategy Review has been exceptional.

“My volunteering experiences with the Institute have been rich and rewarding – I’ve had the satisfaction of making things happen, as well as working with lots of great people along the way. I encourage everyone who has time and passion to volunteer in an area that interests them. I’m honoured to receive the first Distinguished Service Award – which could have gone to so many people!” said Gae in her acceptance speech.



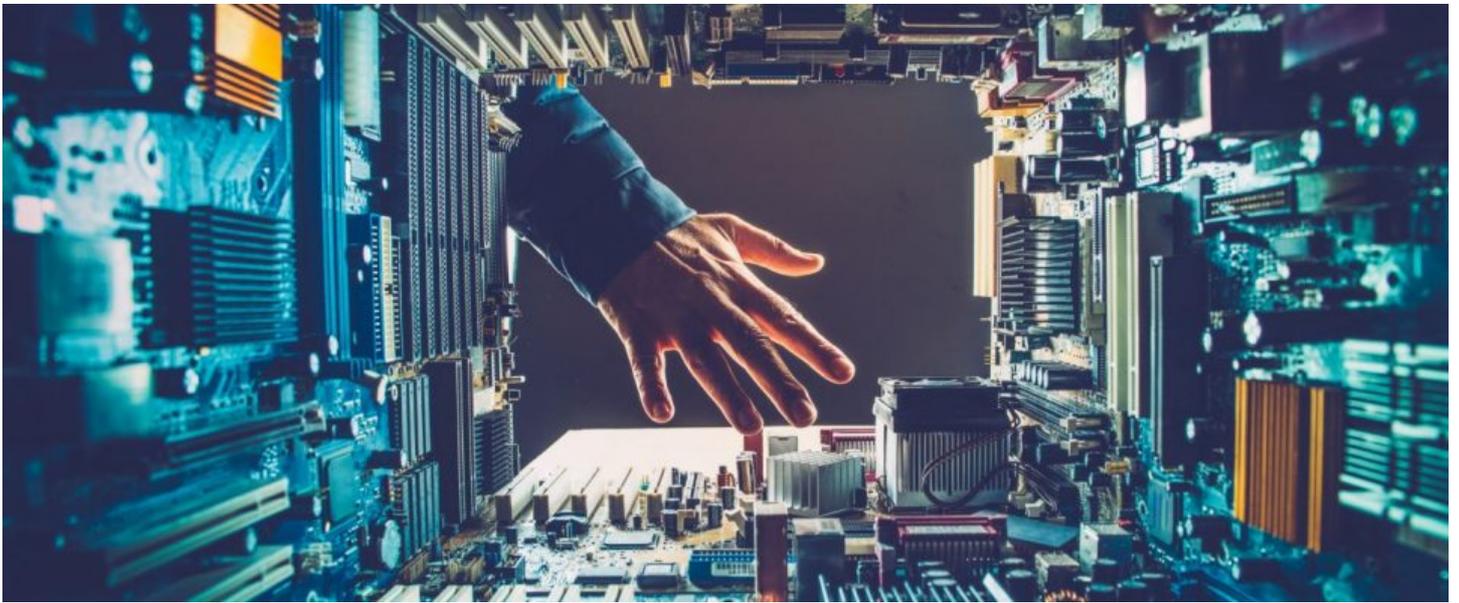
2017 President’s Award - **Andrew Boal**

Andrew's long-term contribution to the Institute's key volunteer activities and his external positive influence on the profession particularly as a key contributor and commentator in the retirement income policy debates. Andrew was the Convenor for the Superannuation Practice Committee for nine years from 2008 to 2016. He also served on Council in 2012 and on the HR & Remuneration Council Committee (2012-2015). He is the current Chair of the Retirement Strategy group. He has been involved in over 140 submissions and two significant White Papers - [Australia's Longevity Tsunami](#), [What Should We Do?](#) and [For Richer For Poorer, Retirement Incomes](#).

In his acceptance speech Andrew commented "it is very humbling to receive the President's Award for my volunteer work with the Institute. The profession has provided me with so many career opportunities, it is a privilege to be able to support the profession in some way in return. At the same time, being able to influence public policy, especially in such an important area as retirement and the ageing, has been really rewarding for me personally."

I am very much looking forward to next year's events and presentation of the 2018 awards already, and plan to continue to make these celebrations very enjoyable. If you would like to share your volunteer story, have any suggestions or feedback, or want to get involved please visit the [website](#) for more information and get in touch with me via lily.meszaros@actuaries.asn.au

I would love to hear from you!



Normal Deviance - In praise of the GLM

By Hugh Miller

In this column, we celebrate the success of the generalised linear model and explore why they are so popular. In its companion column (coming soon), we'll look at the model's limitations and ask whether there are better alternatives.

I consider myself fortunate to have a job where I get to fit lots of models to solve a range of problems. The most class of model I use is the generalised linear model (GLMs), and I think that's true for lots of people doing actuarial or analytics work. GLMs are a class of regression models that have become the de facto standard across insurance, government and many other industries. The [definitive textbook](#) was written in 1989 and the [nineties](#) saw widespread adoption that has endured.

Why have they proven so popular? Let's run through the main reasons:

- **Flexible response variable:** GLMs can model a wide range of outcomes including binary (did a customer leave?), count (how many crashes this year?) and continuous (what did the claim cost?). Having a common framework for such a range is powerful.
- **Multivariate accuracy:** While taken for granted today, combining multiple effects in a way that produces consistent and accurate predictions was a big deal. Even today, GLMs give reliably good accuracy, often off the back of relatively few parameters.
- **Inference:** The ability to formally test hypotheses, including the statistical significance of a predictor variable, is important. It means model can be used to generate insight as well as predict. Often being able to say an effect is not important is just as useful as finding something that is.
- **User control:** Perhaps more than any other multivariate modelling approach, the user oversees the crafting of effects in a GLM. This allows us to impose constraints on the model (such as smoothness or monotonicity of an effect). This can be useful when it comes to model updates too—the same structure can be imposed on new data.
- **Explanation and interpretation:** Because a GLM is typically a smallish set of parameters, effects can be given a clean interpretation as to how it impacts the predictor ('each year of age adds 2% to claim cost').

- **Extensibility:** Linear models and their GLM extensions have become a natural starting point to extend how we model. For example, GAMs are a variant that automate nonlinear predictor effects, while penalised regression approaches such as the [lasso](#) have allowed regression models to be applied to datasets with more predictors. Mixed models allow random effects with priors to be incorporated. The GLM framework remains an important starting point for research and development.

Few other predictive algorithms have as much to commend them. In fact, many modern algorithms could be improved by adding in some of the strengths enjoyed by the GLM. Regardless, I think the GLM will remain a reliable workhorse for many years to come.



2017 Actuary of the Year nominations open

By Actuaries Institute

Nominations for the 2017 Actuary of the Year are now open. The Actuaries Institute encourages members to nominate a colleague who has made a positive contribution to the profession.

The Actuary of the Year award is the most prestigious award presented to a Member of the Actuaries Institute.

The award recognises actuaries who have made a notable contribution to the profession and as a result, brought favourable publicity to the profession. It not only recognises the achievements of individuals but also raises awareness of actuarial capabilities, encourages the profession to continuously make positive contributions and also enhances the profession's profile.

We are proud to once again open nominations for the 2017 Actuary of the Year award and invite members to nominate a colleague who:

- has brought credit to the profession and has the capacity to promote the profession under the banner of Actuary of the Year;
- has made a key contribution to business, the community, government or the profession.

There should be public awareness of the individual and, in making the award, preference will be given to a person who will bring favourable publicity to the profession. It is expected that a particular recent contribution can be identified in making this award, although an ongoing contribution may be considered relevant. Whilst the individual needs to promote the profession, their contribution may not be specifically actuarial but, being a member of the actuarial profession, would be expected to have been a contributing factor to their contribution.

How to nominate

Submit a nomination either [online](#) or by [downloading the nomination form](#).

Nominations must be submitted by Friday 28 July 2017.

Recognition and celebration of the achievements and contributions of one of our members is an ideal opportunity to promote the value which actuaries can add, we look forward to receiving your nominations.

2016 Actuary of the Year



The 2016 Actuary of the Year award was presented to Sarah Johnson for and her contribution to the profession as the Scheme Actuary of the National Disability Insurance Scheme (NDIS). Sarah was "very happy and humbled" to receive the award for leading the development of an inhouse actuarial and sustainability capability within the National Disability Insurance Agency (NDIA).

Read the full article [here](#).



War Stories from Life Insurance Actuaries

By Anna Byrne and Rickie Fong

Rickie Fong and Anna Byrne have prepared a recap of the recent Insights session, 'War Stories from Life Insurance Actuaries', presented by Greg Martin, Richard Lyon and Grant Peters. The three presented a compact survival guide for fighting corporate wars.

