DECEMBER 2017

THE MAGAZINE OF THE ACTUARIES INSTITUTE

Actuaries DIGITAL

In this issue

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

Published by the Actuaries Institute

ISSN 2203-2215

Are you interested in tackling society's issues?

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

The Actuaries Institute's Public Policy Council Committee has launched an essay competition for young actuaries - your chance to be published and win a $3,000 prize.

The Public Policy Council Committee (PPCC) has launched a public policy essay competition to foster thought leadership, by encouraging young actuaries to engage in policy debates and develop solutions based on an actuarial perspective.

Public policy generally describes the legal, regulatory or political action that is taken to tackle problems affecting society. It involves stakeholder interaction that identifies problems and creates new public policy or reforms existing policy.

Key details:

- **Eligibility:** competition is open to actuarial students and members under 35.
- **Requirement:** 2000-word essay (inc. references)
- **Topic:** can be chosen by the entrant but must have a public policy theme and demonstrate an actuarial perspective, when considering the relevant issues.
- **How to enter:** send your entry as a PDF to John McLenaghan, the Institute's Public Policy Adviser **by 31 March 2018.**
- **Judging panel:** likely to consist of the President (or delegate), CEO and PPCC member.
- **Prize:** publication in *Actuaries Digital* or *The Dialogue*, plus $3000.

Actuaries are involved in a lot of public issues and have the right skills to develop solutions. The Institute has been very active in commenting on public issues recently, covering; longevity risk, climate change, intergenerational equity, mental health, genetics and big data.

Actuaries Magazine

If you are an actuary with a keen interest in solving society's issues, this is the perfect opportunity to get involved.

Green and White Papers produced by the Institute cover a range of societal issues.

The competition will encourage young actuaries and actuarial students to choose a topic of their choice and have a go at developing a solution based on an actuarial perspective. The reward will be the opportunity to be published in Actuaries Digital or The Dialogue, a series of papers written by actuaries and published by the Actuaries Institute. The Dialogue papers aim to stimulate discussion on important emerging issues.

Three issues of The Dialogue - leading the conversation.

Please see the terms and conditions here

It's a wrap – 2017 'most read' articles

By Stephanie Quine *(stephanie.quine@actuaries.asn.au)*

2017 was a great year for Actuaries Digital. HQ Editor Stephanie Quine shares the top five 'most read' articles from each quarter in 2017.

The start of 2017 saw renewed energy within the Actuaries Digital Editorial Team with several new recruits on board. The team set about sourcing and reviewing articles on everything from the gender pay gap, to underwriting in life insurance, and even an actuarial-look at love. Actuaries working across a wide range of fields submitted reports, columns and comment on topical issues across the nation, Asia Pacific, and closer to home.

Once again the popular 'I am an Actuary' series took the number one place, by number of page views, in Q1. The series features short career profiles from new graduates of our Professionalism course throughout the year. A big thank you to Martin Mulcare, the Professionalism Course Facilitator, who also coordinates these profiles.

Readers spent an average time of 5:47 minutes per page during Q1. Some were perusing Julia Lessing's analysis of the statistics on remuneration for actuaries, others pondering Milton Lim's lessons on mindfulness and emotional intelligence from his year spent travelling:

Q1			Page views
1	I am an Actuary	Coordinated by Martin Mulcare	1,303
2	Is there really a gender pay gap for actuaries?	Julia Lessing and Jennifer Lang	1,163
3	7 things insurers should be doing to improve the underwriting process	Angat Sandhu	1,116
4	Mindfulness and meditation for actuaries,	Milton Lim	966
5	Love: the numbers game	Victoria Gao	504

"Mindfulness can be seen as the equilibrium resting point of all emotional energies and gives rise to the self-awareness that holds everything together."

