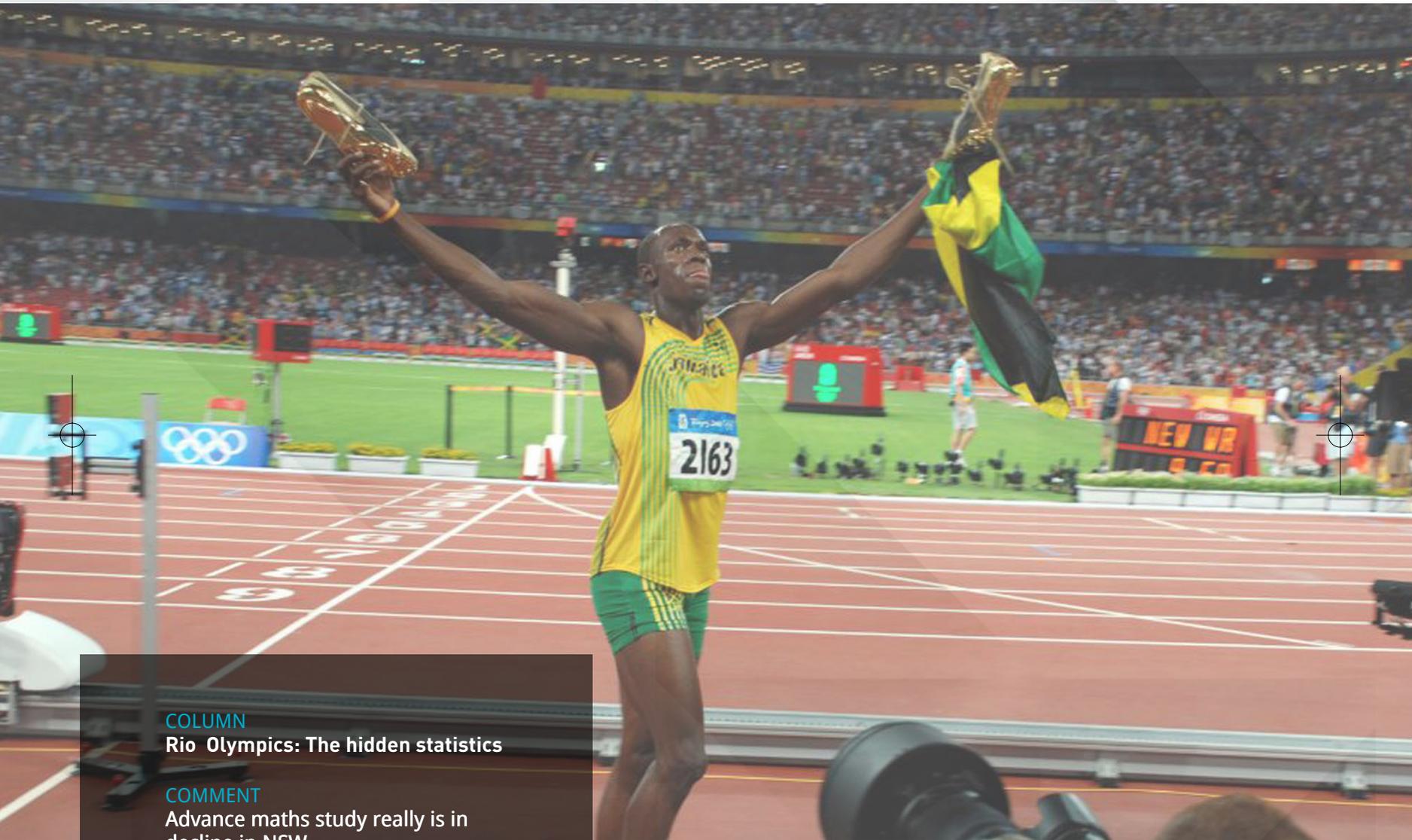


SEPTEMBER 2016

THE MAGAZINE OF THE ACTUARIES INSTITUTE

DIGITAL

Actuaries



COLUMN

Rio Olympics: The hidden statistics

COMMENT

Advance maths study really is in decline in NSW

EVENT REPORT

Data Analytics in action

REPORT

Analytics-assisted triage of workers compensation claims

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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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The Importance of Projections in Developing Retirement Strategies

The Actuaries Institute's Superannuation Projections and Disclosure (SPD) Subcommittee designed a projection model to estimate the income that assets would support during retirement for a number of case studies. Here, the SPD Subcommittee reports on its findings.



Experts are thick on the ground these days, sometimes with free advice that can prove costly later on. And it seems experts are

particularly fond of advising retirees and those about to soak up the sun on weekdays about how and when to spend their money. One strand of free advice at the moment involves recommending that retirees should spend a bit more, or indeed a lot more, to secure a higher pension to take into account impending changes to the asset test.

Understandably, these changes from January 1 next year have many retirees and those close to retiring thinking hard about whether they should change their financial arrangements. To be more specific, after this date the age pension reduces by \$78 per year for each \$1,000 of non-home assets over certain thresholds. At first glance, this looks like you'd have to earn over 7.8% on the extra \$1,000 or you'd be better off without the extra \$1,000 of assets.

The Actuaries Institute cautions that retirees destined to live to a ripe old age should think twice before accepting some of the advice recently aired on this topic. Indeed, this advice ignores the fact that a partial age pension entitlement generally increases throughout retirement as assets reduce. The SPD Subcommittee have designed a projection model to estimate the income that assets would support during retirement for a number of case studies.

A Case Study

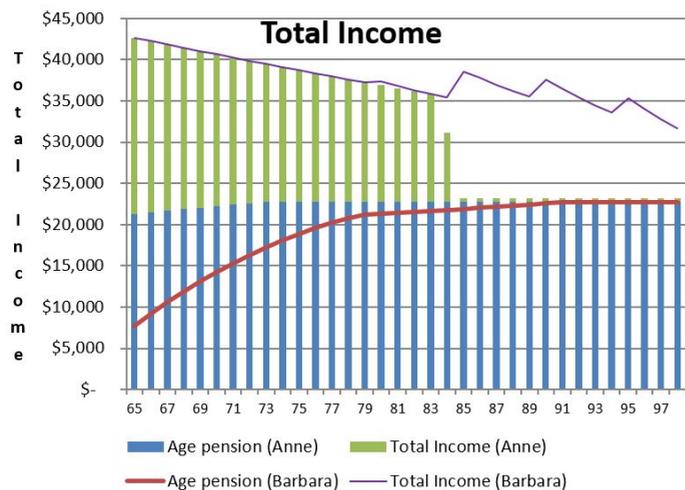
The SPD considered a number of scenarios. They were based on two single females (Anne and Barbara) who own their own homes. Their only asset, other than their home, was a balance in an allocated pension. It was assumed that the allocated pension was the only source of income for both women and that they continued to live in their own homes throughout their retirement. The modelling also assumed that the required level of income each year (the combination of the age pension and income from the allocated pension) would be equal to the annual expenditure of ASFA's comfortable lifestyle for a single person indexed to CPI.

In this case study, we examine one of the scenarios considered.

This scenario assumes the two women plan to retire at age 65 on 1 January 2017 with potentially identical superannuation assets of \$450,000. To highlight the long-term impact of spending some of the superannuation assets before retirement, we assumed that Anne increases her spending before 1 July 2017 so as to reduce her retirement assets and receive a higher age pension than Barbara, who decides to save her money. The additional spending was assumed to reduce Anne's final retirement benefit available on 1 January 2017 to \$250,000.

Chart 1 below provides a year-by-year projection of the incomes of these two individuals to age 100.

Chart 1 – Total income if retiring at age 65



Note: all projected values have been discounted to Today's Dollars at the rate of Wage Inflation.

Assumptions	Net investment return on allocated pension assets	- 6.5% pa compound
	Wage inflation	- 3.5% pa compound
	Price Inflation	- 2.5% pa compound
	Increase in desired income	- Price inflation
	Increase in age pension rate	- Wage inflation
	Increase in age pension asset test thresholds	- Price inflation

The green and purple lines show the total income received in Today's Dollars. The blue and red lines show the annual amount of age pension received.

It can be seen that the aged pension paid to Anne in the early years is higher because the pension assets she owns do not reduce her age pension. However, because Anne has less pension assets she exhausts her assets by age 84, after which she must live on the age pension or use her home to generate additional income.

Barbara, however, at age 84 still has pension assets and therefore receives a higher level of income than Anne for the rest of her retirement. Also Barbara's total income received is equal to or greater than her desired income level throughout retirement. She will also maintain a balance in her allocated pension throughout retirement and can continue without resorting to using her own home to generate additional income.

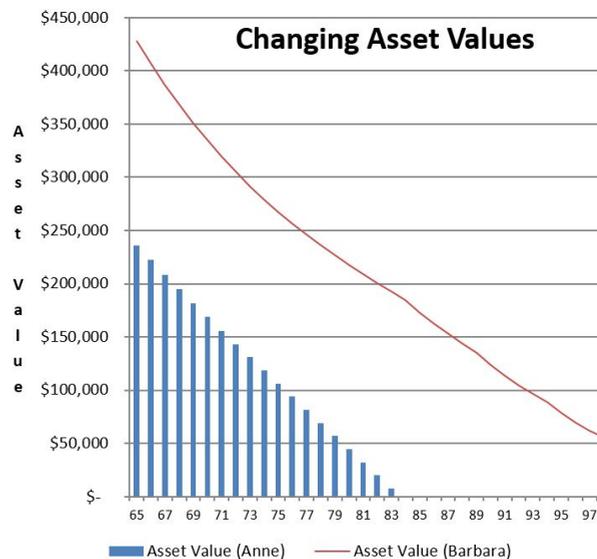
The Institute's SPD Subcommittee authored this article. The members of the Subcommittee are:

- Colin Grenfell, Convenor
- Glenn Langton
- Thomas Sneddon, Secretary
- David Orford
- Bill Buttler
- Richard Starkey
- Esther Conway
- Ray Stevens
- Ian Fryer
- Brnic Van Wyk
- Jim Hennington

An examination of the projected asset values is also instructive. Chart 2 below shows the value of their pension fund assets at the end of each year during retirement.

Chart 2 – Asset Values if retiring at age 65

Note: all projected values have been discounted to Today's Dollars at the rate of Wage Inflation.



Barbara has significantly greater pension fund assets throughout retirement. This provides added flexibility in her spending pattern. It also allows for aged care costs or bequests in later age. The additional assets also provide a buffer if the net investment earnings are less than the 6.5% we have assumed. Importantly, the fact that Anne receives a larger age pension in the early retirement years does not indicate what strategy results in the best long-term outcome.

The example and related discussion above highlight the significant challenges involved in retirement income modelling and strategy choice. Such tasks cannot be properly addressed through conclusions based upon calculations of a retiree's first year age pension and allocated pension income entitlements.

The interaction of the many pieces of Australia's retirement income system is complex. It includes assets and income test rules for the pension, minimum superannuation assets withdrawal requirements and the interaction of other factors such as inflation and investment returns. Any conclusions based on only considering the income generated in the first year after retirement are liable to be incorrect. Only the output of a year-by-year projection can clearly show how these factors interact throughout a person's retirement.

Retirees must make decisions about spending capital over time. Ideally, these should allow for a sensible assessment of future cash flow. Year-by-year projections throughout retirement are vital to capture the dynamic nature of the age pension rules as asset values change. However, this is just the start. Given each retiree has an unknown lifespan and faces unknown investment returns, people have valid concerns about outliving their capital. Models like this one can be extended to assess a full distribution of likely outcomes and take into account the retiree's asset mix and even health status. This allows people to make informed decisions that meet their required levels of certainty.

A longer article which considers all the scenarios examined by the SPD Subcommittee is also available. If a copy of the longer article is required (or if there are any questions on the material contained in this article) please contact [Andrew Boal](#), Convenor of the Institute's Superannuation Practice Committee, or [David Bell](#), Chief Executive Officer of the Actuaries Institute.



Homesafe Wealth Release for retirees

- an interview with Peter Szabo

By Christine Brownfield

At the May 2016 Financial Services Forum, there were sessions on the use of housing wealth to fund retirement and also on the interesting achievements of some "actuary entrepreneurs". This article combines those two topics in an interview with Peter Szabo, an actuary who is the founder and managing director of Homesafe Solutions, a company providing a debt-free home equity release product to senior Australians.



An Actuarial Beginning

Peter commenced his actuarial career when he joined National Mutual after completing a Mathematics degree at Monash University. He sat the actuarial exams through the UK and qualified as an actuary in 1975, by which time he was a consultant with ES Knight & Co. As the newest qualified actuary, Peter found himself working in what were then considered "non-traditional" fields such as acting as an expert witness, assessing economic loss in personal injury cases and structuring solutions

for long term financing of infrastructure projects. In time he ventured out to set up his own consulting firm, and spent the next few decades working with banks, public and private corporations and various government departments.

In the late 1980s, Peter was encouraged by the Victorian Council for the Ageing to find an alternative solution to reverse mortgage equity release products for Australia's ageing population. This marked the beginning of Peter's interest in the home equity release field and thirty years on he is pleased to see the area starting to gain prominence, particularly with recent reports released by the Productivity Commission and the Actuaries Institute.

In some ways, Peter views his work in home equity release as having been the most "actuarial" in his career. He observes that "It naturally commenced with a risk analysis in relation to who should carry the future risks around interest rates, property values and longevity. Should it be the senior homeowner or should it be transferred to an investment pool?"

Developing Homesafe Wealth Release

In 2000, Peter decided to try his hand at building a debt-free home equity release offering. This resulted in the establishment of Homesafe Solutions, a joint venture with Bendigo and Adelaide Bank. Homesafe commenced operations in 2005, offering Homesafe Wealth Release, a home reversion product.