It was a cold but sunny day (the last of autumn) when a mixed band of new and seasoned soldiers from the Australian Actuaries Institute Regiment gathered to hear tales of war from three decorated officers: Field Marshall Greg Martin, Admiral Richard Lyon and 10 Star General Grant Peters.



Life Actuaries Greg Martin, Richard Lyon and Grant Peters.

All three looked in marvelous shape, despite having (between them) fought 90 years in the corporate wars. (Though perhaps sometimes the scars of these wars are more internal...)

For 90 minutes our three fearless leaders regaled us with anecdotes, insights and notable quotes. And although none referenced napalm and its smell in the morning, we were still left with some memorable imagery from their presentation. (A 40-ton truck careening down a hill with a frantic driver (in singlet and shorts) madly trying to apply a foot (covered in only a thong)

to the brake. And the entire gang of chief underwriters, from the Australian industry, gathered around a dinner table at a friendly local Chinese restaurant.)



Impressive turn out for the War Stories insights session facilitated by Ilan Leas.

With the publication of a full survival guide still likely to be some time away, we have distilled some of the gems of wisdom into a handy pocket-sized version, small enough to be printed and stored with your other accoutrements of battle.

1. **Are your defenses protecting you or creating complacency?** If people know they will be checked by those further up the line it may reduce the care they take with their work.
2. **You may think things are working but they are not:** it may be that processes are reconciling because they are being 'forced' to. It is vital to make sure that those responsible for carrying out controls understand the purpose and implications of those controls and do not see them as something to 'get around'.
3. **Get into the trenches:** there is no substitute for real business experience - listen to phone calls with customers, talk to financial planners, spend time with your business stakeholders.
4. **One person's trash is another's treasure:** the workplace is diverse and tasks that one person finds tedious or easy are

guaranteed to be new, challenging or inherently interesting for another. You should always be on the lookout for opportunities to allocate work in the most optimal fashion and get the best from all teams.

5. **Being a leader is NOT the same as being in charge:** You don't have to be in charge to be a leader. Leaders are people who act with integrity and behave consistently in good times and bad. Leaders listen, are collaborative and say 'we' not 'they'. Good leaders surround themselves with good people and focus on showcasing their team's abilities. Thus, ensuring necessary development resources are received.
6. **Communicate often and early:** Simple and early communication is key, particularly when delivering bad news. Remember that you do not own the bad news and that early communication can prevent it gaining uncontrollable momentum. Downfalls come when 'surprises' happen. Very few actuaries have ever wished they communicated 'less' or 'later'.
7. **Take off the rose-coloured glasses:** Don't adjust assumptions to achieve expectations. They are not 'yours' but belong to the business and you should not feel the need to defend them if they are no longer appropriate
8. **Be true to yourself:** Integrity is how you handle yourself both when things are going well, and pear-shaped. Be honest and true to your ethos as this will make up your reputation and impact on your journey in the industry.
9. **"I'm trying to keep you out of trouble":** Language is important when dealing with conflict. Don't put yourself in the position of 'opposing' senior management. Choose language that shows you are acting in their best interests.
10. **Beware of accepting tickets to the next NRL game:** Corruption starts small.

These were not war stories designed to intimidate and scare younger actuaries but rather good reminders of the lessons that have been learnt by others before them.

We thank the panel for their time and generosity in sharing their personal experiences. It is now our responsibility to use these lessons as tools in 'battlegrounds' of our own.



Loss Coverage: Why Insurance Works Better with Some Adverse Selection

By Stephanie Quine

Here we speak with Guy Thomas, author of 'Loss Coverage: Why Insurance Works Better with Some Adverse Selection'. Guy explains the context of his recent publication and why loss coverage is important.

Adverse selection is usually seen as a bad thing, but the book's title seems to contradict this. To set the context, can you outline the traditional argument why adverse selection is a bad thing?

I want to answer that in two parts: first from the viewpoint of insurers, and then from the viewpoint of society as a whole. The book is very much focused on the second, the social viewpoint.

From the viewpoint of insurers, adverse selection means that higher risks are more likely to buy insurance, and lower risks are less likely. To the extent that insurers don't anticipate this in pricing, they will lose money. Obviously this is a bad thing for the insurers.

From the viewpoint of society as a whole, the argument is slightly different. Typically, higher risks are fewer in number than lower risks. Think of life insurance: typically perhaps 80% of lives are lower risks which are offered standard prices, and 20% are higher risks which are rated or declined. So if higher risks are more likely to buy, and lower risks less likely, that implies we end up with a lower number of lives insured than if buying patterns were uniform. Also, because the average risk of the insured pool is higher, the average price of insurance is higher than the average risk in the whole population. This combination – a higher average price, and a lower number of lives insured – is why adverse selection is traditionally seen as a bad thing, from the viewpoint of society as a whole.

That makes sense, but your book title seems to disagree. Why?

Step back for a moment and think about what adverse selection – *“higher risks more likely to buy, and lower risks less likely”* – actually means, from a social viewpoint. It means that insurance tends to be bought by people who need it most! From a social viewpoint, why is this bad?

The traditional answer is the one I gave above: adverse selection also means a higher average price for insurance, and a lower total number of lives insured. What this argument overlooks is the shift in coverage towards higher risks – those who need insurance most. If this shift in coverage is large enough, it can more than outweigh the fall in numbers insured, so that loss coverage is increased.

What is loss coverage?

Suppose 100 deaths are expected in a population, of which 50 are expected to be compensated by insurance. This corresponds to loss coverage of 50%.

Technically, we can define loss coverage as the expected losses compensated by insurance for the population as a whole.

Loss coverage takes account of both the number of risks covered by insurance, and their probabilities of loss. It captures the trade-off between covering the lives who need insurance most (the higher risks), and covering a larger total number of risks.

Why is loss coverage important?

Loss coverage may be a good metric for assessing how effective insurance is, from the viewpoint of society as a whole. Compensation of losses is main social purpose of insurance, which public policy generally seeks to promote. When insurance is compulsory, (eg third-party liability for drivers and employers

in the UK), the purpose of compulsion is to ensure 100% loss coverage.

Although other insurances usually aren't compulsory, compensation of losses under other insurances still seems to be generally regarded as a good objective, and one which public policy should seek to promote.

Don't limits on risk classification lead to a 'death spiral' ending in very few people being insured?

That depends on the response of higher and lower risks to changes in price – technically, the demand elasticities of higher and lower risks. In theoretical models, with plausible demand elasticities, the market does not spiral away to nothing – the spiral always stabilises.

Apart from the theoretical models, it's hard to find convincing real world examples of so-called death spirals. On the one hand, you have the evidence of adverse selection, which is often for fairly limited effects; and on the other hand at the rhetoric of adverse selection, which is often quite exaggerated. I go into both the evidence and the rhetoric in some detail in the book.

How could insurers using big data affect your argument?

I think large and rapid improvements in predictive power using big data are rather unlikely. But at the margin, it does seem plausible that advances in the use of big data may enable insurers to classify risk more accurately. Potentially, that could reduce adverse selection too much, and so reduce loss coverage. So advances in the use of big data could become a possible reason for imposing some new regulatory limits on risk classification. And this loss coverage argument is complementary to other arguments based on privacy or fairness, which may point in the same direction.



LOSS COVERAGE

Why Insurance Works Better with Some Adverse Selection

GUY THOMAS



Loss Coverage: Why Insurance Works Better with Some Adverse Selection can be bought direct from the publishers [Cambridge University Press](#) at a 20% discount (enter code THOMAS2017 at the checkout).

About the Author: Guy Thomas is an actuary and investor, and an honorary lecturer at the University of Kent, Canterbury. His academic publications have received prizes from the Institute and Faculty of Actuaries and the International Actuarial Association. He is also the author of *Free Capital: How Twelve Private Investors Made Millions in the Stock Market*.



The Three Lines of Defence

By Brett Riley

The Three Lines of Defence model is often cited in modern risk management. What is it and where do actuaries fit in?

The idea of having different lines of defence to protect against a threat makes sense. If one line fails, hopefully another one will diffuse the danger with minimal disruption to the organisation. The concept probably has military origins; it has also been adopted in various sports, where players are arranged in groups which the opponent must get past (e.g. forwards, midfielders and specialist defenders).

Within financial services and other organisations, this general idea has been applied as the Three Lines of Defence (“3LOD”) model for risk management. It has been promoted by consulting firms for several years, and was used by the Financial Services Authority (FSA) in the UK as a model for managing risk in banks.

Furthermore, in 2013 the Institute of Internal Auditors (IIA) published a paper endorsing the 3LOD model as sound practice in risk management.

The 3LOD model is also important in Australian financial services. APRA describes the model in its Prudential Practice Guide CPG 220 – Risk Management. This is relevant for determining who may be the Chief Risk Officer (CRO) in a bank or insurer, to maintain independence between the three lines.

This article is the first of two parts written to provide an introduction to 3LOD for members new to risk management in the APRA framework. The second instalment reviews actuarial roles when viewed through this model.