The 'most read' article in Q2 was the report on the Institute's 2016 VicRoads Kaggle Competition. Geoff Sims, Joel van Veluwen and Luke Heinrich created the winning predictive model for the competition to predict the cost of motor vehicle accidents on Victorian roads, relating to the "road infrastructure" where each accident occurred. The trio outlined their model's featured engineering, model training and interesting findings in the article:

Q2			Page views
1	**Analysts at Atlassian and LinkedIn take out Actuaries Kaggle Competition**	Coordinated by Martin Mulcare	694
2	**Equity Risk Premium Survey**	David Carruthers	668
3	**5 minutes with Kitty Chan, Asia Liaison Manager**	Kitty Chan	680
4	**Normal Deviance – getting started in analytics**	Hugh Miller	661
5	**An introduction to the social insurer icare**	Jamie Reid	647

Q3			Page views
1	**I am an Actuary**	Coordinated by Martin Mulcare	942
2	**Are women less confident than men?**	Nicolette Rubinsztein	786
3	**Bringing analytics to life**	Basem Morris	743
4	**Jobs for Actuaries past present and future**	Elayne Grace	695
5	**General insurance the wide-ranging implication of IFRS 17**	Alice Boreman and Laura Barella	661

Once again 'I am an Actuary' took out first place. **Q3 had the highest number of page views overall at 45,012.** This was a 20% increase from Q3 last year (37,224 page views).

Q4			Page views
1	**Workplace rehabilitation services need shake up**	John Nagle	1431
2	**A not-so-actuarial look at the Marriage Equality Ballot**	David Kwak	971
3	**Under the spotlight – Queenie Choi**	Queenie Choi	781
4	**Under the spotlight – Rene Essomba**	Rene Essomba	744
5	**I am an Actuary**	Coordinated by Martin Mulcare	671

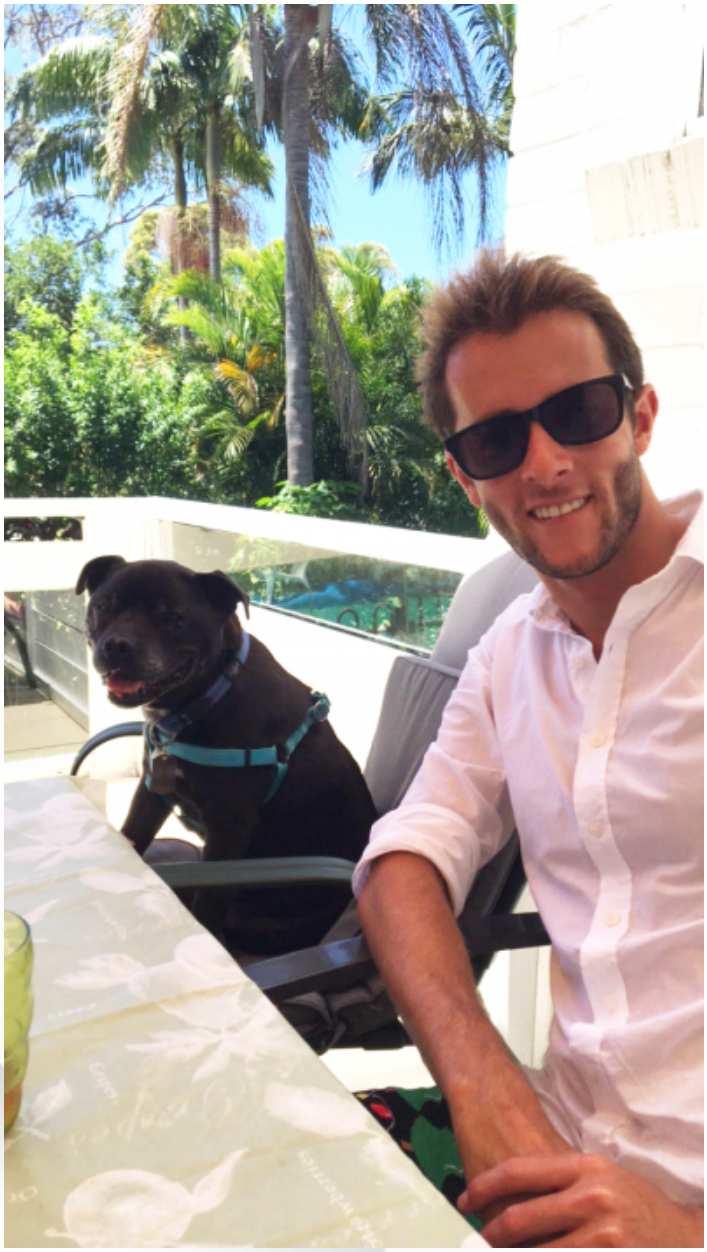
Q4 saw our Injury and Disability Schemes Seminar Plenary Speaker John Nagle take the top spot for **most read article of the year** on *Actuaries Digital* with his reflection on the transformation within schemes and icare's focus on the needs of the injured worker. This was a hot topic following #IDSS2017 - our major biennial event which was held in Brisbane.