Did Peter's actuarial background assist him in the development of Homesafe Wealth Release? "Yes it did. The product is based on actuarial concepts that I studied decades ago. A home can be broken down into two components, a life interest and a reversionary interest. Actuaries are trained to understand and to value these. Pricing the product involves applying a range of assumptions to project cashflows to place a value on the reversionary interest. When a senior homeowner transacts with Homesafe, they are selling a percentage of this reversionary interest".

"There are many other aspects of setting up the Homesafe business where an actuarial background has been helpful too. The product involves a long term contract with future uncertainty around longevity, rates of voluntary contract completion and of course property markets. We have spent a lot of time considering potential scenarios - basically risk management around the brand, the asset that has been created via purchasing a sale interest in a portfolio of properties, legal contracts, etc. We also need to make assumptions about future experience, without much data to go on. Eleven years on we do at least now have some data specifically related to our product".

Housing Wealth's Role in Retirement Funding

Peter has long viewed the family home as the fourth pillar of Australia's retirement income system, and is pleased to see the growing focus in recent times on the important role that housing wealth can play for homeowner retirees. He observes that public policy development still has a long way to go.

Most senior Australians do not view their home as a store of wealth, but as a place to live, and they have a strong emotional attachment to their home. The key to making people feel comfortable tapping into their housing wealth is to ensure that they have security of tenure, meaning that they can continue to live in the home for as long as they wish to. There can be a misperception that utilising housing wealth has to mean losing the home.

Peter observes that "For a retiree homeowner who has few assets besides the family home, accessing a small amount of home equity each year could make the difference between a dignified retirement and just getting by. Releasing home equity can allow people to replace a car or white goods, arrange for home modifications if mobility becomes a challenge or fund some in-home care to make it possible for them to continue living in their home".

The Home Equity Release Market

There are a range of means by which housing wealth can be released. Selling the home is the obvious one, but a retiree still needs a place to live. Downsizing is an option that works for some people. Alternatively, products such as reverse mortgages and home reversion products facilitate the release of housing wealth while a retiree continues to live in the home.

Given all this, why don't more people release home equity today? This is an area that Peter has contemplated for many years, and views as complex. "Of course there are demand factors and supply factors. Some people are of the view that if the demand was there, supply will follow. I disagree. In my view, the demand is there, but there is a market failure due to an unwillingness of investors to supply capital to fund equity release products on a large scale."

"The lack of over-arching regulation covering home equity release is also problematic. There is a lot of regulation covering one specific product - the reverse mortgage. This is like shutting the stable door after the horse has bolted - good principles-based regulation for home equity release products would provide protections, such as homeowner security of tenure, for products that have not been developed yet, as well as for existing products. This would improve confidence in the sector."

"And of course there are issues around financial literacy - people are not familiar with equity release products, and the time in their lives when they need them is perhaps not the time when they feel confident making big financial decisions. Tapping into home equity isn't currently 'the norm' in Australia where the family home is something of a sacred cow."

"With so much commentary about the need for senior Australians to be able to tap into housing wealth to supplement retirement funding, there is a lack of product development. The number of reverse mortgage providers contracted following the Global Financial Crisis - and most of the open reverse mortgage products are not promoted. The Homesafe product is only one variation of a home reversion product, with strict eligibility criteria limiting availability. One would think this is an area that would attract new providers. I am aware of a few potential entrants who looked at developing product, but ran up against a lack of capital. I'm not sure how this gets solved."



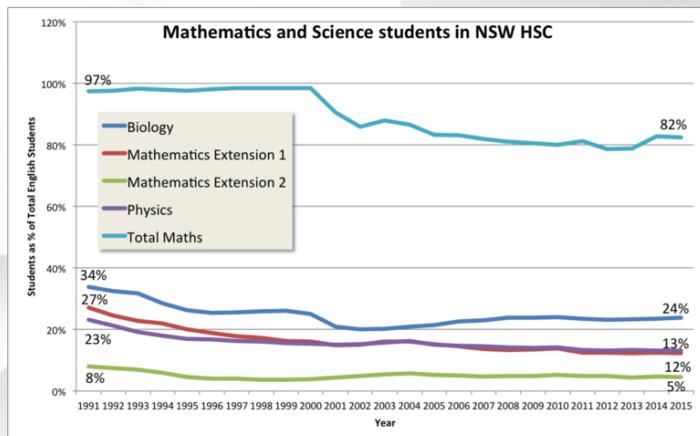
Advance maths study really is in decline in NSW

By Jennifer Lang

Jennifer Lang takes a dive into HSC stats and the numbers of students studying maths and sciences. What she finds is "a bit scary" for anyone looking for a future mathematically inclined workforce.

Inspired by [GeekinSydney's](#) recent [post](#) about HSC subjects, I took a deep dive into HSC study statistics this weekend. What I found was a bit scary for anyone who is looking for a future mathematically inclined workforce. Since 2001, when maths stopped being compulsory, the numbers of students studying maths have dropped dramatically. But it isn't just maths. It is also the sciences, especially the hard sciences, and the proportion of students sitting the higher maths subjects.

Back in 1991, Maths extension 1 (known then as 3 unit maths), which is the course you need to do to do a mathematical subject such as engineering at university, was taken by 27% of students studying English. Now it is taken by 12% of students studying English. Maths extension 2 (known then as 4 unit maths) which is generally a prerequisite to be an actuary, was taken by 8% of students studying English. Now it is taken by 5% of students studying English.



One of the reasons the HSC changed in 2001 (which removed the compulsion for all students to study maths) was to encourage the study of advanced level courses.

According to the 2001 press release about the HSC:

In 1995, the NSW Government appointed Professor Barry McGaw to conduct the most extensive review of the HSC in its 30-year history. The McGaw Review confirmed key community concerns about the 'old' HSC, including:

- too many courses, which restricted many schools from providing students with equitable access to the HSC curriculum, particularly at advanced levels of study
- a significant decline in the number of students studying advanced-level courses
- an assessment and reporting system based on scaling marks and ranking students rather than reporting the actual marks earned and describing the standards achieved
- too much focus on maximising university entrance scores at the expense of the educational needs and interests of students.

Of course, anyone who talks to a current HSC student knows that university entrance scores is still a major focus in subject choice. But the HSC certificate itself doesn't give you a university entrance mark any more. Rather that comes from the [ATAR](#), which is calculated by the universities.

Sadly it seems that if you count science and maths as advanced level courses, the new HSC has failed to encourage students to study them (or any changes in the ATAR). The 2002 press release trumpeted the improvement in advanced level courses (including maths):

2002 course enrolments show that the new HSC is succeeding in turning around the previous decline in advanced-level HSC study, particularly in the core subject of English. Highlights include: 3009 entries in the top-level Mathematics Extension 2 course – up by 15%.

In 2004, it was still looking promising:

In 2004 record numbers of students have taken on the top-level English, Mathematics and History courses, representing overall increases of 69%, 37% and 56% since the first new HSC Class of

2001. Mathematics Extension 2 course entries have increased to 3585 students in 2004 (up by 10% on last year and 37% since 2001).

But 2004 was the peak of the turnaround for Mathematics Extension 2, with 5.7% of the total students studying english studying Mathematics Extension 2 (the old 4 unit). But that was still well below the 8% statistic in 1991, and proved to be the peak. In 2015, 4.6% of all English students studied Mathematics Extension 2. But even worse was the subject that really matters for rigorous mathematical study – Mathematics Extension 1 (the old 3 unit). Extension 2 is really for the seriously talented mathematicians. But we want a good proportion of HSC students to be doing rigorous maths. And in 1991, a lot of them were. In 1991, there were more than 15,000 students doing 3 Unit Maths (Mathematics Extension 1) – 27% of those studying any English subject. In 2015, when the total number of English students was 30% higher, only 8,955 students (60% of the 1991 number) studied Mathematics Extension 1 – 12% of all those studying any English subject.

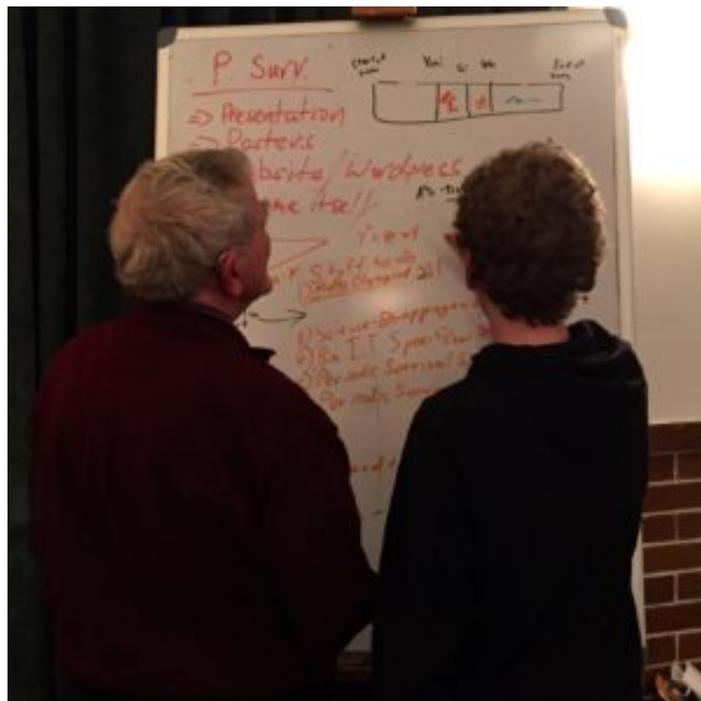
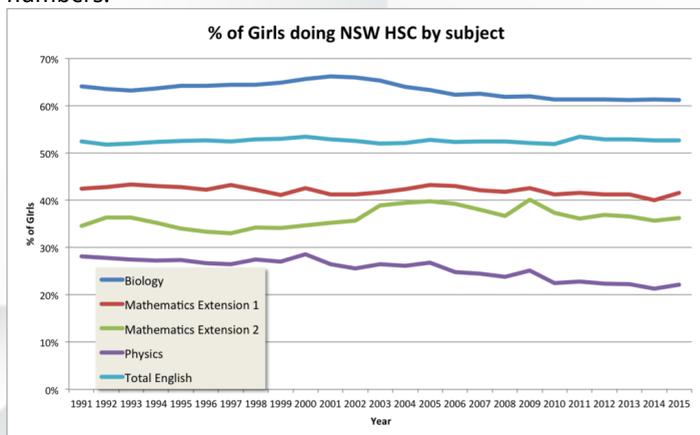
So if you're looking for students who have had the rigorous training in mathematical thinking that you get from studying (among other things) calculus at school, they are going to be harder to find than they used to be. My fellow blogger [geekinsydney](#) focused on the lack of people studying maths. But in many ways, the scarier thing is that those who are studying maths are avoiding the hard stuff. To be an engineer, or a serious coder, or a systems engineer, extension maths is pretty important. But our education system is failing to produce enough students who have studied the hard maths.

The Australian Government has an [Innovation Agenda](#):

Extraordinary technological change is transforming how we live, work, communicate and pursue good ideas. We need to embrace new ideas in innovation and science, and harness new sources of growth to deliver the next age of economic prosperity in Australia. The National Innovation and Science Agenda is an important step in the right direction.

Turning around maths and science education would be a good place to start.

In slightly brighter news, the proportion of girls studying the hard maths subjects (as a proportion of total candidates) has stayed pretty steady over the last 25 years. The only course that has dropped significantly has been Physics. I was glad to see that while girls have followed the boys down the rabbit hole of giving up higher maths, at least they haven't given up in higher numbers.



Master and apprentice

I had a lot of fun making a pivot table of the [statistics released by the NSW Board of Studies](#). They provide a full csv file for each year going back to 1991. But, interestingly, it is impossible using that file to work out the total students studying maths in any given year. The numbers studying each mathematics course are in the file, but the total number studying at least one maths course is not available. So my graph above is probably not accurate. I've done my best to add up the numbers in ways that broadly match the numbers that the Board of Studies provide for the totals, but I can't match them exactly. I've assumed that if you are studying Maths extension 2, you are also studying Maths extension 1, but the details of "all students studying at least one maths subject" is impossible to match exactly.

Possibly another symptom of the lack of interest in maths and statistics from the powers that be – it is not easy to analyse the statistics from the HSC candidature itself.

This article originally appeared on [Actuarial Eye](#) on 18 September 2016.



Under the Spotlight: Beth Lawson

By Beth Lawson

Beth Lawson, General Manager of Finance at National Australia Bank, is passionate about making a difference through leadership and people – focussing on the possibilities and making them happen. She shares with us, her experience as an actuary as well as some other interesting facts such as how she received an Olympic medal.

My interesting/quirky hobbies... I enjoy singing and try to perform at least once a year. And I recently have taken up Argentinian Tango - Tango is the poetic revealing of the soul through movement, meditation.



Beth and her friend Michelle after completing the City2Surf

My favourite energetic pursuit... walking my dog, yoga and now running - I've been thinking of doing the City2Surf for the 25 years I've been in Australia and finally did it!

The sport I most like to watch... if my kids are playing – AFL, Basketball, Netball but if my kids aren't playing then rugby and NFL.

The last book I read (and when)... I'm in a non-fiction book club. We last read "Nothing to Envy: Love, Life and Death in North Korea".

My favourite artist/album/film... My Cousin Vinny with Joe Pesci and Marisa Tomeii.

What gets my goat... apathy and someone staying silent when they disagree with what is being said.

Not many people know this but I... have an Olympic medal from the last Olympics in Los Angeles. I performed at the opening ceremony as part of the Olympic drill team and received a medal!

Four words that sum me up... passionate, caring, dedicated, musical.

If I hadn't become an actuary, I would be... a teacher.