The topic is also relevant to private health insurers (PHI). APRA recently consulted industry about extending its cross-industry prudential standard CPS 220 – Risk Management to this space, and is considering the submissions received.

What is it?

The 3LOD model for risk management can be summarised as follows:

Table 1 – Summary of Three Lines of Defence

Line of Defence	Description
First	<p>Provided by functions that own and manage risks^[1].</p> <p>These generally comprise operational management and staff who make decisions or perform tasks which shape the overall risk profile of the organisation. Operational management and staff also perform the initial risk management on the risks arising in their area of responsibility, either via established controls or by managing and escalating new risks which have developed.</p>
Second	<p>Provided by functions that oversee risks.</p> <p>In most organisations these include the risk management and compliance functions, although some statutory actuarial functions may be grouped in the second line of defence as well. Through their management of the risk management and compliance frameworks, these functions give independent oversight. They also support the first line in managing their individual risks.</p>
Third	<p>Provided by functions that provide independent assurance.</p> <p>Typically, this is provided by the internal audit and external audit functions. Auditors have a greater separation from the business than the other two lines, providing independent assurance that the risk management framework is operating as intended.</p>

Why does it matter?

The different risk management roles for the three lines can be distinguished as follows:

In the last twenty years or so risk management has changed:

Table 2 – Differences between the Three Lines of Defence

Line of Defence	Responsible for Setting Company's Risk Profile?	Frequency of Risk Reviews
First	Yes – the business and first line management make decisions which set the risk profile	Continuous – best practice risk management is integrated with regular business decisions and activities
Second	No – an internal function, but independent of the business	Regular (typically at least monthly, some activities occur more often)
Third	No – external to the business and independent	Less frequent (say, once or twice per annum)

- Interdependencies between risks have increased, due to the global nature of financial markets, product innovation, increased electronic communication and other technological changes. Volatility has increased;
- Some companies have suffered large losses and disruption (and in some cases failed) due to failures in managing their risks. In the past many risk managers were only responsible for a subset of a company's risks (e.g. operational risks) and lacked the seniority and access to raise issues with senior management and Boards;
- Corporate structures have become more complicated as businesses have grown larger, expanded their operations overseas and the risk environment has changed; and
- The pressure for improved performance has risen alongside increased competition in many industries. Also, outside scrutiny from regulators and rating agencies has intensified.

As such, the discipline of Enterprise Risk Management (ERM) developed to provide a company-wide view of all risks and to support better risk-return outcomes. The head of risk management (usually described as the CRO) then assumes a senior management position, ideally with reporting lines to the Chief Executive Officer (CEO) and the Board. In this structure the CRO will typically be supported by a team of risk managers and specialised risk analysts. They operate alongside the business and other advisers and stakeholders (including actuaries, auditors and compliance staff) in managing risks in an efficient and structured way, to avoid duplication but to protect the business and ensure there are no control or oversight gaps.

Given that the framework is cited by APRA, it is important in many of the areas in which our members practice.

APRA's Approach

APRA does not mandate that the banks, insurers and funds which it regulates must follow the 3LOD model. However, other prescriptions in the APRA regulatory framework effectively require the model to be followed by most companies (particularly in the requirements of CPS 220 and the supporting guidance in CPG 220). Refer to paragraph 4 of CPG 220 for more detail.

Appendix A of CPG 220 provides APRA's interpretation of 3LOD. While it is similar to the description above, it also includes detail specific to the APRA regulatory framework.

The role of the Board in APRA's framework is important. It does not sit in any line of defence but has oversight of all company operations, controls and assurance activities. The Board is supported by its committees, including the Board Risk Committee and Board Audit Committee.

The 3LOD model supports APRA's objective for the risk management function (including the CRO) to be independent of the first line and third line. CPS 220 also states the following:

- To maintain independence, the CRO cannot also be CEO, Chief Financial Officer (CFO), Appointed Actuary or Head of Internal Audit (paragraph 40); and
- To give the risk management function seniority to challenge business decisions, the CRO must have a direct reporting line to the CEO and unfettered access to the Board and the Board Risk Committee (paragraph 41).

APRA requires a 'designated' rather than 'dedicated' CRO. This provides some scope for the CRO to have other roles and responsibilities, so long as there are no conflicts of interest (as listed above).

However, CPS 220 also provides for a company to seek approval for alternative arrangements to the requirements listed above. The merits of each case will depend on each company's situation, for example:

- The size, business mix and complexity of the operations. The smaller and simpler these are, the more likely it is that alternative arrangements will be approved;
- How difficult is it for the company to recruit a CRO? Will this place an excessive financial burden on the company? Could the company effectively use a consultant in this role to support an existing junior risk manager already employed by the company?
- If the company is part of a wider group, can it leverage a resource there for support?
- How strong is the company's existing risk management framework?

If alternative arrangements adhere to the principles of the 3LOD model, with suitable access to the CEO and Board, then there is a good prospect that these arrangements will be approved by APRA.

Many Australian private health insurers are relatively small. These questions will become important if CPS 220 is extended to them. When this prudential standard was introduced for banks, life insurers and general insurers, the experience for those seeking alternative arrangements was mixed. Each case depended on the specific circumstances of the company and how it put in place sufficient independent checks in the company's structure.

In the next edition of Actuaries Digital we will explore the role of actuaries in the 3LOD model.

Finding the Right Balance

Future of Health Seminar



What you missed at the 2017 Future of Health Seminar

By Actuaries Institute

The annual Future of Health Seminar returned to Melbourne this year with a star line-up of speakers. Here is a summary of what you missed out on if you weren't there!

The Future of Health Seminar was held in Melbourne last week. Nearly 100 delegates gathered to 'Find the right balance' and the message of the day was that balance comes when we engage widely and work in partnerships.

Ignatius Li facilitated our first session by considering the current balance of Australia's healthcare system. We were fortunate then to hear from the Hon Jillian Skinner (former NSW Minister for Health) and Dr Stephen Duckett (Grattan Institute).

Ms Skinner focused her presentation on creating change as a state health minister while working with practitioners and health staff to improve morale and public health management structures. Dr Duckett made the case to do more on assuring quality outcomes in the health sector and questioned whether the balances struck in public healthcare are in line with community expectations – for example, to what extent is it right for a state health budget to be underweight on quality measures, but deliver superior outcomes in terms of financial stability?

Both discussed how the industry can find the right balance through better governance, better boards, transparent funding, accountable performance, investing in new technology and facilities, genuine data and new programs.

"Going forward, big data and analytics is the new frontier... as an actuary, your skills as a data analyst can unpack the 'black box' [of missing data]" - Ms Skinner.

During Q&A, discussion centred on data quality, privacy issues and how quality metrics should be used. When asked whether there was any health data that shouldn't be released, Dr Duckett asked how do we as a society value the risk of disclosure? The benefits of disclosure are becoming clear. But publishing data may not work in the way we expect, for example, public reporting of hospital acquired infection rates may not cause consumers to take action but it will almost certainly change behaviour at hospitals.

"Knowing is not the same as doing... We need to move from just pretty graphs to true accountability" – Dr Duckett.



Dr Stephen Duckett, the Hon Jillian Skinner, President Jenny Lyon and CEO David Bell

Plenary 2 featured Dr Bastian Seidel (Royal Australian College of General Practitioners), Associate Professor Anthony Lowe (Prostate Cancer Foundation of Australia) and Dr Linda Swan (Medibank Private) sharing on what 'Customer Centred Health Care' looks like for them.

Dr Bastian Seidel highlighted that Australian GPs see 85% of the population every year and yet, our health system remains very hospital centric. Australian hospitals are of a high standard but are extraordinarily expensive to run. "We need to have less operations and less treatment - we need to focus on maintaining health and prevention. And this needs to happen in the community".

Associate Professor Anthony Lowe brought to light the issue of consumer out-of-pocket costs, particularly for cancer patients, sharing quotes from real cancer patients about their frustrations with the current Medicare and Private Health Insurance system and the financial burden that is imposed. "The financial burden

of cancer causes people to forego treatment and stop treatment”.

Looking forward, Dr Linda Swan tackled the issue of customer centred care by illustrating that the ‘third era’ of healthcare will be reached when patients and healthcare providers are in true partnership. In third era healthcare insurers and government will focus on patient outcomes, improved transparency to drive behavioural change and aligning incentives between funders, providers and patients.

Q&A focused on transparency, the challenges of communicating to patients, and highlighted the need for GPs and other trusted healthcare advisers to work in close partnership with patients. There was also some discussion on the need for insurers and other health funders to build trust and demonstrate to providers that their interests are aligned.

“Insurers are funding healthcare, not treatment” – Dr Swan.



Dr Bastian Seidel, Dr Linda Swan and Associate Professor Anthony Lowe

Following lunch, the Institute launched its new thought-leadership series *The Dialogue* with the first issue focusing on the affordability of cancer treatment. *The Dialogue* is a series of papers written by actuaries and published by the Institute. The papers aim to stimulate discussion on important emerging issues. [Private Health Insurance Bill Shock: What Can Insurers Do to Help?](#) was written by Associate Professor Anthony Lowe and Jamie Reid. The paper proposes a simple addition to private health insurance policies designed to alleviate the severe financial impact of a cancer diagnosis.