The nation voted 'YES' in the monumental ballot on same sex marriage on 15 November, making David Kwak's investigation into the demographics underpinning the votes another great read:

> *"A quick calculation of average voter age for each FED suggests that the older the voter, the less likely they were to vote yes"*

Q4 also saw the popular Under the Spotlight series extended into Asia, where readers heard about Queenie Choi's unusual passions. We look forward to featuring lots more members based in Asia in 2018!

Other highlights



In **Q1**, Taylor Fry's Scott Duncan and Editors, Victoria Gao and Danielle Di Sano went Under the Spotlight, the Institute unpacked it's Pre-Budget Submission, and Chief Editor Trang Duncanson presented the results of the Magazine Survey. Senior Consultants at Rice Warner outlined the significant analysis underway by superannuation funds and their insurers (and reinsurers) around disability insurance, while readers were introduced to new Institute President Jenny Lyon's career journey and 'passion for people' in her first Presidential columns of the year.

We heard about the actuarial profession in both Zimbabwe and South Africa; a new Actuaries Climate Index; and kicked off another year of The Critical Line Puzzle challenges with Numbered Cones and Magic Squares.

The 'Beat the Geek' competition pitted NRL and AFL tipsters skills against the expert modelling power of an actuarial and analytics firm while Valentines Day saw us investigate how maths can decipher the unruly patterns of love, with Editor Victoria giving us three top tips:

- #1: How to win at online dating – Don't be very attractive
- #2: How to pick the perfect partner – Reject the first 37% of your dates
- #3: How to avoid divorce – Argue a lot

Q2 saw Managing Director at CommInsure Helen Troup, and Pacific Life Re's Tyson Johnston go Under the Spotlight, while the Institute's new Asia Liaison Manager, Kitty Chan, was also introduced.

Editor Hugh Miller penned the first instalment of his series Normal Deviance on Data Analytics while Macquarie Uni actuarial student Abhishek Maran explored the role of data tracking in Netflix's creative success in the first of the Student Columns for the year.

Jamie Reid reported on an informative Insights session about the largest general insurance service provider in Australia - icare,

while Rickie Fong and Anna Byrne recapped the popular 'War Stories from Life Insurance Actuaries' Insights presented by Greg Martin, Richard Lyon and Grant Peters.

Editor Suba Chelva also shared key takeaways from a Melbourne seminar on the Use of Drone Technology in the General Insurance industry. If you missed the Actuaries Summit, Young Actuaries Conference, Future of Health Seminar and/or inaugural Volunteer of the Year Awards - the Magazine had you covered with articles on the key highlights of these major event in the actuarial 2017 calendar.

In Q3 the 'Ask an Actuary' column was resurrected (since Bruce and Gae went underground) with our anonymous actuary and resident mystery writer answering your burning question: will there still be actuaries in 2049? **If you are interested in getting involved as a writer or contributor to this popular column in 2018, please get in touch with us at** ActuariesMag@actuaries.asn.au