My work history... I worked for a life reinsurer for 10 years then moved to the NAB where I've had a number of roles – a few actuarial manager roles then moved into transformation where I have developed many important skills (important, not soft) and for the last five years into general management as General Manager, Finance.

What I find most interesting about my current role... I've had the opportunity to be involved in many different aspects of the construction of the 80% sale of the life company from NAB to Nippon – negotiating agreements, setting up the new Finance team and working with multiple stakeholders to ensure everyone knows how things will work when the agreement is completed later this year.

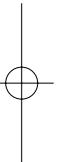
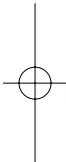
My role's greatest challenges... Keeping everyone focussed on the most important deliverables – it's too easy to get distracted by minor issues or "noise".

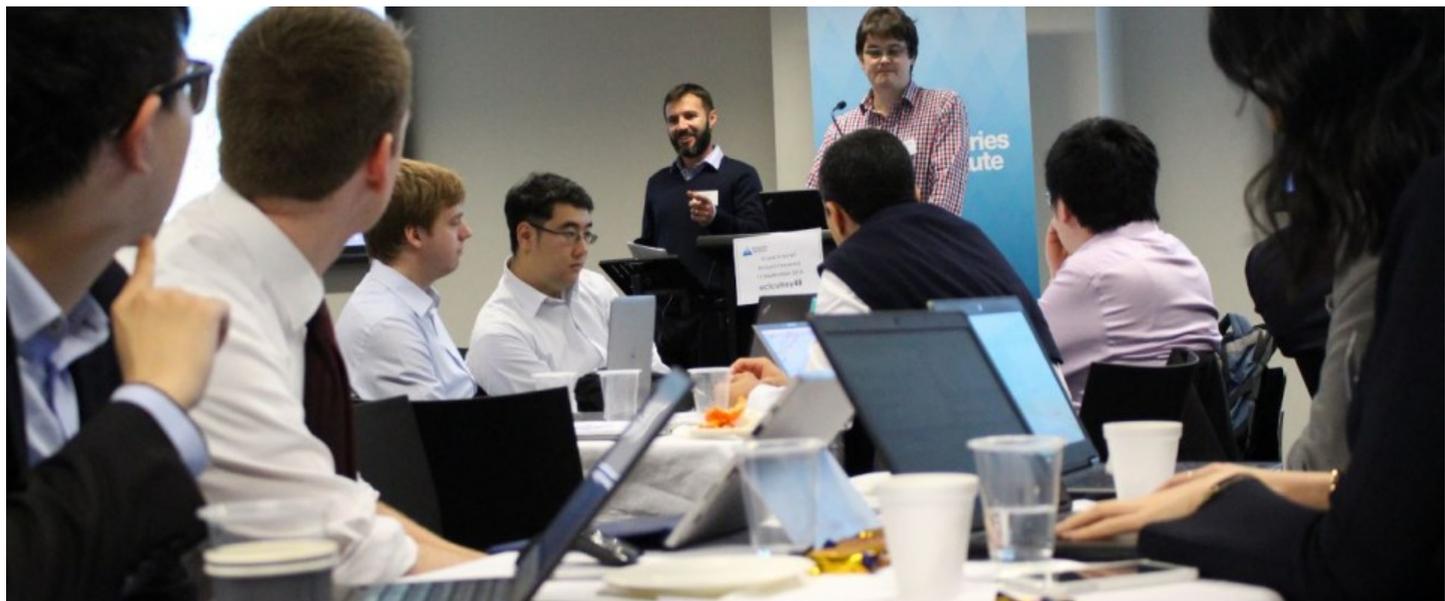
Who has been the biggest influence on my career (and why)... I feel like I've learned from everyone I've worked with, both those I've reported to and those who have reported to me.

My proudest career achievement to date is ... developed a high performance finance team culture through a focus on leadership and people that moved the team in leaps and bounds – doubling engagement on the brink of high performing and nearly doubling the business excellence score – also getting close to high performing.

If I won the lottery, I would... spend more time in the charity I'm a director of Life Changing Experiences Foundation that runs a wonderful program called Sister 2 Sister which gives at risk teenage girls life skills and mentors to show them a different path.

Contact Beth: Beth.Lawson@nab.com.au





Data Analytics in action

By Stephanie Quine

The 'Data is Power' Seminar (Tuesday 13 September) featured an afternoon of practical workshops with wor_YX YI Ua d' Y WXY' UbXh hcfghc UggjghXY Y[UHvg"

A broad range of modern predictive learning techniques, including nearest neighbour, neural nets, penalised regression and tree-based ensembles were covered.

"I thought this provided a good mix and broke up the day and kept the participants engaged," said one of the attendees, Nathan Bonarius from Rice Warner.



Actuaries got stuck into R building models to predict outcomes with a high degree of non-linearity before going head to head to compete for the first place prize in a Kaggle competition on a dataset with over 200 variables.

"Actuaries have the perfect chance to have a big impact in this area. There may be a little to learn initially but the core skills are the same," said delegate Basem Morris.

The winner of the Kaggle competition on the day was Melissa Tam, an actuary at Finity in Melbourne.

"Melissa won the prize on the day because her model best optimized some of the parameters for the best performing algorithm," said Hugh Miller from the Organising Committee.

The competition asked delegates to predict telco customer's future behaviour (whether they upgrade their product holding) based on 230 available predictor variables.

"It was challenging because it involved a larger number of variables, as well as real-world issues such as missing values and categorical variables with many different field values," said Hugh.

The final winner (decided a week later on Tuesday 20 September) was Stephen Lau, (another) actuary from Finity.

Stephen attributed the win to a combination of a larger 'forest' of tree-based models, better handling of missing variables and incorporating some of the categorical variables with many levels.

"Congratulations to Stephen! A special mention also must go to Juan Luong, from Perth - he wasn't at the event on the day, but did produce the best performing prediction model in the subsequent week," said Hugh.



The morning featured presentations focused on trends in the data analytics field with someone from outside the industry (an engineer by training), Bob Williamson (pictured above) of Data61, who specializes in data, challenging delegates on the value and process of cleaning data.

"Raw data is an oxymoron," said Bob.

Another delegate on the day, Basem Morris from Deloitte reflected after Bob's presentation: "often the most important ingredient in data analytics is not the data, rather it's common sense."

"It was good to see the government at the leading edge of many of the new techniques being applied in the data analytics space," said delegate Nathan Bonarius on Bob's talk.

"His work on integrating risk measures into machine learning models is something that members of the Actuaries Institute should keep an eye on because it will be directly relevant to our traditional working space," said Nathan.

Adrian Smolski (pictured below) of MapR gave a presentation showcasing the plethora of technologies that are being developed to house and manage large datasets and the difficulty in bringing it all together.

"These are areas where actuaries may traditionally not have the right skillset and may need outside help," said Nathan.



The second session featured presentations from Alex Macoun (Quantium) and Lorna Ash (RB) which brought to light some interesting examples of data analytics in practice.

"Lorna's presentation showed just how actuaries can add value in industries outside of financial services, such as media and FMCG," said Basem.

The speakers discussed using a scientific process with control groups to improve marketing attribution analysis, and the benefits of updating strategies over time as new information becomes available, and trends change with time.

"With the amount of data being generated these days and current technological advancements, data analytics is touching every part of our lives," said Basem.

"Actuaries have the perfect chance to have a big impact in this area. There may be a little to learn initially but the core skills are the same."

"Thumbs up to the organising committee for an informative and interactive day. I look forward to the next one."





The top ten articles on Actuaries Digital

By Trang Duncanson

Actuaries Digital features a range of different articles that are mostly contributed to us by guest authors. In this month's editorial, Trang Duncanson highlights the magazine's most popular articles and some tips on what makes a 'well read' article.

We get many questions from potential authors asking what they could write about for *Actuaries.Digital*. So, we've pulled together some recent stats for you on the 'most read' articles and also provide you with some tips on how you can make the 'Top 10'

Top 10 articles since April 2015	Date	Author	Category
I am an actuary	Sept 2016	Martin Mulcare	Career
Eurovision a major actuarial exercise	Jun 2016	Arun Isaac	Topical, statistics
You can call me AI	Jun 2016	Stephen Huppert	Robadvice, algorithms
Netflix announces new series "The Game of Probabilities"	Apr 2016	Kirsten Flynn	Humour/April Fools, probabilities
I am an actuary	Mar 2016	Martin Mulcare	Career
Looking for love	Feb 2016	Kirsten Flynn	Humour

Disability income - the price is not right nor is the product	Aug 2015	Brad Louis	Disability income, Insights session recap
Three actuarial success stories	Jul 2015	Rob Paton	Actuarial work in Public Policy
Predicting the 2015 NBA championships	Jun 2015	Murali Logendran	Topical, probability, sport
Is there an Uber Future in Australia?	Apr 2015	Catherine Weston	Big data, telematics

Stephanie Quine from our editorial team summarises what a makes a great "well read" article:

- Content relevant to actuaries and the industry sectors they work in.
- Topical – related to upcoming national or international events.
- Career information.
- Easy to read – organised and concise content. Maximum of

- Use of imagery and other media..

1,000 words. Although we encourage articles from the broad range of industry areas showcasing actuarial talent, clearly our readers also value a good laugh at the start or end of a hard day's work!

When authors link their articles to their social media sites, such as LinkedIn or Facebook, there is a large pick-up in readership. We highly recommend authors share their articles across their social media networks as it raises their individual profile, as well as extending our reach to our non-actuarial audience.

Very soon we will be launching a short survey on *Actuaries Digital*, and we look forward to hearing what our readers think.

In the meantime, remember the unread story is not a story; it is little black marks on wood pulp. The reader, reading it, makes it a live thing...Ursula K. Le Guin



Inspired volunteering – A Jedi’s code

By Stephanie Quine

Lily Meszaros, the new Committee and Volunteer Manager at the Actuaries Institute, talks to Stephanie Quine about her mission to better support the vital work of volunteers.



A day job can provide challenges and rewards, but a greater sense of fulfilment, balance, new perspective and skills are sought in myriad pursuits outside of regular work... just ask a Jedi.

Lily Meszaros has observed volunteers and volunteer programs closely for years. Her personal journey is entwined with a colourful career that includes her own volunteer work. But more on that later.

Lily joined the Actuaries Institute in June and, despite little knowledge of the actuarial profession, was impressed with its volunteers.

“Actuaries are some of the most highly intelligent and passionate people I’ve ever come across. They thrive on high quality standards and determination to keep abreast of current issues and best practice,” says Lily.

“Volunteers are not free, they are often extremely busy professionals and active members of our community.”

Over the past two months, Lily has consulted with internal stakeholders, Committee Convenors and volunteers who make it possible for the Institute to produce and mark rigorous new exam papers, award qualifications, voice positions on Australian public policy, run events and maintain best practice in an elite industry.

“In one of my early introductory meetings, a volunteer told me he contributes approximately 460 hours per year. He is also in a senior management position in a large firm. I asked him what drives him and he simply said, ‘I am very proud of my profession and all I do is for the good of the profession’,” says Lily.

There is a perception that volunteers are not busy people; that they are just making use of their ‘spare time’. “This is wrong,” says Lily. “Volunteers are not free, they are often extremely busy professionals and active members of our community.” It’s her aim to ensure Institute volunteers, who make up 12% of the membership, have a positive volunteering experience and are satisfied with the contribution and impact they make.

An important factor in the Institute’s education program ranking is the level of volunteer participation. “This isn’t surprising, considering an active Member base generally indicates that past students feel like they had a quality educational experience. When our current students see that existing Members are actively involved in our volunteer programs, it encourages them to remain engaged and connected with the Institute after they complete their qualification,” says Lily.

Lily has already helped set plans to celebrate National Volunteer Week; develop a reward and recognition program for its volunteers; and establish a ‘Volunteer of the Year’ award.

“I would also like to find ways of creating volunteering opportunities for our younger actuaries as currently the majority of our volunteers are Fellows,” she says.

Finding the balance

Lily was formerly responsible for Recruitment and Relationship Management of Starlight Children's Foundation volunteers (in NSW/ACT) - who donate an estimated \$1,000,000 of their time and professional expertise per year. The many volunteers she met in her role managing Volunteer Engagement for the Division of Alumni and Development at Sydney University also inspired her. "One of the projects I ran there was the 'Welcome to Sydney' program, for new international and regional students, which grew from 15 events hosted in 2014 to 52 events hosted in 2015."

6.1 million Australians (36.2% of people aged 18 years and over) participate in formal volunteering*

This program saw the University's alumni volunteers host more than 260 students who came from 44 countries in 2015. "It was an excellent program to give new students a sense of Sydney University's heritage and make professional connections. It also brought the alumni community closer to the university, engaging them for other benefactor programs," says Lily, she appreciates the value of such a program markedly because of the generosity she was shown by Australians when she first arrived from Rwanda in 1995, aged 21.

Following some modelling and catalogue shoots, Lily was hired to play Stass Allie in *Star Wars: Episode II - Attack of the Clones* (2002) and *Episode III: Revenge of the Sith* (2005). Her two boys (aged nine and six) still revel in the fact mum wielded an actual light saber.



"Jedi are very powerful, yet very humble and balanced."

Lily admits she doesn't fancy acting as a career for its long hours, standing around in costume and makeup, doing countless retakes and, in the end, only seeing herself on screen for two seconds. Nonetheless, she always likes to do something different to her day job, and she does admire the Jedi code: "Jedi are very powerful, yet very humble and balanced," she says.

The same could be said for many of the 6.1 million Australians (36.2% of people aged 18 years and over) who participate in formal volunteering (*Voluntary Work Australia 2010).

"Volunteers believe in and enjoy making a contribution using the expertise that they have accumulated and they make a significant impact to our Institute and the general community," says Lily.