Plenary 3, saw a change in facilitator (Jamie Reid) and a particular focus on private health insurance. Dwayne Crombie (BUPA), Matthew Koce (hirmaa) and Michelle McPherson (nib

holdings) each reflected on the challenges facing the industry and the best case for reform.

Each speaker agreed that the key challenge was the affordability of PHI premiums and maintaining the value proposition for consumers. “Premium affordability and medical out-of-pockets are the biggest issues” said Michelle McPherson.

“What patients tells us they want most of all: to understand in advance about co-payments, transparency about product coverage and coordinated care from doctors and specialists” - Dwayne Crombie.

The speakers pointed to a number of real short-term prospects to improve system efficiency through prosthesis reform, risk equalisation and community rating reforms. There was also agreement that the industry needs to improve the consistency of product disclosure and terminology about medical procedures, but the long-term game is moving from a fee-for-service model to value-based contracting and aligning incentives between insurers and providers.

During Q&A, all speakers said they were optimistic about the future, pointing to a growing sector and the limited ability and appetite of Government to continue to fund healthcare services at current levels of growth.

“We’ve been obsessed with improving the customer experience; value for money and affordability is harder. I would be optimistic. It’s just that things are slow... there are constraints in doing the right thing but we are heading in the right direction” - Dwayne Crombie.



Dwayne Crombie, Michelle McPherson, Facilitator Jamie Reid and Matthew Koce

There was a short break to refresh before the final plenary session commenced with a stage full of speakers. Richard Hurley (Department of Finance), Julia Cooper (Finity), Margaret Bennett (Northeast Health Wangaratta), Mirelle Campbell (Actuarial Consultant) and Sean Heng (Independent Hospital Pricing Authority) shared with us three case studies inspired by the topic ‘Health Analytics & Big Data - Embracing the Change’.

Richard Hurley, who was introduced as working in the most exciting work of his career, shared with us an example of the work undertaken by the Department of Health’s analytics team. His conclusions: linking large health datasets isn’t the type of work that can be done without access to clinicians and policy experts. A key part of his work is managing project expectations, ensuring that there are clearly defined research questions so that the analytics are policy relevant and keeping a lid on

enthusiastic Execs who underestimate the time and processes necessary to set up a project for success.

Julia Cooper and Margaret Bennet worked together on a health data project that Margaret described as “an absolute game-changer”. Julia discussed the approach taken in analysing the data for a health care service and the surprising results, such as identifying frequent users of ED. Margaret discussed the benefits the organisation had gained through the use of data analytics. The inclusion of socio-economic data allowed the identification of causation factors that improved the treatment provided by the health service.

Mireille and Sean discussed the work involved in determining pricing adjustments when adverse events are deemed to be within the control of the hospital (e.g. injuries related to a patient falling). Unsurprisingly the process required significant education of, and discussion with, stakeholders.

The Q&A session discussed the practical challenges associated with big data and health analytics and the types of expertise that are necessary in a health analytics team.



Sean Heng, Mireille Campbell, Richard Hurley, Facilitator Jamie Reid, Julia Cooper and Margaret Bennett

The day was brought to a close with a reminder about the hope and challenge of healthcare. People are interested in the sector because individuals are living longer lives, new technologies are being developed to improve the quality of healthcare but we must also recognise that there are limited budgets from Government and individuals. Health actuaries are part of the healthcare system and have the opportunity to work with others to develop efficiencies that will benefit all Australians. There is a real need for collaboration and to engage with others.

Thank you to seminar sponsors (Causeway and Finity), our speakers, facilitators, and the organising committee for bringing the 2017 Future of Health Seminar to life.



Causeway



Finity



FOHS Organising Committee: Indy Abeykoon, Richard Hurley, Sarah Gibson, Elizabeth Gemmell, Raymond Yeow, Jamie Reid and Ignatius Li

The Institute’s Health Practice Committee would love to hear from you if you are interested in discussing with us the next steps for the profession in engaging with the health sector. The next Health Practice Committee meeting is on 22 June, please let Convenor [Nick Stolk](#) know if you are interested in contributing to the meeting.

Sponsors





The Critical Line - Volume 13

By Oliver Chambers

Oliver Chambers brings us this month's Critical Line challenge: how to escape from the jungle.

This month's article comes to you from the sunny beaches of Otres Cambodia. I've been wandering around South East Asia for the past three months but haven't forgotten about the eagerly anticipated puzzle column. This month's puzzle may or may not be inspired by real life experiences...

Lost in the jungle

An actuary has gone for a hike in the jungle and become disoriented. He knows that he is 1km away from a perfectly straight road of infinite length, but does not know which direction he is facing. The forest is very dense so he will not be able to see the road until he walks upon it. What is the shortest distance he needs to walk to be certain of finding the road?

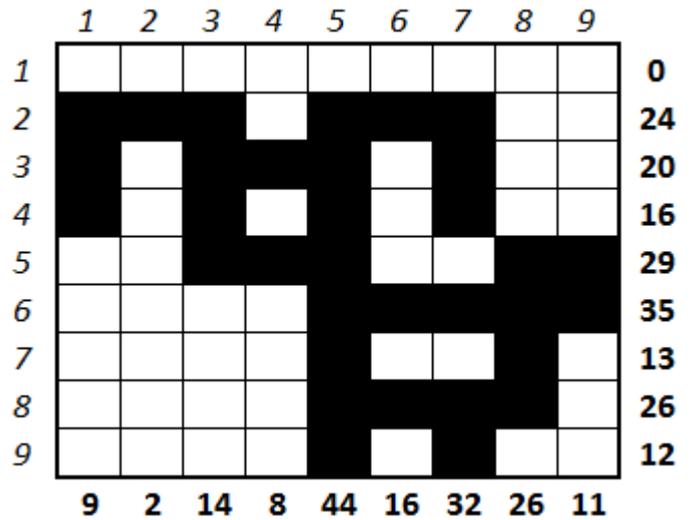
The submissions with the minimum length path will win this month's \$50 book voucher.

For your chance to win \$50, send your solution to the puzzle to ActuariesMag@actuaries.asn.au

The Critical Line - Volume 12 Solution

Congratulations to Stephen Woods who was the first to submit the correct solution!

Thanks to all those who wrote in with their solutions! The final answer to the location of the eggs is shown below are given below;



X	K	B	W	G	I	K	J	N
C	O	G	Z	T	I	O	N	Y
I	Q	R	I	A	T	N	C	O
N	O	A	X	L	C	S	G	N
E	C	N	T	U	N	H	R	A
P	B	O	R	T	T	E	B	H
C	D	W	C	S	T	F	B	P
V	E	X	P	G	A	T	I	V
I	F	V	M	E	N	C	X	H

Unscrambling the letters reveals the location:

CONGRATULATIONS! IT'S IN THE RABBIT CAGE





When life gives you lemons, make Lemonade - A Behavioural Science guide to Lemonade Inc.

By Leon Yan

Reading time: 4 mins

Lemonade is the new New York based insurtech that is 'redefining everything we understand about insurance'. Leon Yan, Actuarial Manager at Cover-more introduces Lemonade and tells us why it works.

Add lots of sugar to make it extra sweet

I've been casually following Lemonade Inc – the New York based **insurtech** that is redefining everything we understand about insurance – from its expansion into California to it receiving a strategic investment from Allianz. I must admit *I really, really enjoy Lemonade*.

I may be under the spell of the **halo effect** (or the tendency to like everything about a person), in this case an insurance organisation, including aspects that have not been observed. I'm only informed by what I read through the media. I'm not acquainted with any Lemonade employees and I've not interacted with Lemonade as a customer but *I really, really enjoy Lemonade*.

It's hard to dislike Lemonade when even the name is **associatively coherent**. Our mind connects 'lemonade' to a constellation of positive ideas such as it's delicious, refreshing and quenches one's thirst. It happens unconsciously when ideas are **cognitively easy** for our minds to process. We've had **repeated experiences** of lemonade that were pleasing and are **primed** to enjoy the sweet taste when we're thirsty, so this places us in a **good mood**.

And this is clever because the ethos of the organisation is to transform the experience of insurance, from what feels like a 'lemon' into 'lemonade'.

The secret ingredients

Lemonade boasts an impressive run sheet of innovative insurance ideas:

1. So long moral hazard

Lemonade unashamedly asserts to never be in conflict with customers nor make money by denying their claims, effectively solving **prisoner's dilemma**.

They cracked the **game theory** gridlock, they say, by having their hands 'commercially' tied. Firstly, Lemonade is set up as a Public Benefit Corporation and certified as a B-Corp in what is an insurance industry first. Lemonade does not place the interests of profit and returns to shareholders at a detrimental cost to society.