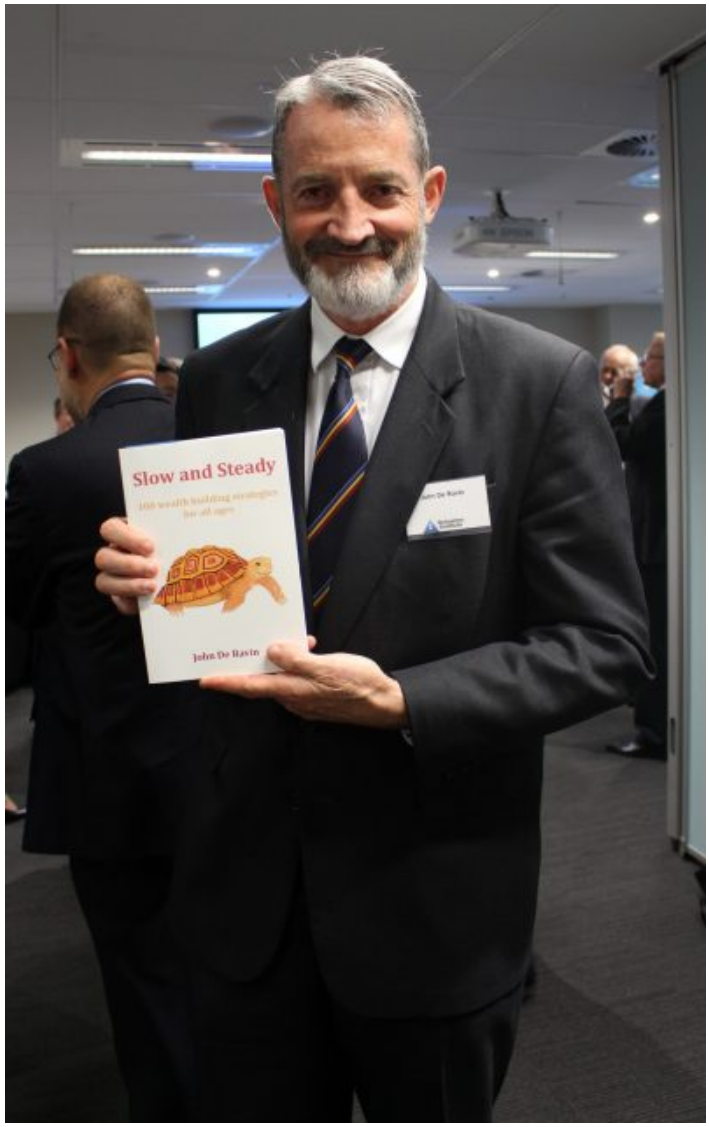
July, August and September saw monthly updates delivered by the Institute's IFRS17 Implementation Taskforce. These valuable updates continued monthly to December.

Professors at Bond University's Actuarial Science program Dr David Lau and Sean Elliot went Under the Spotlight as did new Banking Practice Committee Convenor - Jason Slade, and we heard about actuarial activities in Singapore, Kuala Lumpur, Beijing and Shanghai with Kitty Chan's report on the Institute's Asia Tour.

Nicolette Rubinsztein reflected on her experience of confidence as a career mum, following two women's networking events (Sydney event pictured above) at the Institute and Rice Warner's Richard Dunn shared lessons from the 2017 'Actuaries as Leaders' Forum, especially on challenging your views:

"In exposing yourself to diversity – even when this diversity is uncomfortable - you engage in a process of reflection and improvement which may provide the impetus for positive change."

Editor Angat Sandhu outlined the varied success of robo-advice and face-to-face propositions in local and international markets while Acting CEO Elayne Grace shared results from a comprehensive



survey of members education, employers and job functions. Basem Morris revealed some fascinating insights at the intersection of predictive analytics and behavioural science while Geoff Atkins explored the escalating costs in CTP and Mark Baxter discussed the potential consequences of APRA's extended powers around senior banking executives in the BEAR.

Q4 saw the strong pipeline of content continue - a very encouraging sign for the New Year.

Actuary John De Ravin - a member of the Institute' Retirement Incomes Working Group (RIWG) - published five articles. The first detailed the findings of a survey of 65 financial planners, and the following four formed a series on personal finance strategies: extracts of top tips from his new book.

We previewed some interesting sessions at the November Injury and Disability Schemes Seminar, before posting a wrap up of highlights from the event. The sold out Data Analytics Seminar, ERM Seminar and ASOC Actuarial Pathways Networking Event were covered in depth.

Readers were introduced to 'meetups' - a social platform that is the basis for Zeming Yu's new column on Data Analytics as well as for gatherings of the Institute's new Social Networking Group (pictured below).