Volunteers on various Committees at the Institute give up their time and expertise to better educate and position the profession. Above, Councillor and long-time Institute volunteer, [Hoa Bui](#) speaks at the 2015 Appointed Actuary Insights session.

Finding a match

It is important when designing volunteer programs and mobilising volunteers, that the right people are matched with the right task. "You need to analyse the mutual benefit; work out the target audience and match it with volunteers who are passionate about that particular cause," says Lily.

"The Institute and its volunteers have a strong relationship. I hope I can enhance that by improving processes and ensuring the vital work of our volunteers is better recognised and celebrated," says Lily.

Volunteering has so many benefits. It connects you with others, it brings fulfilment in knowing that you are making a difference, and it can expand your skills and in turn advance your career.



Banking on Capital: An Overview

By Peter Sinkis

Last month (Tuesday 30 August), the Actuaries Institute supported the Banking Practice Committee in bringing together an incredibly strong set of speakers from industry, regulators and academia to present their insights on the world of banking. Peter Sinkis reports.

Institute President Lindsay Smartt stepped up to the podium and welcomed guests and speakers, as well as acknowledging the traditional owners of the land. Before we knew it, the second Actuaries Institute Banking Seminar was off and running.

The overall theme of the conference was *Banking on Capital* and three plenary sessions brought this out in a variety of ways.

The first plenary “Bubble, Bubble: Toil or Trouble” provided industry insight on the complex dimensions of regulatory change. It also covered every Australians’ favourite topic – house prices.

The second “Branching into Banking” took a human capital angle and considered actuarial careers in banking through two shining examples.

The final plenary saved the best until last, featuring perspectives from FSI committee member Kevin Davis, the Chairman of APRA Wayne Byres, and Steven Münchenberg CEO of the Australian Bankers’ Association.

Plenary 1 – Bubble, Bubble: Toil or Trouble

After the President welcomed the opened the proceedings, the first session began with Shaun Dooley, Group Treasurer of NAB giving an overview of how the bank was adapting to the challenges of managing a bank balance sheet in a complex and evolving regulatory and business landscape. He provided the audience some insight into the many dimensions of regulatory change faced by the bank. These included elements related to capital, credit risk, liquidity, conduct risk.



Shaun focused on the Net Stable Funding Ratio (NSFR), one of the key liquidity metrics introduced as part of Basel III with compliance required by 1 January 2018. This particular metric focused on ensuring that the risks created from the overall maturity mismatch naturally present in bank balance sheets between short-term liabilities and longer term assets are well balanced. He brought into focus some of the system level challenges created by the metric, noting that recent research – highlighted to the international community by the Bank of England – that new money creation in the form of deposits appears to be driven more strongly by the creation of new lending than by the overall levels of deposit pricing. While some imperfect relationships exist between deposits and assets at a system level in Australia, this remains an area open for future research and will likely have important implications for future policy development.



Shaun concluded his discussion by highlighting that developing unquestionably strong banks in Australia moved well beyond simply bringing more capital into play. It extended to a multi-dimensional view considering funding, liquidity, earnings, stress testing capabilities, reputation, management, conduct and fundamentally culture. All these are important pre-requisites for a resilient bank and more generally for a safer, stronger banking system.

Following Shaun's presentation Peter Jolly, Global Head of Research in the Global Markets division of NAB talked about the broader economic landscape. He presented a number of insights on every Australians' favourite topic – house prices. Beginning by considering some views of the definitions of bubbles, he focused in on the key commonalities: assets that are above fundamental value, driven by excessive debt and poor lending standards.

In bringing this general definition to the Australian context he identified the major drivers as low mortgage rates improving affordability; foreign demand; and population growth outstripping the supply of dwellings. At present, it appears the latter two effects are beginning to wane. In taking a global perspective, Peter recognised that at times international investors did not recognise that Australia had a mix of property markets across a variety of cities, some of which have stabilised or adjusted to changing economic fortunes.

He noted that declines in houses prices are more than just a theoretically possibility when suitable historical views are taken into account – the 1890s, 1920s, and early 1990s all saw a decline in house. Overall though, household debt growth has been slowing in Australia relative to the recent past, and while households are more vulnerable to increases in rates, or interruption of their incomes there does not appear to be any trigger in the immediate or foreseeable future.

Together these two discussions gave a solid grounding in the significant challenges being faced from an industry perspective.

Plenary 2 – Branching into Banking

The next plenary moved the focus to human capital, rather than the traditional financial sort. Two highly experienced banking professionals – Nicolette Rubinsztein, a Director of Unisuper and Michael Cant the Executive General Manager of Corporate Financial Services for CBA – both of whom began with actuarial backgrounds reflected on their career journeys and their paths both into and within the banking world.

A variety of common threads emerged from their discussion. Nicolette highlighted what she saw as the four aspects that resulted in her move into banking: resilience, some luck, the opportunity to work flexibly and instinct.



In many ways both our plenary speakers followed similar careers: time in consulting; shifts into wealth management businesses; transitions to new employers partly due to acquisitions, and ultimately shifting into the banking divisions of their organisations from the world of funds and wealth management.

Adaptation and a willingness to continue learning were key in both stories. Michael highlighted the importance of learning in depth what many in the bank had simply 'grown up' with. He also highlighted the opportunity actuaries have to leverage and market existing skills. The key is to identify skills from your current area that are valuable in a potential role in new areas or to a prospective employer.

Nicolette noted the importance of the foundations of product management and strategy developed within previous roles. This knowledge facilitated the shift to banking through considering all aspects of a customers' experience, from digital, communications, staff training and product structures. These skills allowed her to be successful in delivering change for customers across these areas.

These discussions highlighted both the opportunities in banks, as well as, the need to adapt and continue learning to be successful within them.

Plenary 3 – Foundations: Capital, Regulation and Policy

Our final speakers covered a relatively broad range of topics.

To begin with Kevin Davis, a Professor of Finance at both Melbourne and Monash Universities, as well as a panel member of the recent financial systems inquiry began by introducing us to the Australian market for Additional Tier 1 and Tier 2 capital instruments.



He highlighted many of the complexities surrounding these bail-in securities. Namely that the triggers for conversion to equity, a CET1/RWA ratio less than 5.125% or a regulatory declaration that an institute has reached a point of non-viability, are highly complex to model. The paradigm shifts from the world of risk to a world of uncertainty. The world of uncertainty, as opposed to the world of risk, is characterised by people's inability to understand, manage or quantify the possible outcome.

The Australian market in this space has grown at a somewhat astonishing pace with over \$30bn in securities of these types being issued domestically. He noted that a variety of issues need to be considered surrounding these securities, in particular whether the predominately retail investor base taking on these securities really understand what they are getting into, and whether there are simpler and better ways to adapt the mix of capital banks have on issue.

Wayne Byres, the Chairman of the Australian Prudential Regulation Authority (APRA) looked at the question of Finding Success in Failure. He considered the nature of banking, and that unquestionably strong is not the same as invincible, and that while capital accumulation is - and remains - sensible, regulators still must be prepared for failure.



He contrasted two potential pathways when a failure occurs, the first orderly where it is rapidly anticipated, there is no loss to protected beneficiaries and in a sense no one notices. The second, disorderly consisting of surprise, significant losses, and disruption. As a regulator he highlighted that the goal, assuming failure at some point is a given, to be maximising the likelihood of orderly failures.

The ways to achieve this orderly approach include active supervision, the right powers and willingness to intervene, substantial planning and preparation while the bank is operating in a business as usual state, the ability of institutions to maintain critical functions, and beneficiary confidence in a strong backstop to encourage positive outcomes for the community.

Steven Münchenberg, the CEO of the Australian Bankers' Association (ABA) brought the final discussion into the dimension of political risks. He noted the changing nature of the

communities trust in large businesses and institutions. In particular, he noted three drivers: community views of banks shifting due to their failure to live up to their own standards; the rise of a section of the population who feel left behind in the existing economic system while banks remain highly profitable; and finally that a strong drive in some sections of politics driving this seemingly with a view to link the Prime Minister with the banks and use this to demonstrate that he is 'out of touch' with the day to day concerns of Australians.

The ABA and the banks in Australia have little opportunity to impact the latter two aspects of the public mood, however, can influence the first - ensuring strong standards are established and followed. That is where effort is being focused.

Final Thoughts



The 2016 Banking Seminar brought together a wide variety of views and served as a valuable forum for our speakers to bring out new and emerging ideas about the world of banking. It highlighted that an unquestionably strong banking system stretched well beyond simply raising capital levels, highlighted the varied career opportunities open to actuaries willing to continue to learn, and that a wide variety of challenges continue to be addressed in the banking sector.

As always, thank you to our speakers, the Actuaries Institute and the Banking Practice Committee in helping to deliver the event.



Analytics-assisted triage of workers compensation claims

By Ivan Lebedev and Inna Kolyshkina

Director of Data Science Inna Kolyshkina and Scheme Actuary at ReturnToWorkSA Ivan Lebedev combine forces to explain a project undertaken to explore the usefulness of advanced data analytics capability for ReturnToWorkSA.

In 2014, ReturnToWorkSA undertook a project to explore the potential usefulness of advanced data analytics capability to its business.

The aim was to predict the likelihood of claims staying on income support for one year or more from the date of lodgement (hereafter, this event will be referred to as “becoming long-term”) using the information available at thirteen weeks from lodgement.

A further requirement was that the prediction model should be easily interpretable by the business.

On average, by 13 weeks after claim lodgement, more than 80% of claimants will have returned to work. The remaining ones must have had certain barriers that prevented them from making a recovery. These barriers are commonly related to the severity of the underlying medical condition, psycho-social factors such as the relationship with employer/job, worker’s general resilience etc.

At 13 weeks post-lodgement claims establish a history that includes medical diagnosis and treatment, interactions with GP/ specialists, entitlement payments, etc. While each element of this data may not be particularly predictive, the business case set out to check whether advanced data analytics would allow one to identify the patterns and combinations that reliably predict high or low probability of a claim becoming long-term.

Challenges

The event of a claim becoming long-term is influenced by many factors. Strong variability of claim duration for a given injury type and age is illustrated in Figure 1.

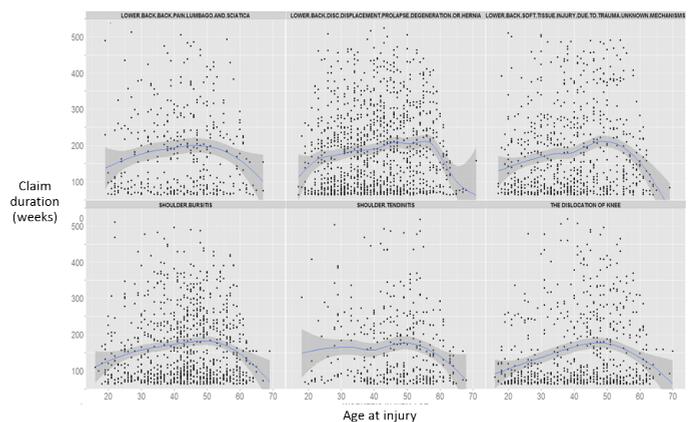


Figure 1: Two-way analysis of claim duration versus age and nature of injury. The blue curve shows generalised additive model (GAM) fitted in the data and the dark grey region around it shows the corresponding confidence interval band. A high degree of variability for injured workers of the same age and injury type is clearly visible.

The features that significantly complicate the modelling of claim outcomes are data sparseness, multicollinearity and the fact that the majority of the potentially important predictors (such as TOOCS codes for nature of injury, body location, etc) have large number of categories.

Facing the challenges

TOOCS system has a wide gap between the highest level (nature of injury group) and the lowest level (individual nature of injury). As a result, some of the high-level categories are too broad to be useful, while some of the low-level categories have too little support (number of claims in the dataset). To address this situation, low-level categories with large support were raised up in the hierarchy, high-level categories with small support were

lowered down and low-level categories with small support were amalgamated with similar ones.

Since nature of injury and body location were expected to be amongst the most important predictors of claim duration, an important step was to combine them into a single variable in order to concentrate only on combinations that occurred in practice.

Finally, we applied correlation analysis to identify the clusters of variables that were highly correlated to each other; the variables that were found to contain redundant information could be removed from the analysis without sacrificing the accuracy or validity of prediction.

Early disappointment

To efficiently evaluate what accuracy could be achieved with the chosen predictors, we employed three different data science methods known for extracting maximum predictive value from the data - Random Forests, GBM and LASSO regression.

The results were consistent for all the methods used and showed that only 11-13% of the variability as measured by R-squared- equivalent measures was explained.

The segmentations performed by Conditional Inference Trees, classical Classification and Regression trees and cluster-based approach were consistent in producing only two main claim segments with poor separation between the probability of a claim becoming long term (Figure 2).

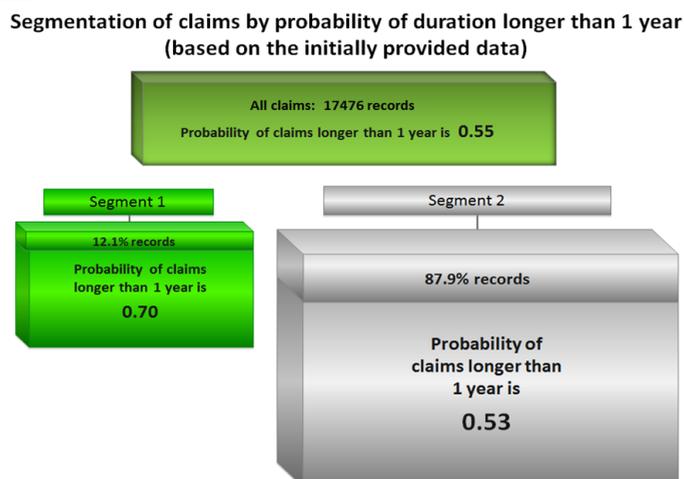


Figure 2: Initial segmentation of claims. The separation between high-risk and low-risk segments is low.