Secondly, Lemonade will only take a flat fee to pay expenses and reinsurance. They return what's leftover in the annual 'Giveback' to causes that their customers care about. Lemonade openly use clear, transparent and empathetic language to show they are onside with customers: 'we gain nothing by delaying or denying claims', 'we treat premiums as if they are still your money and return unclaimed remainders'.

*Admiration, respect and praise breeds goodwill in the public. The **Law of Reciprocity** will thus ensure they attract more customers who are socially responsible and who will do the right thing.*

2. A clever behavioural scientist

This is a structural fix to the model of insurance, and the grand architect is Lemonade's Chief Behavioural Officer, Dan Ariely. On **trust** and **behaviour** he explains:

People are generally honest. We all have a trust self-image that we might push from time to time. It's like speeding; that doesn't make us feel like bad person when we do it. The same goes for insurance. People don't feel aligned to the insurer, but they do

feel the relationship is adversarial. This gives people a sense of entitlement and leads to embellishment and even fraud

Lemonade is determined to put **trust** at the forefront of insurance.

3. Not a fad but a true P2P model

Customers are grouped by their affinity to good causes. Those passionate about medical research or community sports will be grouped as peers. Unspent premiums from the risk pools are subsequently donated to the selected causes.

The **motivations** for both the insurer and insured are thus aligned, and any irresponsibility by either party put this common objective at risk. It is **consciously** or **subconsciously** avoided at all cost.

4. Artificial Intelligence

Lemonade is a technology company running insurance. AI is used as the first point of contact with customers, to quote and sell insurance via a mobile app. Next, a series of algorithm runs all the underwriting and a price is served. Prices are quoted as monthly, making the figure look *lower* than otherwise. This is **reduced metering** at its best. Our cognitive bias will make it more likely that we compare this *lower* price to say cups of coffee so the quote is made to **feel** cheaper.

Claims are also lodged, assessed and paid instantly through the app using a chatbot. There is no Claims Department *per se*, a series of algorithms will determine exactly what is paid out. Lemonade boasts the fastest pay out, in 3 seconds! Customers sign a digital pledge and also record a short video statement all designed to induce **socially responsible behaviours**.

*When the **tyranny of distance** and lack of **personal connection** is replaced by a **code of honour**, and also the customers record a video that is **watched**, they are then more likely to **do the right thing**.*

5. Cognitive ease

The Lemonade ecosystem is designed to be extremely easy to navigate. Things that are easy induces **happiness** and **positive feelings**. Consistent cartoon like formatting, open and trust building content, and snappy aesthetics all builds familiarity towards the brand. When customers are repeatedly told that Lemonade is there to do good, we're subconsciously **primed** to feel **generous** and **kind**.

When a purchase path is **easy** and **intuitive**, we *enjoy **cognitive ease** and are **rewarded** by the experience*.

Spread the word

I introduced earlier the concept of **association**. We are all hard-wired to associate things we like with happiness. Most people will see the word 'cake' and subconsciously be happy. It's our brains' way of saying 'cake' is a good thing.

So did you notice I repeatedly used the phrase *I really, really enjoy Lemonade*? Maybe you didn't give it too much thought. But assuming you also enjoy the beverage, you are more inclined to trust what I say. And if I repeat it again and again, it will be more **associatively coherent** so that if you read the word *lemonade* you will now think of the company. So if you like *lemonade*, it's now easy to appreciate why this company is quickly conquering the United States one beverage at a time.



Welcome to the Institute's newest members!

By Actuaries Institute (Actuariesmag@actuaries.asn.au)

Reading time: 1 minute

A warm welcome to the Institute's newest members in Australia and overseas.

Australia

Haiming Zhu (NSW)

Hoan Thi Ngoc Nguyen (NSW)

Marc Mer (NSW)

Benno Malasi Lyakurwa (NSW)

Stephanie Bao Lin Ngo (NSW)

Corrina Ching Man Cheung (NSW)

Jia Si Hu (NSW)

Khang Thanh Le (NSW)

Kushal Mithal (NSW)

Min Han Chow (NSW)

Nishant Mainali (NSW)

Oliver Michael Wood (NSW)

Shaochuan Wang (NSW)

Soroush Eslami Amirabadi (NSW)

Subarna Panday (NSW)

Eric Siu Yeung Au (VIC)

Ilhan Evin (VIC)

Jeanne Kuang (VIC)

Luke Bexley (VIC)

Viet Hoai Lam (VIC)

Zhi Hao Ong (VIC)

Zilu Tang (VIC)

Adam Junyu Nie (ACT)

Dongxu Li (ACT)

Jonathan Kuan-Chung Feng (ACT)

Tianhao Zhou (ACT)

Xiaoxu Meng (ACT)

Travis John Yates (QLD)

Yi Zhou (SA)

Zhiyong Zhu (SA)

Overseas

ShengYu Du (Hong Kong)

Yan Cheuk Sung (Hong Kong)

Wai Tung Chan (Hong Kong)

Jennifer Anne Howe (New Zealand)

Jennifer Anne Howe (New Zealand)

Jiajun Zheng (Shanghai)



Leading the conversation

By Elayne Grace

Reading time: 2 mins

Elayne Grace, Deputy CEO and Head of Public Policy, is pleased to announce that the Actuaries Institute has released the first paper in its new thought leadership series *The Dialogue - leading the conversation*.

[Private Health Insurance Bill Shock: What can Insurers Do to Help?](#) was written by actuaries Anthony Lowe and Jamie Reid and aims to stimulate constructive discussion within the industry and the broader community about the cost of cancer treatment and private health insurance solutions. The paper was successfully launched at the Institute's Future of Health Seminar in Melbourne on 8 June 2017 and attracted significant media attention.

In recent years, the Actuaries Institute has continued to increase its public policy contributions, providing significant responses to the 2014 Financial System Inquiry as well as Productivity Commission and regulatory discussion papers. We have also published several White Papers and Green Papers including:

- [The Impact of Big Data on the Future of Insurance](#)
- [Unlocking Housing Wealth – options to meet retirement needs](#)
- [For Richer, For Poorer: Retirement Incomes](#)
- [Who Will Fund Our Health?](#)
- [Australia's Longevity Tsunami: What Should We Do?](#)

In the next few months, we are hoping to release our Green Paper on mental health.

However, as Head of Public Policy, I was keen to create a forum where Actuaries could have a voice and stimulate discussion on important, emerging public policy issues. A space where we could highlight these issues and consider them reflectively. The aim was not to formulate immediate solutions but to start the conversation and collaborations with interested stakeholders and explore new insights. And so, *The Dialogue* was created.



The Dialogue will be a regular series of short papers that aim to give actuaries a voice and build on the growing reputation of the Institute and the profession as a valued, independent public policy contributor. We want to be proactive rather than reactive on issues facing society and use our expertise to consider these over a longer time frame to stimulate policy debate.

Actuaries will write the papers. Opinions expressed will not necessarily represent those of either the Actuaries Institute, its members, directors, officers or employees. However, *The Dialogue* papers are in line with our [public policy principles](#) of public benefit, risk focus, transparency and disclosure, equity and 'the level playing field' and good regulation.

The topics considered will be relevant to the profession's expertise but not limited to narrow sectoral interests. If you have a public policy concern and are interested in writing a thought leadership piece, please get in touch via elayne.grace@actuaries.asn.au



How can actuaries help in human services?

By Julia Lessing

Reading time: 5 mins

Last month Julia Lessing participated in the Actuaries Summit as a Plenary Speaker, encouraging delegates to “Think Differently” about the role of actuaries in tackling some of society’s wicked problems. This article covers the key themes from her presentation.

A story about Jack

Jack is a young boy with two little brothers. His mum and dad were teenagers when he was born. Jack’s mum loves her boys and Jack’s dad has a job. Jack’s grandma helps daily. This young family doesn’t have much, but Jack and his brothers are happy and well cared for.

Over the next few years, things change for this family.

Jack’s dad loses his job after a round of cutbacks at work and starts going out drinking with his mates to cope. He is violent when he’s been drinking and often takes out his anger on Jack’s mum.

Jack’s grandma dies and the combination of grief and the loss of practical support lead to Jack’s mum becoming depressed. Jack’s teacher notices he is having trouble concentrating in class and often comes to school without lunch. Concerned neighbours have called the police several times after hearing loud arguments between Jack’s parents. Jack’s family is evicted from their home because they are so overdue on the rent.



indicators and counting rules to track whether the joint efforts were delivering improvements as expected.

Multi-disciplinary teams of professionals are required to address our society's wicked problems.

How can actuaries help?

So what do actuaries actually do? Actuaries use mathematical techniques to analyse data, perform calculations and provide advice based on predicted future scenarios.

Actuaries are trained to give advice about what to do today, based on our professional view of future conditions.

For some actuaries, that actuarial advice might be what price to sell an insurance premium for, but actuarial techniques can also be used in human services.