Under the Spotlight featured Asia based members Queenie Choi, Louis Lee and Holly Ou; and our Mental Health and Insurance Green Paper launch with National Mental Health Commission Chair Lucy Brogden was covered, along with the new SWWS campaign and Peace of Mind podcast that support this important piece of policy work by actuaries.

APRA's paper on the "Review of the role of the Appointed Actuary and actuarial advice within insurers" was explored by different authors; and, the results from a recent Member survey on the level of interest in an actuarial hackathon were also covered.

Thank you to all contributors and our great Editorial Team for a fantastic year – we're looking forward to delivering more great content in 2018.

AASB 17 Taskforce Update - December

By Benoit Laganiere

In this latest update from the Actuaries Institute's AASB 17 Implementation Taskforce, Benoit Laganiere discusses considerations related to aggregation and contract boundaries to assist Australian actuaries involved in implementing the new accounting standard.

The Aggregation and Contract Boundary work stream is another of the technical work streams of the Institute of Actuaries' AASB 17 Implementation Taskforce which overall is focused on producing guidance for Australian actuaries involved in implementing the new accounting standard.

The scope of this particular work stream covers questions relating to the formation of Portfolios and Groups, inclusive of considerations related to onerous contracts, contract boundary and elements of insurance contracts that may potentially fall outside of AASB17. Reinsurance specific considerations are also covered.

While the above topics are not as technical as previous subjects covered in similar updates, practicing actuaries will need to dedicate a significant amount of time engaging with various stakeholders within the entity they review in order to set groups of insurance contracts which will form the basis of the insurance liability valuation results.

Similar to other work streams involved with the AASB17 taskforce, the Aggregation and Contract Boundary volunteers meet on a regular basis and include a wide range of participants from general insurance, health insurance and life insurance backgrounds.

How are aggregation considerations expected to impact the current price?

At its core, AASB17 deals purely with insurance contracts regardless of the insurance sector serviced by the entity. This is arguably a change from the current standards which are more focused on the insurance entity as a whole. Fundamentally, practicing actuaries will need to ensure that insurance contracts are grouped together depending on whether or not contracts are 'subject to similar risks' and 'managed together'.

These words shouldn't be too unfamiliar to most as a similar statement can be found in the current standards. However, AASB17 goes further by setting the expectation that contracts in different product lines would not be expected to have similar risks. Therefore, an initial level of aggregation of contracts is expected to broadly follow lines of business and/or distribution streams underwritten by the insurance entity. This initial level grouping is referred to in the standard as "*portfolios of insurance contracts*".

Once portfolios of insurance contracts have been defined, each portfolio will need to be divided into a minimum of three '*groups*'.

1. a group of contracts that are onerous at initial recognition, if any;
2. a group of contracts that at initial recognition have no significant possibility of becoming onerous subsequently, if any; and
3. a group of the remaining contracts in the portfolio, if any.

Furthermore, no contracts incepting more than twelve months apart shall be grouped together.

As you can now appreciate, it is expected that the above rules will result in much more granular groupings than current practice. Finally, it is worth mentioning that while each group will form a unit of account, the standard stipulates that further allocation of the liability valuation results is quite acceptable. This means that the actuarial valuation models could be performed at higher or lower level that the entities' adopted groupings. Valuation results will then either be allocated or aggregated to each group.

Why is the consideration of the contract boundary of insurance policies important under AASB17?

Since no contracts incepting more than twelve months apart can be grouped together, contract boundary considerations are intrinsically linked to groupings.

The boundary of a contract is determined when the insurer has the practical ability to set a price or level of benefits that fully

reflects the risks of a particular policyholder. If this criteria is not achieved for a single contract, it is possible to reach a boundary if the insurer has the practical ability to set a price or level of benefits that fully reflects the risks of a *portfolio* that contains the contract, and if the pricing of premiums for coverage only relate to risks up to the assessment date. If neither of above considerations are met, the obligation continues for this portfolio of insurance contracts.

For some contracts, the above considerations can easily be determined. However, it is expected that for certain forms of life insurance contracts, there will be a fair amount of judgement involved in assessing the boundary limits. Some general insurance and health insurance contracts will also require careful justifications when landing on a position on the boundary.