This result clearly did not meet the business expectation.

1 Data enrichment

This result indicated that certain unknown factors excluded from the initial model influence the outcome. Using the input from the SMEs and external research in worker compensation claim duration prediction, we then sought to enrich the data with additional information, including:

- claim reporting lag;
- information on the treatment received (for example, type of providers visited, number of visits, provider specialty);
- information on the use of medications and, specifically, on whether a potent opioid was used;
- information on claimants' prior claim history, including

previous claim count, type and nature of injury and any similarity with the current injury

There was a significant increase in the proportion of variability explained by the model. We identified 36 most significant attributes for classifying claims into high- and low-risk segments. The top 12 predictors are shown in Figure 3.



Figure 3: Top 12 predictors for the risk of a claim becoming long-term. The green line shows the extent of the importance of each predictor on the scale from 0 to 100.

Building the final model

The business required the probability of a claim becoming long-term to be expressed in the form of intelligible business rules. To achieve this, we used Decision Trees in combination with Association Rules analysis.

The final model allows one to allocate a claim to one of 6 segments shown in Figure 4 on the basis of 36 characteristics and their combinations.

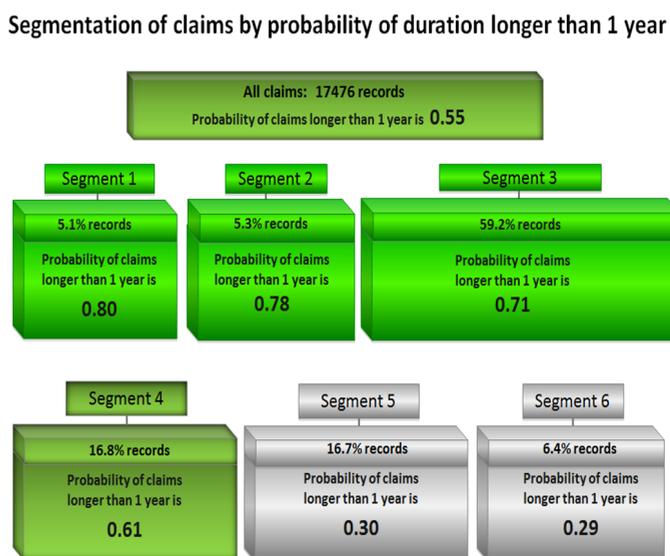


Figure 4: Segmentation of claims by the final model

The model shows a good separation between the high-risk segments (1 and 2) and low-risk ones (5 and 6). The ability to reliably identify claims with high risk of becoming long term has a clear business value because it can be used to focus case management activity where it is most needed.

Key learnings

Although one might think that decision tree-based methods could work with raw categorical data and that the binary splitting algorithm would automatically amalgamate small categories into larger groups, in reality, this is not the case. Our experience in this and other projects is that a thorough review, cleansing and regularisation of categorical data is essential for building a good prediction model.

The appreciation of the critical role of expert business knowledge in achieving good outcomes was another key learning. It is by consulting the subject matter experts that we were able to identify that the history of prior claims can be added to the model. This allowed us to significantly improve the prediction accuracy.

The approach that worked very well in this project was to first focus on achieving a satisfactory prediction accuracy and then concentrate on developing the final model that meets specific business requirements. When targeting accuracy, by using the tools that extract the greatest amount of predictive power from the data we could quickly assess the inadequate predictive potential of the initial dataset and direct our efforts to data enrichment.

At the stage of developing the final model we already had a defined set of predictors to work with and could concentrate our efforts on refining the model itself. It should be noted that depending on the business requirements, the final model could have been developed not only in the form of decision rules, but also in any other form (e.g. GLM) required by the business.



Insurance Contracts IFRS enters the Home Straight

By Grant Robinson

In this article, IASC Convenor Grant Robinson illustrates the historical developments of a common way of reporting insurance contracts which started in 2005. He also shares details of future plans and potential impacts of the new process.

The Coming Change in Accounting for Insurance Contracts

The amazingly long journey to a common way of reporting insurance contracts, which began way back in 1997, is finally drawing to close. We can be pretty confident that we will see the final standard released in 2017, with a 2021 mandatory effective date the most likely.

This means that some of those who will be doing the reporting under the new standard for the first time will not have been born, when this standard was first conceived.

The following sets out the journey and outcomes.

2005 – Phase One

Under its first phase, with the issue of IFRS4 *Insurance Contracts*, effective from 2005, the IASB:

- defined what are *insurance contracts* and *investment contracts with discretionary participation features*;
- grandfathered existing accounting treatments for these contracts (i.e. AASB 1023 and AASB 1038 in Australia), subject to liabilities held meeting an adequacy test; and
- improved disclosures.

Since then the IASB, has been working to replace the wide variety of grandfathered accounting practises with one accounting approach or model that would apply to any type of insurance, be it – general, health or life insurance, as well as for participating investment contracts.

2007 - Discussion Paper

The IASB set out in its 2007 discussion paper, its initial thoughts on an accounting model for insurance, to be based on three building blocks:

- unbiased current estimates of expected contractual cash flows;
- adjusted for the time value of money at current market discount rates; and
- a margin that market participants require for bearing risk;

Plus a margin for the provision of any other services, if any, a 'service margin'.

2010 – Exposure Draft

The exposure draft issued in 2010 kept the three building blocks – current estimates, current market discount rates and adjustment for risk.

The service margin was replaced with a 'residual margin' calibrated to remove profit at contract inception based on incremental acquisition costs, and released over the life of the contract.

Under this model the following items would go through profit and loss:

- Release of residual margin for the period (similar to MoS);
- Interest on the liability in the current period (similar to MoS);
- Unexpected cash flows - actual cash receipts or payments that were not as expected (similar to MoS); and
- Changes in estimates of future cash flows (differs from MoS in not remeasuring the residual margin for changes in future estimates)
- Change in risk adjustment over the period reflecting both release from risk and changes in the uncertainty of future cash flows (no MoS equivalent);

2013 – Revised Exposure Draft

Responding to concerns about profit volatility, from taking changes in current estimates and discount rates straight to the profit and loss, and the adverse impact of contract boundaries on health insurance, the IASB, revamped the proposed accounting model in number of significant ways:

- The 'contract boundary' (i.e. the point at which the insurance contract ends for the purposes of calculating the balance sheet liability) to be set, not only when it can be fully repriced at the individual contract level but also if it can be at the portfolio level, which makes the next renewal date the contract boundary for stepped premium life insurance sold on yearly renewable premium terms (a substantial change from MoS);
- The 'contractual service margin' (formerly the residual margin) could now be remeasured for changes in estimates relating to future coverage albeit at inception discount rates (more akin to MoS), but previous losses could not be reversed and changes in risk margins relating to future coverage could not be included in the remeasurement;
- Profit and loss to be based on inception discount rates with the impact of current discount rates to go through other comprehensive income not profit and loss;
- Investment contracts with insurance riders not to be unbundled and reported as insurance unless both components can lapse independently of each other (very different to MoS and current insurance IFRS);
- Very complex accounting for participating and investment linked business involving identifying those elements of contractual cashflows driven by guarantees, options and underlying assets and applying different accounting for each element.

2016 – Tentative Decisions on Final Standard Completed

In February 2016, the IASB completed reviewing issues arising from feedback on the 2013 revised exposure draft and decided that the staff could now proceed to drafting the final standard, with some further changes:

- In remeasuring the contractual service margin (CSM), previous losses can now be reversed (similar to MoS) and changes in risk margins relating to future coverage can also be included in the remeasurement of the CSM;
- The use of Other Comprehensive Income for changes in current discount rates is no longer mandatory, which means the impact of changes in current discount rates can generally go through the profit and loss if preparers so elect;
- A 'variable fee' model is proposed for participating business where participation is based on a clear pool of underlying items, in which case the CSM can be adjusted for changes in the entity's expected share of returns on underlying items, net of any expected cash flows that do not vary with the underlying items (akin to MoS).
- The release of CSM has been simplified to "passage of time" for both non-participating insurance and participating insurance (e.g. conventional business) with only participating investment business able to use "transfer of investment service" (making profit release even more different to MoS).
- Restricting the ability to group insurance contracts for purposes of determining onerous contracts and allocating the CSM to contracts that at inception have both:
 - Cash flows expected to respond in similar ways (amount and timing) to changes in key assumptions; and
 - Similar expected profitability (ie similar CSM as a percentage of the premium).

Further Field Testing – 2H16

In conjunction with the drafting, the IASB has invited a limited number of insurers around the globe to participate in field testing on the drafting on five topics:

- Aggregation of contracts – focus on the number of groups required for CSM – the restriction on grouping to contracts with similar profitability that react in similar ways to changes in key assumptions is likely to cause a huge increase in the number of groups. Even if this results in a group having only one contract in it, it may not be combined with other groups;

- Scope of variable fee approach – focus on understanding types of participating business that qualifies and judgements involved – we believe that most, if not all Australian participating business will qualify for the variable fee approach;
- Derivatives used to mitigate financial market risk – focus on understanding how these are used for participating business eligible for variable fee model and if the option to match their reporting in profit and loss works as intended;
- Determining insurance finance income or expenses in OCI – understanding how disaggregation methods would work for OCI accounting – our focus has been on lobbying to avoid the complexity of OCI for those who prefer current accounting in the profit and loss;
- Recognition of changes in estimates – understanding how experience and changes in estimates flow through – some similarities with MoS in that the CSM is remeasured for changes in estimates relating to future coverage. Also some significant differences in that:
 - the remeasurement uses inception discount rates for the CSM vs current for the change in fulfilment value;
 - changes in current estimates for IBNR and outstanding claims reserves go straight to profit and loss as they do not relate to future coverage;
 - some items that would previously have been recognised as experience variances under MoS may now be recognised through an adjustment to the CSM.
- Transition – understanding when and how the three transition options (full retrospective, simplified transition and fair value transition) might be utilised;

The questionnaire, which includes relevant extracts from the draft standard, is publically available on the [IFRS website](#).

The IASB is currently expected to consider feedback from the field testing and set the implementation date for the final standard late this year, with the final standard being released in first half of 2017.

Overview of the coming standard

There is a weekly series of webinars, over April and May, by Darrel Scott, member of the IASB, which provides a good overview of the forthcoming Standard, which can be found [here](#).

Potential Impacts

The following provides a quick summary of key potential change impacts:

- Stepped premium yearly renewable term insurance becomes short term business resulting in:
 - large write down in DAC on transition, as acquisition costs can only be deferred till next contract renewal;
 - potential improved ROE for mature insurance businesses, reflecting reduction in equity from DAC write down;
 - significant new business strain for a start-up insurance business
 - uncertainty about tax treatment of the DAC write off.
- Increase in profit volatility due to:
 - Changes in assumptions for IBNR and open claims reserve estimates going to P&L instead of against future profit margins;
 - Reduction in profit margins (CSM) available to absorb assumption changes due to the introduction of the risk adjustment;
 - Much lower level of grouping for loss recognition (onerous contracts); and
 - Mismatch in discount rates used for measuring impact of assumption changes on CSM (inception discount rates) vs fulfilment value (current discount rates), unless using the option to put the impact of discount rates changes through Other Comprehensive Income
- Individual yearly renewable risk business profit less sensitive to changes in lapse assumptions and market interest rates due to significant reduction in implicit DAC.



Friendworking

By Bill Konstantinidis

Bill Konstantinidis from the Institute's Leadership and Career Development Committee discusses how important it is to keep in touch with your professional network. He also shares his personal experience of 'friendworking' and the benefits to his career.

Friendworking - it's like networking but only with your friends

Everyone tells us that networking is necessary for successful career development. We often see jobs being filled that we didn't see advertised. Sometimes this is because a job was created for someone or alternatively they knew who would fit the bill.

A personal lesson

When I was 28 I got promoted to a senior management role. I was energised. I had made it another rung up the corporate ladder. I worked hard. I delivered. I smashed the targets. I buried myself in my work. At the age of 30, after a hostile company takeover, my world came crashing down. I was retrenched. What was I to do? My career had been on a steady upward trajectory. I knew I was good at my job and thought it would be easy to find a similar job but it wasn't. I was left applying for jobs by submitting resumes in response to advertisements and I felt like just another number. I then realised that I had buried myself in work for so long that all my business connections had dried up. There was no one I could speak to about possible opportunities.

What did this teach me?

The lesson for me was "keep in touch". Sometimes having a strong professional network is just as valuable as an impressive resume. It would be very beneficial if you knew a few people who can help you add a face to your candidate number. Since then I have consciously made an effort to reconnect with friends, old colleagues, industry friends and old university friends. I have invested time in people (and coffees). These are people I like so I don't call it networking, I call it Friendworking.

Who to Friendwork with?

I generally catch up with people I like.

Some people you may enjoy catching up with are those that you have an existing connection with:

- previous school or university colleagues;
- previous and current work colleagues;
- people you have met at functions, weddings, parties or conferences;
- relatives;
- old bosses;
- communities you belong to or have belonged to (e.g. sport, religious, charities etc); and/or
- cultural, language and racial connections for those with a migrant background.

Basically you need some common ground to build on when you share a coffee.

Use your phone book, email address book, LinkedIn or Facebook to stimulate your memory to help prompt you to think who you would like to catch up with.

Why coffee and what if I don't drink coffee?

Coming together over food is an age old custom. We see this in many religious celebrations and rights of passage. In my view, coffee is a smaller version of a meal that has significance which makes it more than a meeting. You don't drink coffee so coffee shops don't work for you - that's a poor excuse! You can drink tea, hot chocolate, hot water, a caramel milkshake, cold water or a soft drink. It is more about getting into a neutral environment.

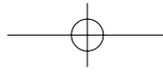
How Often?