In Jack's case, it may be determined that Jack and his brothers are not safe at home, and need to be placed in foster care. But what if Jack's mum can get treatment for her mental health and Jack's dad gets help finding a new job? Maybe Jack and his brothers could safely return home. What if this pattern happens again in the future? Even just from a child protection perspective, there are multiple pathways that children can follow, requiring fairly complex modelling to assess future needs and resources of the system supporting families like Jack's.

This is another example of the work actuaries where actuaries have helped. Government agencies need to be able to reliably model likely numbers of vulnerable children requiring different services, such as foster care, into the future to support their budget estimates. The skills and capacity required to undertake this complex modelling are not always available within government departments. Even if they are, oversight agencies will often seek independent teams to review and assess these models before they can be used.

Not only are actuaries well placed to assist, many already are helping. The diagram below shows some examples of projects that actuaries have been involved in recently:

Actuaries can, and want to, help improve society's wicked problems.

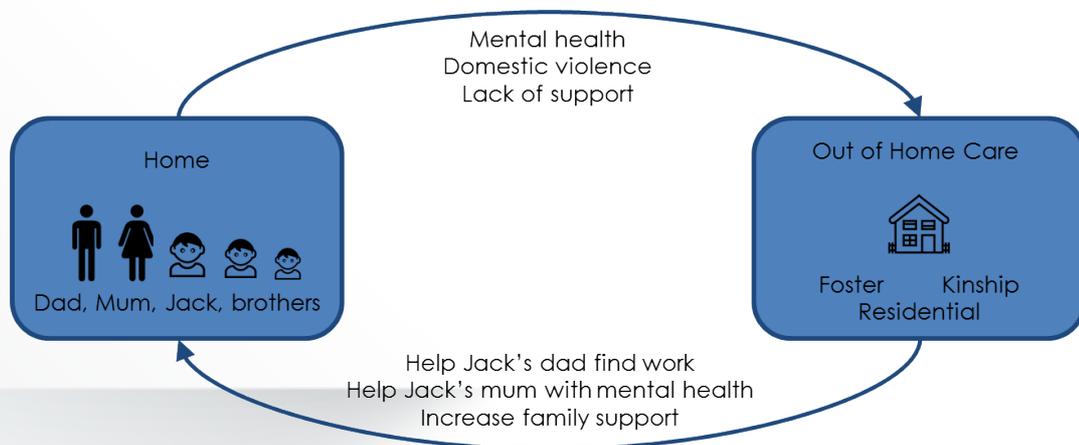
Obstacles for actuaries working in human services

Although actuaries are well placed to help, I think there are two main obstacles for actuaries wanting to work in human services: skill-set and brand.

Obstacle 1 – Skill-set

As actuaries, our formal education was focused on statistics, probability and economics, so our actuarial professional exams alone may not be enough for us to be effective in our work in human services. This might mean we need to undertake further education or either paid or voluntary work experience to supplement our analytical skills and learn the language of human services.

For example, I trained and served as a telephone crisis counsellor for Lifeline for several years. This experience not only allowed me to give back to my community by helping Aussies in need, but it gave me front-line experience in some of society's complex problems as well as an opportunity to learn the language of human services.



Actuaries want to help, and are already involved

- Actuarial Investment Approach
- Welfare Modelling
- Workforce analytics



- NDIS
- Social impact investment modelling
- Royal Commission Redress
- Social Housing

Obstacle 2 – Brand

While the actuarial professional brand is strong within insurance circles, many professionals working in human services have never met an actuary, nor do they know what an actuary can do.

Since actuaries need to work in multi-disciplinary teams to tackle some of these complex issues, it is critical that we build strong relationships with other human services professionals and clearly articulate how actuaries can help. It is not always helpful to lead with “Hi, I’m an actuary” and expect everyone to know what that means! Instead, we need to explain what we can do, how we can add value. “Hi, I’m an actuary and I’m trained to give quality advice about what you might do today, based on our quantitative and qualitative prediction of likely future conditions”.

As actuaries, it’s important to remember that we don’t automatically have a “seat at the table” when tackling society’s wicked problems. Recently we conducted a survey where we asked non-actuaries about their perceptions and experiences of working with actuaries. Nearly two thirds of our survey respondents had never met an actuary before working with our team, although they all agreed that they would be prepared to work with actuaries in the future.

Conclusion

Our society has wicked problems, requiring multi-disciplinary teams of professionals to help solve them. While there are obstacles we need to overcome, actuaries are keen and well-placed to be part of the teams solving these problems.

By thinking differently about what actuaries can do, there is an opportunity to utilise the skills of actuaries to bring enhanced rigour to the analysis and planning in human services. If we can overcome some key obstacles, actuaries can help tackle our society’s wicked problems.

References:

[1] <https://www.beyondblue.org.au/the-facts>

[2] <http://www.homelessnessaustralia.org.au/index.php/about-homelessness/homeless-statistics>

[3] <https://aifs.gov.au/cfca/publications/child-abuse-and-neglect-statistics>

See the original article by Julia Lessing [here](#).



Optimizing share market return using fundamental financial analytics

By Graham Taylor

Reading time: 4 mins

Here, authors Cary Helenius, Kevin Gomes and Graham Taylor discuss analytic techniques to identify the influence of company financials on shareholder return, and whether their model can predict future market out-performance.

This article is a follow-up to our 2014 article [“Fundamental financial analytics”](#) in which we discussed the use of analytic techniques to identify which and what level of company financials influence shareholder return. One future direction mentioned in the article was whether an alternative statistical model could have funds management applications – whether we can use the findings to predict future market out-performance. The results of that investigation are presented here.

Our research

The milestones of our research can be summarised as follows:

- **“Market Eye Q” Understanding the Drivers of Shareholder Return** presentation at the Actuaries Summit 2013 where we identified statistically significant relationships between listed companies’ financial ratios and total shareholder return (TSR). For example, companies that release financials showing a high level of ROE and a positive change in ROE will, on average, have a larger positive change in their share price relative to other companies.
- **“Market Eye Q” Analysis of financial management levers for stock selection** paper at the Actuaries Summit 2015 where we presented our findings of better than market average returns from using our alternative model coupled with simple prior price momentum filters to select companies in which to invest.

Before our presentation at the Actuaries Summit 2015 we optimized the future actual return by back testing combinations of prior price momentum and TSR predicted by our model although those initial findings did not make it into the paper. Over the 2 years to December 2016 we have monitored, without

influence of hindsight, the return from companies selected by our model/prior price momentum filter by the following groups:

- Group A - top 50% of companies predicted by our model of TSR.
- Group B - top 50% of companies predicted by our model of TSR with a prior price momentum filter.
- Group C - top 25% of companies predicted by our model of TSR.
- Group D - top 25% of companies predicted by our model of TSR with prior price momentum filter.
- Group E - companies predicted by our optimized model TSR and prior price momentum filter.

Results

The return for companies selected by our model is calculated from the end of the day of release of the half-year/full-year company’s financials to the end of the next half year, around 3.5 months later, (typically to the end of June or December) and prior to the next release of financial reports. We then averaged the return over the companies selected (assuming equal investment in each) at each half-year and compounded the return over the 4 periods of investment to December 2016. The results for Group A to E are shown in the table below.

Group of companies	Selection criteria	Average number of companies selected at each half-year	Compound return
A	Top 50% of companies predicted by our model of TSR	96	19%
B	Top 50% of companies predicted by our model of TSR with a prior price momentum filter	55	26%
C	Top 25% of companies predicted by our model of TSR	54	22%
D	Top 25% of companies predicted by our model of TSR with prior price momentum filter	30	26%
E	Companies predicted by our optimized model TSR and prior price momentum filter	13	40%

Some commentary on the table:

- Including a prior price momentum filter improves the return – compare Group A to B and C to D. This makes intuitive sense – a company may release a good set of financials but the market deems the outlook poor – this was the case for a number of mining engineering companies.
- The optimized model TSR and prior price momentum filter (Group E) produces the largest return (40%) although from selecting only 13 companies.