Contract boundary considerations will also directly impact the valuation approach used. If the boundary is determined to be twelve months or less, the simpler Premium Allocation Approach can be used without having to test results against the more detailed General Approach (or Building Block Approach).

What other considerations will be reviewed by this work stream?

As mentioned earlier in this article, AASB17 deals purely with insurance contracts. It is therefore possible that some contract features may fall outside of this standard such as certain types of annuities or non-participating investment features of life insurance contracts. General insurers will also need to carefully consider cash flows related to salvage and subrogation, especially if such activities are covered by other standards (i.e. inventories).

Under AASB17, reinsurance contracts are accounted for as separate contracts and will therefore be aggregated in distinct groups. This will have a direct impact on valuation and reporting activities. Considerations when aggregating reinsurance contracts will potentially differ from primary insurance contracts given the vast diversity of reinsurance protection available in the market today, some of which span across several lines of business.

In summary, actuaries will need to dedicate a significant amount of time reviewing the inventory of an entity's insurance policies. Any subjective assessment of contract boundary and aggregation level will need to be documented so that company auditors can follow the assessment process undertaken and validate the justifications of key decisions made.

Under the Spotlight - Asia series - Holly Ou

By Holly Ou

Chief Operating Officer for Swiss Re Corporate Solutions Insurance China, Holly Ou goes under the spotlight to share some highlights of her actuarial career, personal life and her vision for the future.

Summarise yourself in one sentence…Professional and strong willed with a caring heart.

My interesting/quirky hobbies… Playing card games (I've played through entire days with friends when I was younger)

My favourite energetic pursuit…Jogging (or fast walking for me)

The sport I most like to watch…Volleyball, in particular the Chinese Women's volleyball team

The last book I read (and when)…Green Eggs and Ham by Dr Seuss, last night to my kids at bedtime.

My favourite app…Wechat (widely used in China as Whatsapp is blocked is China now)

My favourite artist/album/film…Nicholas Cage/Avril Lavigne's "Let Go"/Titanic

The person I'd most like to cook for… is my kids as I hardly get the chance to cook for them. I always try to do it over the weekend whenever I can.

I'm most passionate about… My family, friends and people; being able to make a change no matter how small it is.

What gets my goat… People that are oblivious or don't care about their surroundings, especially the people around them.

Four words that sum me up… confident, inspiring, caring, gracious

If I hadn't become an actuary, I would be… a Barrister as I would love to be a lawyer standing up in court making an argument for my client.

Why and how I became an actuary… I honestly only decided to pick actuarial studies after I received my high school marks. I did not know too much about the profession, but knew it was challenging and suitable for those who were good at Maths. I wanted to give it a try to see if I would be capable. It was a great decision.

Where I studied to become an actuary and qualifications obtained… Macquarie University

My work history… I was offered a scholarship by Zurich Financial Services during my university studies, and I stayed with them after I graduated. I then moved to QBE Insurance focusing on

CTP portfolio. 12 years ago, a fantastic opportunity allowed me to work in China for PriceWaterHouseCoopers' actuarial consulting division based in Shanghai. I took the challenge and enjoyed my 10 years working as a consultant especially in a High Growth Market with so many things yet to be determined by the regulator, by the industry and by the profession. I also led a whole range of interesting projects, including IPO's, large M&A transactions, and Management Consulting across the Asia Pacific Region.

I joined Swiss Re Corporate Solutions Insurance China as their Chief Risk Officer. Returning to the corporate environment especially a giant international organisation, I found it easy to adapt given my past experience. The beauty of being a CRO is that I was a part of all the important meetings across all functions (a very broad powerful role). This could be not achieved without the Swiss Re open culture. After two years as CRO, I took the role of Chief Operating Officer overseeing all supporting functions.

What is challenging and interesting in my role is that I never know what to expect each day. It's a fast-paced environment and I need to think on my feet and address problems quickly. Our organisation is still very new in China, and my role is to make sure all supporting functions are working closely and effectively together under my guidance. A good leader is able inspire their team members and help them to gain confidence and grow

Who has been the biggest influence on my career (and why)... One partner who I worked for at PWC in China. He showed me how to be a leader with business acumen. A good leader is able inspire the team member and help them to gain confidence and grow. Also, my husband, my rock and confidante.