The general rule is sometime is better than no time. The people you really like - really often e.g. monthly, three monthly. The people you have less in common with maybe every two years.

How do I start?

Why don't you commit to as little as one coffee catch up a week with someone you haven't seen in a while?

When? Planned



It is important to book in advance to increase your success rate of getting a suitable meeting date. A week or two in advance works best.

- Pre-work, either for coffee or breakfast. Before work is good as booking time later in the day can get bumped by work priorities.
- If you have a meeting at the other end of town or in a different city and you have some contacts who work in the vicinity, try to plan a coffee catch-up before or after that meeting.

Where? Electronically/Remotely

Acknowledge people when they get a new job or have a special event in their lives. Even if you don't catch up with people face to face send them an email or call them to say hello and see how they are going. Nowadays you can also message them on LinkedIn. By doing this they will at least know that you exist and you cared enough to contact them.

When? Serendipity

Life often deals out opportunities and it is up to us to make the most of them. Without taking a risk you don't get a return. We need to make the effort to talk to someone even if we may be fearful of whether they will acknowledge us favourably. When we run into someone we know on the street, at an airport, on a plane, on a train, on a bus or at a function, go up and say hello. A brief acknowledgement goes a long way and shows you care enough to make time to have a quick chat. I met my future employer at a wedding! I got my courage up and talked to a CEO of a major insurer and I was only an analyst. I had a job offer within the next fortnight. It's the same with someone that you meet at the airport... they could be your future employer.

Expand your Friendwork

You may not have many friends since you did your actuarial studies, you worked hard and had no social life. Well you can build your Friendwork by:

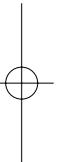
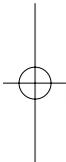
- joining some social groups;
- join a public speakers group like Toastmasters;
- join community groups;
- use the Meetup application to see what groups meet in your area; and/or
- create your own group or committee e.g. Chess Friends /Chinese Actuaries.

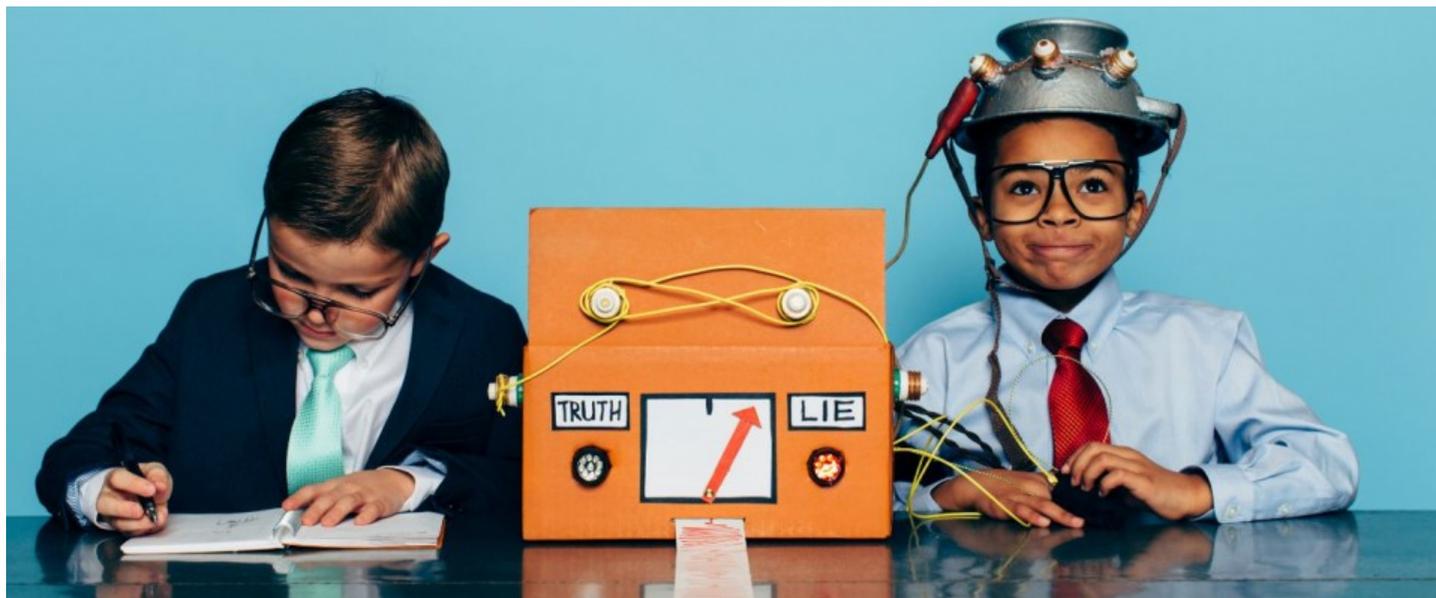
What has Friendworking given me?

- The opportunity to learn about other people, culture and companies.
- I have been headhunted because people think of me when they are trying to fill a role.
- Having coffee with a friend is a safe place to de-stress from my work environment.
- I know when jobs become available so I can apply or put forward people I know.
- I have had the joy of helping people through work challenges and career decisions.
- I have the opportunity to use more experienced people as mentors which has helped me learn what I should do in my work and career
- It has allowed me to keep future employees warm.
- It has allowed me to keep future employers warm. That is, they think of me when jobs come up. I have built trust – I am a known quantity – it is like a continuous interview
- I have someone to ask professional or market questions to.

Conclusion

The message I have is, catch up with your friends. The more people that know you and remember you, the more likely you will get that opportunity you have been looking for. It's not hard, you just need to take the first step.





Master trainer in 'Deception Detection' to address ERM2016

By Stephanie Quine

Organisational psychologist and master trainer in 'Deception Detection Skills', Alan Hudson, will present strategies for better enterprise risk management (ERM), alongside a host of decorated speakers at the ERM Seminar in Sydney on 20 September.

Now in its eighth year, the 2016 [ERM Seminar](#) (Tuesday 20 September) will focus on practical risk management. Speakers will address the important roles risk managers perform in organisations and use case studies to explore new approaches to risk management that are especially applicable to actuarial roles.

Plenary 3 speaker Alan Hudson has a qualification you don't come across every day. The Principal of AH Business Psychology is a fully accredited master trainer in the Paul Ekman International science-based training programs in Deception Detection Skills. The rigorous program teaches how to detect credibility and truthfulness using assessment of a person's demeanour across five channels: facial expressions, body language, vocal tone, verbal style, and content.

"People's ability to tell truth and lies untrained is about 54% - almost the toss of a coin," says Alan.

"This training is particularly useful for specialists whose job it is to assess and elicit information, whether that's through interviews, audits, recruiting, forensic or security scenarios."



Think you've got a good poker face? Alan challenges you to think again.

The training teaches one to ascertain a person's "baseline" regular/relaxed facial expression and then analyse their expressions of "initial involuntary emotional response" of one of seven emotions (surprise, fear, anger, sadness, happiness, disgust, and contempt). According to Alan, these expressions are

universal; and transcend race, gender, cultural background or age.

"You can tell reliably if a person's feeling one of these emotions...they show the same expressions in the direction of the eyes, the forehead, the set of the mouth," he says. "Once you've identified this emotion, the skill then is to probe with well-crafted questions." Reading and influencing people is clearly a professional skill enhancing tool that comes in handy when conducting meetings and negotiations, as well as advancing projects and leadership roles. As Alan says, "even the smallest insight can mean a huge difference to negotiation outcomes". "Internal fraud goes up each year, and for social security fraud, in 2012 the official Government figure was \$700 million a year, which suggests current figures are just under a billion dollars a year."

ERM2016 will open with a keynote presentation by [David Murray](#), Chair of the Financial System Inquiry, who also launched the Institute's White Paper "For Richer, For Poorer - Retirement Incomes" in September last year.

Then, a full day of presentations will see attendees take home key learnings in the following areas:

- Key Macro Risks
- Identifying Emerging Risks
- Influencing and Reading People
- Risk Culture, Conduct Risk & Reputation
- Case Studies - Risk Management in Practice
- The Role of CRO

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[Find out more and register.](#)



Rio Olympics: the hidden statistics

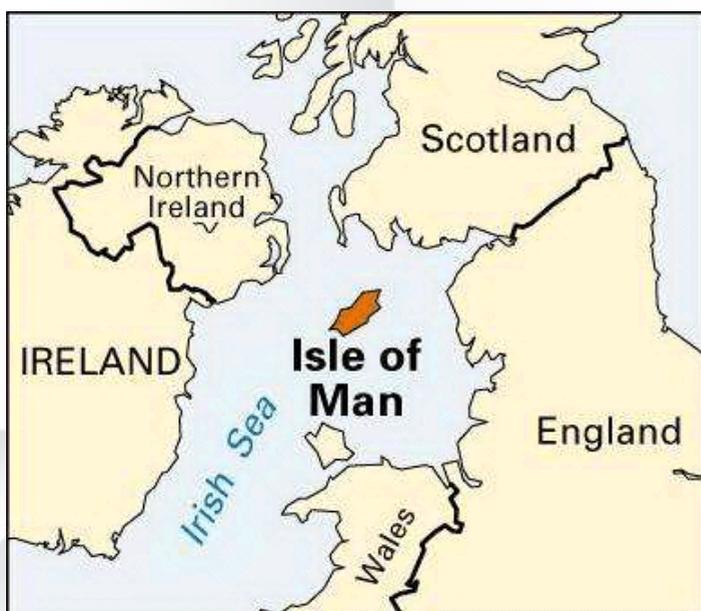
By Amanda Aitken

With 1,417 days until the Tokyo 2020 Olympic Games, actuaries Amanda Aitken and David Kwak look at who topped the Rio Medal Tally and why. Did you know that if results are adjusted for population size, the Isle of Man, Grenada and the Bahamas top the table? And Australia beat out the UK and US! Read on for some fascinating insight into what drives country performance, based on actuarial analysis.

Most people focus on the overall Medal Tally, with an equal weighting for gold, silver and bronze. As typical actuaries, we weren't happy with this overly simple approach and have instead examined the following two results:

- Medal Score (with a weighting of 3 for gold, 2 for silver and 1 for bronze)
- Medal Score per million population

Our Medal Score tally results in the following Top 10 countries (right)



Country	Medal Score (G=3,S=2,B=1)			Medal Tally (G=1,S=1,B=1)
	Rio (2016)	London (2012)	Beijing (2008)	Rio (2016)
USA	250 (1)	225 (1)	220 (2)	121 (1)
Great Britain	144 (2)	140 (4)	98 (4)	67 (3)
China	140 (3)	190 (2)	223 (1)	70 (2)
Russia	112 (4)	155 (3)	139 (3)	56 (4)
Germany	86 (5)	85 (5)	83 (6)	42 (5)
France	80 (6)	67 (6)	70 (7)	42 (6)
Japan	73 (7)	66 (7)	46 (10)	41 (7)
Australia	56 (8)	65 (8)	89 (5)	29 (8)
Italy	56 (9)	53 (10)	54 (9)	28 (9)
Netherlands	42 (10)	38 (11)	34 (14)	19 (13)

* Numbers in brackets represent relative rank

Two things are clear from this tally:

- Our weighting of gold, silver and bronze medals doesn't have a big impact on who places in the Top 10 (although in 2016 it did)

lift Great Britain to 2nd and Netherlands into the Top 10).
 • USA, Great Britain, China and Russia have consistently ranked in the Top 4 over the last 3 Olympics, and consistently scored well above the next 6 countries in the Top 10 (clearly not breaking news!).

Much research has been conducted to understand what drives the performance of such countries. Gonzales (2016) suggests that four factors are key:

- population size;
- wealth;
- previous Olympic performance; and
- whether the country is hosting that year's Olympic Games.

Research conducted by [Bredtmann and colleagues \(2016\)](#) found that other influential factors included:

- planned economies (these countries tend to invest more in sport as they value the prestige associated with sporting success); and
- religion (some religions ban or discourage female participation in sport, reducing the medal opportunities from women's events).

Research conducted at [Ruhr-Universität Bochum](#) suggests that factors such as funding support and political systems also influence Olympic performance.

We conducted our own research by collecting a range of economic, cultural, political and demographic variables and running these through a Generalised Linear Model (GLM), which suggested the following as being the most significant predictors of Olympic success (listed in order of significance):

- population
- number of colleges/universities in the country
- previous Olympic Medal Score
- total government spend (not just sports related)
- host country impact
- female mortality rates

Most of these are fairly intuitive and consistent with the research outlined above. The number of colleges in a country is likely to be highly correlated with overall population size. The larger the population, the larger the pool of athletes from which to choose an Olympic team. Previous Olympic performance is likely to reflect the current Olympic training regime and team members and the importance the country places on sport.

The host country impact is also well documented as having a large impact on a country's performance, perhaps by increasing sports-related spending, reducing travel-related fatigue/jetlag/acclimatization issues and increasing the number of supporters cheering the athletes on. When Great Britain hosted the London Olympics in 2012, their Medal Score jumped to 140 from 98 in Beijing in 2008. Brazil's Medal Score jumped from 24 in 2008 and 28 in 2012 to 39 when they hosted the Rio 2016 Games.

Total government spend is one measure of wealth, which allows for more money to train athletes and invest in sporting equipment and infrastructure.

Female mortality was a more surprising finding. Perhaps it simply reflects the overall health of the female population and therefore a bigger pool of high-performing female athletes. However, other variables tested such as average female body mass index ("BMI") and female economic participation did not prove to be significant.

Clearly, overall population size has a significant impact on performance. So how do countries rate if we adjust for population size? The table below shows the Top 10 countries by Medal Score per million population.