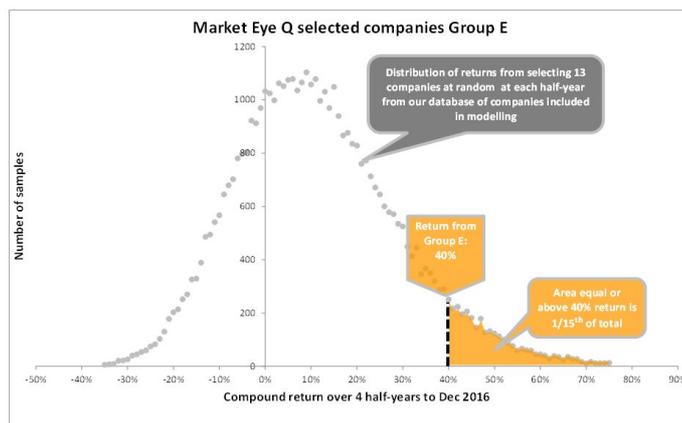
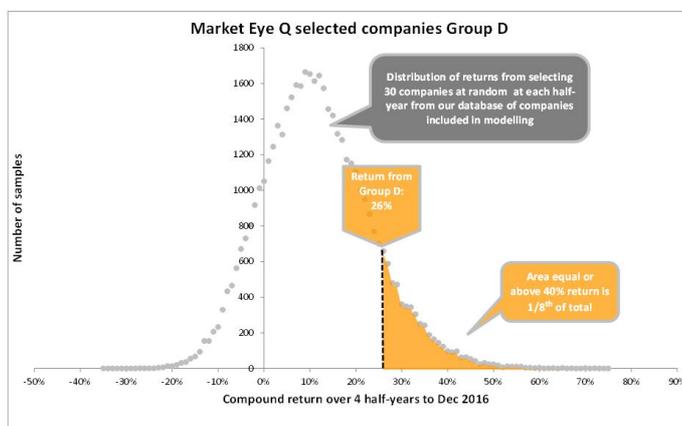
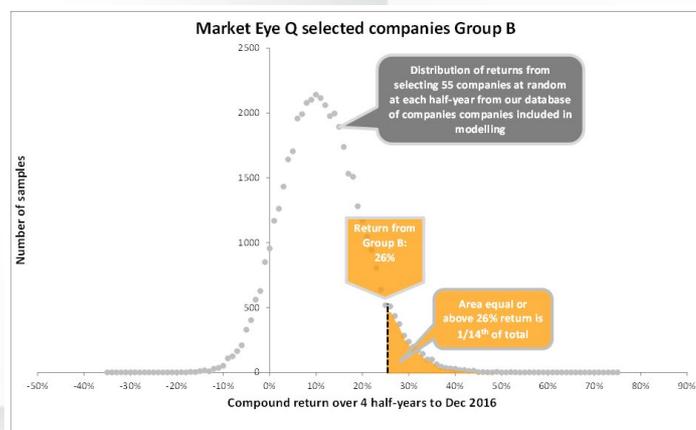
The table below shows a sample of model picks from Group B (some highs and lows) over the 2 years to December 2016 and the actual return from end of day of release of the financial report to around one month before release of next half-year or full year financial report.

	Model picks	Actual return
MTR	MANTRA GROUP LIMITED	50%
APE	AP EAGERS LIMITED	27%
DMP	DOMINOS PIZZA ENTERPRISES LIMITED	24%
QAN	QANTAS AIRWAYS LIMITED	16%
DMP	DOMINOS PIZZA ENTERPRISES LIMITED	-12%
RHC	RAMSAY HEALTH CARE LIMITED	-16%
GNG	GR ENGINEERING SERVICES LIMITED	-28%

Results in context

The returns in the first table compare favourably to the change in the ASX 200 which increased 5%, from 5,411 to 5,665, between end December 2014 and end December 2016. (Noting for this analysis we have excluded dividends from our returns to make them comparable to the ASX 200 index performance, and our group of modelled companies excludes banks and miners as their reported financials are not comparable to the broader market.)

To put the results into context with respect to the companies we have included in our modelling^[*], we have plotted below the actual investment returns shown above for Groups B, D and E against the distribution of investment returns formed by the simulation of 55, 30 and 13 randomly selected companies respectively at each half-year for the 4 half-years to December 2016 (and calculating the compounded return as we did for our selected companies).



Some commentary on the charts:

- In each case, there is fairly compelling evidence of out performance. For example, the 40% return seen for Group E would only have occurred by luck 1/15th of the time. Equivalently, the 1/15 is a measure of the statistical significance of the result, when compared to random selections of portfolios of the same size.
- The significance of the result B and E is similar, despite the higher return for E. This reflects the shape of the (slightly skewed) bell curve; it is harder to achieve the same level of outperformance with a larger portfolio.
- The return of 26% for Group B is the same as the return for Group D, although the statistical significant of the result for Group D is not quite as strong.

There are also some pragmatic considerations when interpreting the results

- These results may change if monitored over a longer period than 2 years (they are subject to a degree of random influence)
- Some of the financials in our model, at least over this 2-year period, may benefit from re-weighting (noting that the prior price momentum filter did not have as large an impact on the top 25% of model selected companies as it did for the top 50% - see first table and compare return for Group A to B and for Group C to D).

Take-aways

- **Companies that report strong financial performance, on average, outperform the investment returns of those that do not. Market outperformance from this portfolio of companies can be achieved by investing in these companies at the end of the trading day following the**

release of financials and holding these stocks to a month or so before the release of the next financials.

- **The investment performance of this portfolio can be further increased by including a prior price momentum filter across the companies that have reported strong financial performance.**
- **Significantly higher than average market returns can be achieved by investing in companies selected by our optimized model TSR and prior price momentum filter.**

[*] We include around 200 ASX companies at any point in time excluding banks and miners.

**DISCLAIMER: This article should not be considered as financial advice.*



Actuaries Digital download and print edition - May 2017

By Actuaries Institute

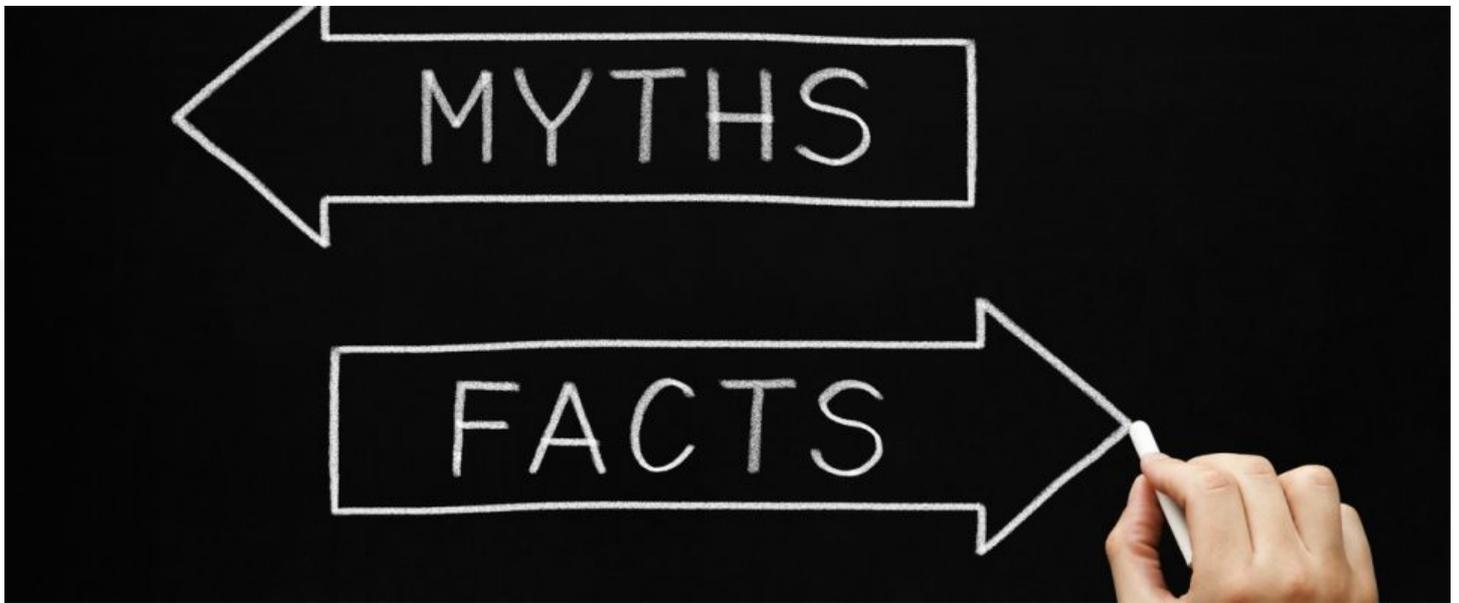
Reading time: 1 minute

Welcome to our round-up of the articles posted on Actuaries Digital during May 2017.

We have collated them into a convenient PDF format for you to print and read at your leisure.

Please click the image below to read.





Perceptions and Misconceptions of Actuaries

By Gaurav Singal

Reading time: 3 mins

In this student column by Gaurav Singal from UNSW, two major stereotypes of actuarial students are investigated. Gaurav challenges these stereotypes and illustrates the reality of being an actuarial student.

Thirteen years of schooling can seem like a lifetime for most students, however when faced with the difficult decision of choosing their career path many students are still left dumbfounded. As students weigh their career options to optimise their job security, salary and working hours, many mathematically inclined students will eventually decide that actuarial studies is their calling. For these students, myself included, a worthwhile career awaits them as they embark on the journey of becoming a qualified actuary. Unfortunately, however, many others are deterred by the false perceptions surrounding the actuarial profession. This misnomer, fuelled by deeply engraved misconceptions passed on through the generations, has discouraged many students from choosing this career path, despite possessing the right mindset and set of skills. There are two major stereotypes that many students like myself have been widely exposed to in the past:

“Actuaries are confined to the isolations of their workstation”

It is a common misconception amongst students that actuaries sit hunched behind a computer, crunching numbers into Excel using their excellent mathematical knowledge. Monotonous, boring, dry – these are all words commonly associated with the profession, yet this is far from reality. As an active and inquisitive student who dreaded the thought of spending the rest of his working life glued to a seat at an office desk, this perceived lifestyle seemed daunting.