Country	Pop'n (m)	Medal Score per million population			
		Rio (2016)	Rio (2016)	London (2012)	Beijing (2008)
Isle of Man	0.1	4 (69)	45.6 (1)	0.0	0.0
Grenada	0.1	2 (73)	18.7 (2)	28.6 (1)	0.0
Bahamas	0.4	4 (55)	10.3 (3)	8.2 (3)	8.8 (2)
Jamaica	2.7	26 (20)	9.5 (4)	8.9 (2)	9.0 (1)
New Zealand	4.6	35 (13)	7.6 (5)	5.9 (4)	3.8 (7)
Croatia	4.2	23 (22)	5.4 (6)	3.0 (11)	1.6 (21)
Denmark	5.7	25 (21)	4.4 (7)	3.1 (10)	2.4 (15)
Slovenia	2.1	8 (48)	3.9 (8)	3.4 (7)	4.5 (3)
Bahrain	1.4	5 (50)	3.6 (9)	0.8 (38)	2.9 (13)
Hungary	9.8	34 (15)	3.5 (10)	3.7 (6)	2.1 (17)

* Numbers in brackets represent relative rank

This list is very different to that using the unadjusted Medal Score! On this measure:

- Australia ranked 16th with a score of 2.4
- Great Britain ranked 18th with a score of 2.2
- USA ranked 39th with a score of 0.8
- Russia ranked 40th with a score of 0.8
- China ranked 74th with a score of 0.1

Small countries such as Isle of Man, Grenada and Bahamas are able to make it to the top of this list because of 1 or 2 superstar athletes. What becomes obvious though is that countries such as Jamaica, New Zealand, Croatia and Denmark perform very well considering their small population.

To try to understand what might be driving the success for these countries, we reran our GLM and found the following variables to be the most significant in predicting Medal Score per million population:

- prior Medal Score per million population
- GDP per capita
- average monthly income
- male mortality rates
- religion

These are largely consistent with other research which found that prior Olympic performance, wealth and religion may all be influential factors. However again mortality rates make an appearance, although this time male rates were found to be significant when female rates were not.

Of course, other variables, some of which are difficult to source and/or quantify, are also likely to play a part in determining Olympic success. These include:

- government spend specifically on sport
- sports culture
- individual country circumstances such as the banning of the Russian athletes
- Olympic training regimes such as hours of training and beginning ages for athletes

So with Olympic fever still in the air following Rio 2016, why not do your own investigating and pass any significant findings on to the Australian Olympic Committee!

Aussie Aussie Aussie, Oi Oi Oi!



A Claim Pairing Approach to Measuring Superimposed Inflation

By Aaron Cutter

There are many ways of measuring superimposed inflation. In this article, Aaron Cutter of Finity explains how to measure superimposed inflation by pairing claims that 'look-a-like' - a technique adapted from home price inflation techniques.

Many factors influence the amounts that are ultimately paid to claimants as settlement of bodily injury claims. Injury severity and personal circumstances are two such factors. However, because there can be a spectrum of characteristics within each factor, plus confounding effects of other factors, traditional techniques on aggregate payment experience to understand superimposed inflation have inherent shortcomings. Also, there is some ambiguity in what is being measured by and hence how best to measure superimposed inflation.

Observing settlement amounts associated with the exact same claim from two different settlement periods would provide the purest measure of superimposed inflation (once underlying economic inflation is allowed for). Clearly that is not possible. However, finding and pairing two or more claims that are almost identical is feasible.

What is a claim pairing index?

Akin to the methodology used in compiling house price indices, we have developed a claim pairing approach to measuring superimposed inflation. The concept is to:

1. Find 'pairs' of similar claims which have settled in different time periods
2. Calculate the inflation between these claim pairs. This contributes to the inflation index for the period between their settlement dates.

Application to NSW CTP Claims

We have applied this approach in the context of NSW CTP claims.

The pairing approach:

- Compares every possible combination of claims, and generates a similarity score based on the claim

characteristics. Characteristics have different contributions to the score, and are based on statistical modelling of the drivers of cost. For example, the combination of injury codes has the highest weight. Other factors such as the occupation and liability status of the claimant, whilst still important, are given lower weightings.

- Finds the set of claim pairs which optimises the similarity scores, subject to the constraint that a claim can contribute to a period's inflation only once (i.e. any one claim can be matched to at most one claim which settled earlier, and one claim settled after).

Each claim pairing implies a level of inflation between the settlement dates of the claims. We combine these inflation points into an inflation index, using a bootstrapping process which is analogous to but a bit more complicated than calculating forward rates from spot curves. The construction of an inflation index in this way is more complex because:

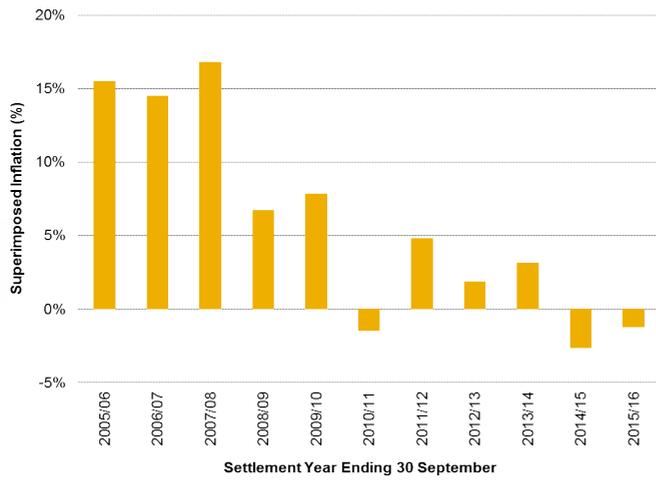
- There are multiple claim pairs contributing to each periods' inflation, and the size of these claims can vary significantly. Care needs to be taken to allow appropriate weighting to each claim pair's contribution to the inflation index
- There are pairs which cross multiple periods. Noting that inflation is not uniform across the entire period, care needs to be taken to ensure this is dealt with correctly

"A Claim Pairing Approach to Measuring Superimposed Inflation - A NSW CTP Example" first appeared at the 2015 Injury Schemes Seminar. Access the full [paper](#), [presentation](#), and [audio](#) by joint authors *Karen Cutter, Aaron Cutter, John Yick, Minh Phan, Charlie Chen*.

Results - NSW CTP Superimposed Inflation

Once the inflation index is constructed and wage inflation backed out we can form a view of superimposed inflation. The chart below illustrates our results:

Superimposed Inflation - NSW CTP Claims



The flexibility of the approach lends itself well to a number of applications, including setting pricing and reserving assumptions although, the interpretation of results needs to be conscious of the application.

Concluding remarks

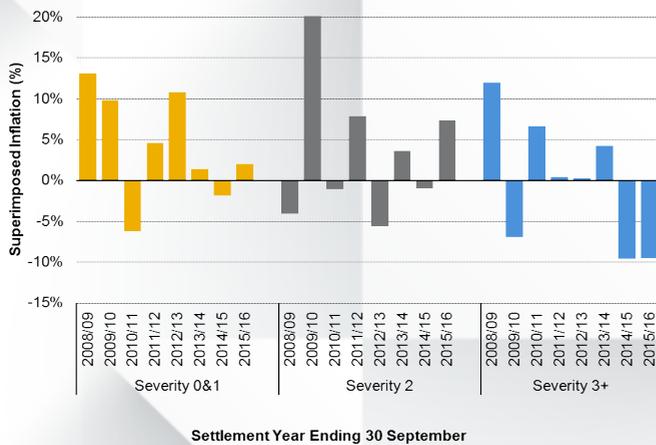
We have illustrated how a claim pairing index approach can be applied in the context of NSW CTP claims. This is one example of how using advanced analytical techniques can enrich and draw new insights from your data that aren't otherwise apparent.

Our index estimates:

- Superimposed inflation was very high up until 2007/08. This is consistent with generally accepted views that claims inflation in NSW CTP portfolios was high over this period due to the Economic Loss and Care heads of damage.
- Between 2008/09 and 2013/14, superimposed inflation was lower but still material, varying between 1% and 8% (average of 4% over these six years).
- For 2014/15 and 2015/16, our index estimates that superimposed inflation has been negligible or even negative at -3% to -1%.

Our approach lends itself to examination of the types of claims contributing to superimposed inflation. We have examined superimposed inflation within each maximum injury severity group (excluding workers compensation claims).

The following graph shows the superimposed inflation, as measured using our pairing approach, from 2008/09 for each injury severity group (maximum AIS).



We observe that:

- The high superimposed inflation in 2008/09 to 2012/13 is driven by sustained high inflation for Severity 0&1 claims, in conjunction with some high contributions from the Severity 2 and Severity 3 claims.
- The low superimposed inflation in the two most recent years is driven by low inflation for Severity 0&1 claims, and strong negative inflation for Severity 3+ claims.

Note that the approach we have adopted specifically excludes any impact on total costs associated with more claims notified, accepted and ultimately paid.



I am an Actuary

By Martin Mulcare

Martin Mulcare presents the most recent instalment of the popular I am an Actuary series. In this article, seven young actuaries share personal experiences of their actuarial journey.

Is being an ‘actuary’ enough?” This was one of the openly discussed questions raised at the Professionalism Course.

I am a Consultant at NAB working in the Deposits Product Portfolio Management and Analytics Team, supporting Pricing, Corporate and Wholesale segments. My current role gives me an excellent opportunity to expose myself to a wider range of stakeholders. I am enjoying this as I am facing new challenges and learning new banking products. The grounding from core technical and Control Cycle studies allows me to provide insightful analytics and demonstrate risk management and governance to drive effective business decisions.

I continue to develop new skills and capabilities through interesting projects and to collaborate with different expertise from Strategy, Product and Distribution areas in the Bank. I am spending more of my time working on PowerPoint presentation packs and interacting and presenting with various stakeholders. On the other hand I am also learning new tools like Tableau and SAS to support my analytical work.

Back to the original question, how do actuaries bring value to the non-traditional world? Build your brand as an actuary in the business. What differentiates us is our strong footing in professional values, behaviour and accountability. One of our guest speakers, Tim Gorst, proposed that to be successful you must package yourself to show your ability to bring value to the business and also be accountable for what is required of your role. The other crucial capability is presenting with impact to your stakeholders and Rebecca Stowe provided a live demonstration at her session.

I strongly believe the ability to keep technical and complex things simple, together with our integrity and professional capabilities, enhances the value of actuaries to our businesses and industries.

John Chan



“Why do we need to go through the pain to do part 3 and becoming a Fellow if you are not working in the traditional actuarial fields where actuarial advice is required by regulation?”

Caroline Chen



I am a Lecturer in Finance at the RMIT University. I obtained my PhD in Finance from the University of Queensland and worked there as a Lecturer in Finance before joining RMIT. I started my journey of becoming an actuary at the Australian National University and graduated from ANU with a Bachelor of Actuarial Studies and a Master of Actuarial Studies in addition to a Bachelor of Commerce and a Master of Finance. Having recently qualified as an Associate, I have decided to keep pursuing the actuarial qualification (FIAA) while working as a finance academic.

Unlike most actuaries working in academia, I teach finance and do research in the field of finance rather than the traditional areas of actuarial studies. However, nowadays interdisciplinary research is an important trend and boundaries between disciplines are increasingly blurring, particularly for finance and actuarial studies, two very closely related disciplines. In fact, to address many complicated issues, it requires inputs from multiple disciplines, professions and industry groups. For example, there is huge potential for the collaboration of actuarial studies and finance when analysing the implications of climate change. Having been undertaking research in the area of corporate finance with a good track record in publishing, I have recently extended my research to the area of environmental finance. I feel my actuarial-finance background benefits my research by providing a broader view and fresh research ideas.

It is a great honour and privilege to be part of the profession. I highly value the opportunity to become an actuary and believe it is really worthwhile to spend time on actuarial training while pursuing my academic career.

Lauretta Karreman



Like most who end up in this field, I did not grow up wanting to be an Actuary. To be honest, I did not know what an Actuary was and fell into that large group of people who give the questionable nod when you tell them about it. However, after a friend told me she was going to apply to study Actuarial Science, I thought 'I like maths, let's give it a go'.

At the end of 2011 I completed my Bachelor in Actuarial Science at Curtin University and started work at HBF as a Business Analyst not too long after. During this time I had the opportunity to work with many business areas and realised my true passion of using data to make strategic and effective business decisions.

I have since moved to Melbourne where I am a Growth Consultant at Forethought, a brand growth firm. We solve challenges for ambitious brands by using science to understand consumer behaviour and decisions. In this role I work with clients to understand and solve their growth challenges through leveraging data insights. This role has shown me how the skills we learn in preparation to become an Actuary can be applied to a broad range of jobs and industries.

I hope throughout my career I can help in making all businesses and industries see the benefits of employing an Actuary.

Mingyuan Guan



I love being an actuary. It allows me to use my talents and have a meaningful and positive impact. I would like to think that I am actually helping people, and the business, by participating in high-level business decision-making and solving real problems.

I have been working in personal insurance pricing for several years. General insurance pricing is always challenging as future losses and expenses need to be estimated and no-one can really know the future with certainty. The only thing that seems certain is that our assumptions will be wrong. Therefore, I recognise the importance of business knowledge to balance the technical aspects of the job. One of the key skills I value in this context is the ability to explain complex technical matters in a non-technical manner to those without an actuarial background.

I am currently applying analytics in a general insurance corporate, which is normally considered to be a non-traditional area for actuaries. Personally, I am always excited by the insights gained from data and have a view that the core actuarial skill set is highly relevant to the world of analytics. In the future, there will be far more opportunities for actuaries to utilise their skills in different areas such as pricing, claims, customer behaviour, marketing, operations and HR.

Apart from having to study for exam preparation, the other important hobby for me is skiing. Sometimes, I do find it quite difficult to prioritise between skiing and studying, especially when the winter season starts. My skiing style is to “go hard” on “double black diamond” runs and off-piste skiing. I always try to push the boundaries and embrace any challenges. It is all about confidence and courage.

One of my life goals is to ski all around the world and ultimately become the best skier within the actuarial society and the best actuary among all the ski experts.

Queenie Chow



After having finished my double degree majoring in Actuarial Studies and Spanish (!), I started my career in corporate superannuation services with Russell Investments. As part of an actuarial consulting team in Melbourne, I was given the great opportunity to work in various engaging assignments. These ranged from traditional retirement work such as managing defined benefit liabilities and fund modelling to performing analysis on insurance tenders and unit pricing arrangements.

Unlike the typical actuary profile, I would describe myself as a ‘risk-lover’. I love adventures and, above all, I love travelling. I have previously had the valuable experience of living in France, Mexico, Hong Kong and West Africa. Late last year, through the network of Actuaries Without Borders® (AWB), I had the exciting opportunity of working voluntarily with a senior actuary with her own consulting business in Togo (West Africa) and also the Executive Director of AWB. My actuarial skill-set was warmly welcomed and I cannot describe the sense of fulfilment and reward one receives working as an actuary in global development.

The humble experience in Togo opened up new doors to the boundless world of micro-insurance and managing risk for the underserved. I now have the privilege of working as an Impact Insurance Fellow with the International Labour Organization (ILO), the oldest agency of the United Nations. This 2-year fellowship program provides me with the valuable opportunity of applying my actuarial expertise in developing insurance solutions for low-income markets and supporting innovation projects in Sub-Saharan Africa. What an honour to be able to use my actuarial technical expertise to serve the public well-being from Nairobi, Kenya!

As I embark on this challenging venture of micro-insurance, I am thrilled at how the skill-set of an actuary can have a positive impact in the lives of the low-income population in developing countries.

Rae Gao



There were two simple reasons why I chose Actuarial Studies. I was pretty good at maths, and 'it's all about the money money money'. To be completely honest, I did not know much about the profession other than it being highly selective. I consulted my only source of information, a family friend who dropped out of actuarial studies after first year in university. Needless to say the advice I received was not entirely encouraging. Despite all this, I went through with it. I am very glad now that I can call myself an actuary (AIAA).

I joined Coles Insurance three years ago. I considered myself very fortunate to start off my career with a start-up company. I had the opportunity to work on many cross function projects, such as signing off on marketing materials, designing underwriting criteria, creating customer contact strategies and identifying fraudulent claims. I am fascinated by how much a start-up challenger can disrupt the market, and am proud to be part of the journey. Coles Insurance was later acquired by IAG, and this new experience helped me realise working as an actuary had a much bigger responsibility. IAG's motto is to make the world a safer place and the professionalism course has helped me join the dots.

So it is like Jessie J says, it's not about the money money money. I (being an actuary) want to make the world safer. Forget about the hourly rate we charge.

I would like to end my bio with a personal interest to show that I have a life outside of my 'modelling' career. I enjoy yoga and am seriously considering a side career path as a yoga instructor. I am a strong believer of the healing effect of yoga, especially during the traumatising exam periods.

Tom Bland



Why did I become an actuary? I think my answer to this question would be largely the same as most people who became an actuary: attractive pay; mathematical base; differentiate oneself. The more interesting question for me, in these times where opportunities abound and individuals rarely stay put for long, is why do I remain an actuary?

My first three years in the actuarial space have been incredibly exciting. I started my career for two and half years at EY in Melbourne in the Actuarial - Banking and Capital Markets team. During this time I was exposed to a wide range of interesting challenges across the broad scope of banking from Regulatory and Accounting requirements across Credit, Market and Operational Risk as well as looking at the Enterprise Risk Management as a whole.

This led to the opportunity to join the EY London firm early this year and since this move I have spent a lot of time all over Asia on multiple engagements around IFRS9.

Why do I stay in this space and, more importantly, why do I believe being an actuary is important for this? First the opportunities that our quantitative background gives us are unbounded. More and more, clients are looking for individuals with a proper quantitative background to add value to their business. Additionally, being an actuary gives us the ability to communicate complex ideas which is invaluable and I have found this to be one of the most exciting and rewarding parts of the job.

Ultimately, I feel like being an actuary gives us the greatest potential to take advantage of the huge range of opportunities that are emerging. Additionally I have also found my actuarial training to be hugely beneficial for my role running a non profit choir called [Polyphonic Voices](#).



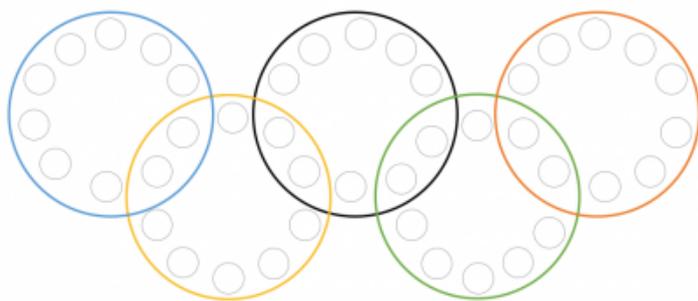
The Critical Line: Volume 6

By Jevon Fulbrook and Chris Ebbs

In the spirit of the recent Rio Olympics, Jevon Fulbrook and Chris Ebbs have an Olympic-themed puzzle for you; the sixth installment of the Critical Line.

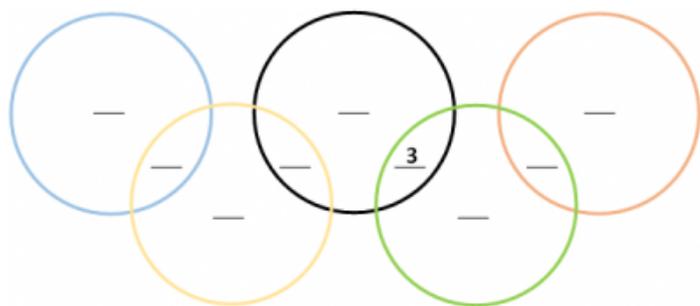
The first step is to arrange these five words in the Olympic rings. Each word goes inside one larger coloured ring, with one letter in each of the smaller circles. All words can be placed with the letters going clockwise. Where the rings intersect, the same letters must be used for both words.

- Accomplish
- Asymmetric
- Haemolysis
- Plicamycin
- Sculptural



When you've worked out how the letters are arranged in the circles, the letters in the crossover sections (8 in total) can be used to complete the following puzzle.

Taking the 8 letters, research how many countries competing at this year's Olympics begin with that letter. Once you have those numbers, write them in roman numerals. Each letter is represented by the number of letters used in the roman numeral. For example, there are 13 competing countries beginning with the letter A; this is XIII in roman numerals and uses 4 characters, hence A=4. Once you have converted each of the letters to a number, complete the Olympic rings below with the 8 numbers used so the sum of the numbers within each ring is the same.



Send your answer to ActuariesMag@actuaries.asn.au for your chance to win a \$50 Dymocks voucher!

Critical Line Volume 5 – Solution
By Dan Mayoh (dan@fintega.com)

Congratulations to Andrew Parker and Oliver Chambers for both sending in correct solutions. The prize is awarded to Andrew, congratulations!

The answers to the Mastermind challenges in Critical Line Volume 5 are as follows:

Probabilities of winning:
Part 1: 14/1296
Part 2: 106/1296
Part 3: 132/1296

Optimal strategies:
Part 1: Choose any code that contains at least 3 different digits (e.g. 1123, 5465, 1652 etc). Any of these will give you a 14 in 1296 chance of winning the game within your first two guesses. 1080 of the 1296 possible initial guesses fit this criterion (720 of which contain exactly 3 different digits, and 360 of which contain 4 different digits).

Part 2: There are many combinations of guesses that are equally optimal. The first of these in numerical order is the guesses 1123 and 2453. Another optimal combination is 1234 and 1355. In all there are 17,280 equally optimal combinations. All of these involve a code with exactly 3 distinct digits and a code with 4 distinct digits, where the repeated digit in one code is not



present in the other code. There are other criteria to the pairs of codes too, but that gives you a flavour.

Part 3: Here, the optimal strategy is to first pick any code with exactly 3 distinct digits (e.g. 1123), which will then give one of 14 possible scores of black and white pegs. For each of these 14 outcomes, there is one or more optimal second guesses. The table below presents the lowest-number optimal second guess for each of the scoring outcomes, given a first guess of 1123. The format of the score is given as "B-W" where B is the number of black pegs, and W is the number of white pegs.

First Score	Second Guess
0-0	4455
0-1	2445
0-2	2344
0-3	2314
0-4	1211
1-0	1445
1-1	1415
1-2	1214
1-3	1231
2-0	1242
2-1	1243
2-2	1212
3-0	2413
3-1	Impossible
4-0	Any guess

Method for solving:

Parts 2 and 3 are solved by brute force searching, with some shortcuts to eliminate combinations that are symmetrical to combinations we've already considered. Doing this on a computer first requires writing a formula or block of code to determine the peg score given a specified code and specified guess. That task alone is an interesting little Excel challenge.

Part 1 can be solved by brute force as well, but can also be solved without a computer. The approach is described here. Please excuse the lazy formatting.

Noting that the peg outcome 3 Black 1 White is always impossible, then for any nominated first guess you will get one of at most 14 different peg-outcomes depending on the code, with frequencies $F_1, F_2, F_3, \dots, F_{14}$ that add up to 1296 (since there are 1296 equally likely codes).

Given peg-outcome j , of which there is an $F_j / 1296$ chance of achieving, you have a $1 / F_j$ chance of your second guess being correct.

The overall probability of your second guess being correct given your nominated first guess is then:

$\text{Sigma}(j=1 \text{ to } 14) [F_j / 1296 * 1 / F_j]$ for all non-zero F_j 's. That simplifies down to $\text{Sigma}(j=1 \text{ to } 14) [1 / 1296]$ without even needing to find the F_j 's, provided the F_j 's are non-zero. This sums to $14 / 1296$ provided our first guess has at least 3 distinct digits. (A first guess with only 1 or 2 distinct digits will mean that some of the 14 peg-outcomes can never be achieved, giving us less than 14 values of F_j that are non-zero.)

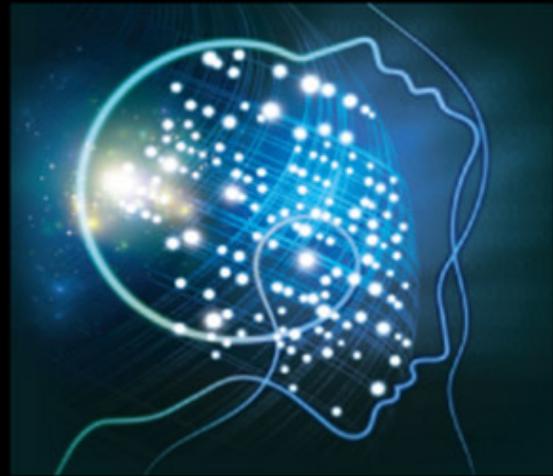
What I find interesting about this is that some of the second guesses are codes that have already been excluded as being correct, yet making that guess is still the way to maximise your chances. For example, if the score is 3-0 (3 blacks and 0 whites after guessing 1123, the code cannot possibly be 2413 (or else the guess 1123 would have scored 1 black 2 white), yet 2413 is an optimal second guess.



Data Analytics

Data is Power

13 September 2016 • Sydney



What you can expect at the 2016 Data Analytics Seminar

By Hugh Miller and Jennifer Yu

The 2016 Data Analytics Seminar, 'Data is Power', will be held next Tuesday (13 September). We spoke to Hugh Miller, Actuary at Taylor Fry and one of the speakers for the event, and asked him some questions about what we can expect from the seminar.

You're presenting at the upcoming Actuaries Data Analytics Seminar, what are some key points in your presentation/ how the workshop will work?

I'll be involved in the afternoon sessions, which will be interactive laptop-based exercises focused on teaching some modelling techniques on a couple of case studies. I'll be looking some customer behaviour, where everyone will be competing on their computers to build the best prediction models.

What are the newest exciting insights that 'big data' is producing or will produce?

While a lot of big data work is done on selling and marketing, I'm personally excited by some of the other applications. One is better government – using their data so that policy is well targeted and money not wasted. Another is the automation of transport through self-driving vehicles – it will change much about car safety, ownership and our use of time.

How are actuaries placed to expand their skill-set?

Yes, the trend has definitely been that analytics is getting more detailed and 'lower level' in terms of needing to be across IT and programming. Moving around large amounts of data at speed means you have to understand what's going on at a hardware level, and many of the big-data platforms assume the user knows programming. While there'll always be a place for our more common tools (Excel and SAS), we'll need to broaden and collaborate. Actuaries have proven skills on the technical and business side, so are well-positioned to contribute.

How do you anticipate the generation of more and more data, and specialists and machines to analyse data, will impact the actuarial profession?

Not sure. Many tasks I do today will be done by machines in the future, so the main question is whether there are enough new higher order tasks to keep me employed. I'm excited by the chance to use more data to improve some of our traditional activities, like reserving.

What do you hope delegates will take away from the Seminar this year?

This is the second seminar we've run – the first was very well attended but a lot of the feedback was that people wanted to get deeper into the technical side. This time we'll have some great talks from a broad range of speakers in the morning and have the hands-on session in the afternoon. Delegates will hear some interesting perspectives and gain real coding experience.

The Seminar has sold out – what are your impressions of the profession's sentiment towards and appetite for 'owning' the data analytics field?

I think lots of people recognise it as a growth area, and a space that isn't dominated by any particular profession. That means it's an exciting area to get involved in. I don't think we'll 'own' the space (there wouldn't be enough of us even if we wanted to), but there's plenty of room for us to add value.

We look forward to seeing all delegates at the event, if you don't want to miss out, register for the [online webinar!](#)



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