Even after starting my degree at UNSW, this thought still lingered the back of my mind; had I made the right choice? My first careers fair with the Actuarial Society of UNSW quickly dismissed any lingering doubts in my mind.

Conversations with a range of representatives from different firms and positions were quick to shatter stereotypes. Although they acknowledged the importance of strong technical and problem-solving skills, they also identified the necessity for

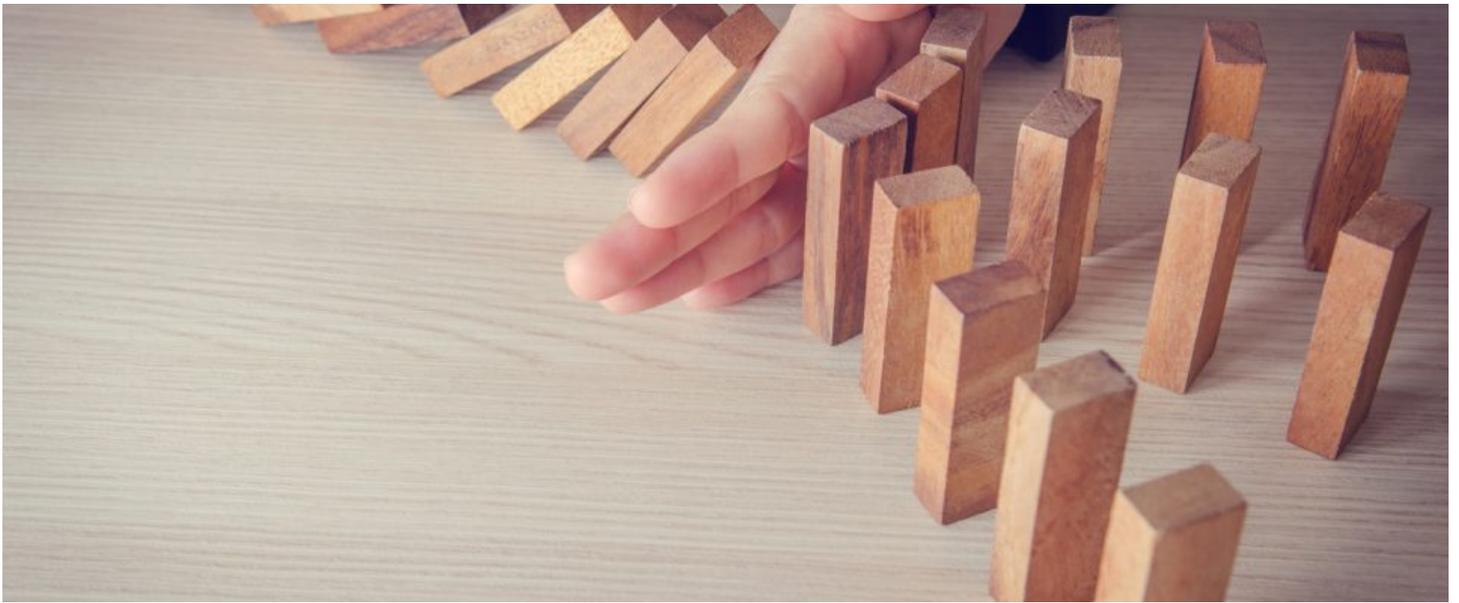
strong communication skills. One representative’s words had a particularly resounding effect on me. “As actuaries, you do not work for yourself – you work for other people. Your job will be to find a solution to problems they may not even know about. You must communicate with them to figure out what their problem is and show them how your model will resolve it.” It is this interactive lifestyle that can become habitual as an actuary that is often overlooked by naïve students like myself. This is a product of the constantly evolving profession and has consequently resulted in the actuarial skillset being utilised in many other non-traditional industries. This is another misconception that I too was exposed to as a student

“If you become an Actuary, you have to work in Insurance”

As a student, this statement felt like the unofficial motto of the actuarial profession and insurance felt like the resounding focus of most university actuarial courses. However, it also seemed to have a negative stigma attached to it. Whenever I revealed that I was an actuarial student, people would pessimistically reply “Oh, so you’re going to be working in insurance.” Maybe it was this constant response or perhaps it was my lack of knowledge, but I would begrudgingly accept the fact that I would be working in the insurance industry.

The range of firms that presented themselves at the Careers Fair however told a different story. Not only was it refreshing to see a multitude of firms not associated with insurance, but as an aspiring commerce student, I was also interested to see what other prospects lay in the financial sector. The possibility of working in non-traditional roles such as financial services, e-commerce or even genetics seemed almost too good to be true. Yet it was clear that the actuarial industry was not how it was perceived – it was constantly adapting to the increasingly globalised society we live in today. This is reflected in the expansion of actuarial majors being offered by universities. UNSW for instance has responded with a new major aimed at actuarial risk management for financial organisations.

The reality of the actuarial profession is that whilst it is constantly evolving, perceptions about it are lagging. It is essential that these misconceptions change to accurately reflect the dynamic and expansive scope of the profession and prevent these false conceived notions from dissuading potential budding actuaries.



Managing Operational Risk in Financial Reporting

By Shubham Saxena

Reading time: 3 mins

Pricing Actuary at TAL, Shubham Saxena writes about risk in financial reporting and strategies valuation actuaries can use to manage it.

One of the many fields in which actuaries operate is financial reporting. Valuation actuaries experience numerous challenges when it comes to raising reserves and reporting on why financial results are different to business plan. As such actuaries have to be very confident with the reserves raised to ensure analysis of profit is reasonably accurate.

This article provides a short summary of some strategies which valuation actuaries can use to ensure an efficient control framework is in place to manage operational risk and as such improve management reporting. The examples included in this article are:

- Collaborative relationship with Operations team
- Maintaining up to date checklists
- Investing in Infrastructure

Operational risk can present itself in many ways when deriving policy liabilities. Some possibilities include:

- Poor data quality where information on certain key rating variables are missing and as such are having a material impact on the reserves. An example is cause of claim indicator (Accident/Sickness) missing for open disability income policies.
- Failure to update assumptions in line with recommendations from and as intended by Appointed Actuary.
- Delays in administration of new products in the valuation system and as such "approximating" the reserve which may not be in line with underlying mortality and morbidity rates.

There are several strategies which actuaries can use to resolve issues such as these and pave the way for faster and accurate reporting of financials. These include:

1 – Collaborative Relationship with the Operations Team

Operations team go through many challenges of their own in their roles. As such we cannot expect them to resolve all data

issues in one go. It then becomes important to resolve the most material data issue and then building the solution in Business As Usual (BAU) culture. The discussions are best limited to one or maximum two data quality issues at any one time. Sufficient time should be set aside and the two teams should work together regularly to ensure the collaboration is leading to higher confidence in the accuracy of financials.

2 – Maintain up-to-date Checklists

Actuaries should regularly maintain detailed checklists which state all the tasks which are needed when raising reserves. This is the initiative which is regularly skipped over. However through adopting this process, a number of errors can be avoided (by even experienced professionals) if work is reviewed against an up-to-date checklist.

The checklist should ideally contain all the steps such as formatting of data, update of economic and non-economic assumptions, and checking reserves for a single policy against all the assumptions.

3 – Investing in Infrastructure

It is important to invest in infrastructure which helps with improving efficiency, reviews, and movement of reserves since the last financial reporting period. This initiative can be cost effective if improvements are made to existing processes on an ongoing basis.

A valuation infrastructure would include sourcing policy and claims data; modeling reserves; conducting analysis of profit; and management reporting. Potential improvements could involve any one of following:

- A data cleaning model which makes reasonable assumptions for missing data. Changes in characteristics of data since previous reporting period can help justify movement in reserves.
- Policy checks which demonstrate reserves have been calculated correctly against best estimate assumptions
- Developing reporting templates which allow for analysis of change against previous reporting period.

Models should allow for analysis at a granular level. This helps with troubleshooting problems or answering detailed questions from management.

Actuaries can try to integrate one or two strategies in day to day tasks and team culture. Sound management of operational risk would lead to higher confidence in the financials; more time being spent on analysis; and easier communication of results with the wider business.



ACTUARIES INSTITUTE
ABN 69 000 423 656
LEVEL 2, 50 CARRINGTON STREET
SYDNEY NSW 2000 AUSTRALIA

t +61 (0) 2 9239 6100
f +61 (0) 2 9239 6170
e actuariesmag@actuaries.asn.au
w www.actuaries.asn.au