My proudest career achievement to date is … Continuously working outside of my comfort zone, from corporate to consulting where I built a very strong P&C actuarial consulting team, from a traditional actuary to a Risk Actuary, and now from a Risk Actuary to a role where I hope I can make valuable changes.

10 years from now, I will be … a more patient mum with two teenagers (if that's possible) and doing something I absolutely love in my career and be able to travel more.

When I retire, my legacy will be…She was a genuine, gracious person with high integrity.

What is your vision on Asia?... In fifteen years Asia will be economically larger than Europe and North America combined. You cannot imagine how fast China is moving towards online systems and usage of the apps. A mobile fruit stand on the street with an old trolley will ask you to scan his/her barcode to pay rather than cash.

My view on cultural differences is…we should respect the difference in culture and the cultural difference should bring in more ideas and make sure we are truly globalised.

Why I'm proud to be an actuary… It takes a lot to be an actuary. Actuaries are quick learners and very persistent in their pursuit of obtaining their qualification!!!

The most valuable skill an actuary can possess is … consulting skills. Without knowing your stakeholder's problem or expectations, you will not be able to come up with anything that will be of use to them.

If I were President of the Institute, one thing I would improve is… review the examination syllabus, process, contents, make sure we do not lose any talent on the basis that (in my opinion) Australian exams are harder than others.

At least once in their life, every actuary should…work for a corporate business and a consulting business. The experience that they will obtain from both will make them a much better professional.

My best advice for younger actuaries… there are so many opportunities outside of the traditional actuarial zone. Do not be afraid of taking two steps further or even outside of your comfort zone, you do not know where it will take you. Try the path less travelled.

If I could travel back in time I would…not change a thing and land exactly where I am right now.

If I won the lottery, I would… open my own consulting firm and hire actuarial graduates doing consulting work for all types of organisations, not just insurance companies.

New Developments in Longevity Risk Transfer Market

By Jackie Li *(jackie@actuarialworkshop.com)* and Leonie Tickle *(leonie.tickle@mq.edu.au)*

Macquarie University has released a report focused on measuring longevity basis risk in realistic scenarios as part of an ongoing research project sponsored by the Life and Longevity Markets Association (LLMA) and Institute and Faculty of Actuaries (IFoA). Here, Actuarial Professors at Macquarie Uni, Jackie Li and Leonie Tickle, explain their findings.

While most longevity transactions so far have been customised in nature, *index-based* solutions and *standardised* products could draw more interest from financial entities both inside and outside the insurance industry.

They have much potential in providing effective risk management at lower costs and significant capital savings.

Some of the products in Table 2 (below) have already been issued and tested in practice, with different levels of success. However, the potential mismatch between the hedging instrument and the pension or annuity portfolio being hedged leads to longevity basis risk.

The research project sponsored by IFoA and the LLMA aims to address this problem.

Phase 1 of the project was completed by Cass Business School and Hymans Robertson LLP in December 2014, in which a decision tree framework was developed as a practical guide on how to select a two-population mortality model (Haberman et al., Longevity Basis Risk: A Methodology for Assessing Basis Risk, 2014, IFoA).

Phase 2 of the project, focusing on measuring longevity basis risk in realistic scenarios under practical circumstances, was completed by Macquarie University recently, with the **report released in November 2017** (Li et al., Assessing Basis Risk for Longevity Transactions - Phase 2, 2017, IFoA).

There is a huge potential for the life market to continue to grow. When global economic conditions improve, hedging instruments become more widely affordable, financial institutions offer more innovative products, and pension plans sponsors and market investors have a better understanding of longevity risk transfer, the life market will have a great chance to flourish.

Actuaries working in life insurance and superannuation are encouraged to keep up-to-date with the latest development in this area.

A broader perspective

Continual improvement in mortality is a worldwide phenomenon. While it is certainly something to celebrate for human beings, it imposes a significant challenge to pension plan sponsors and annuity providers. "Longevity risk" is the risk that pension plans or annuity portfolios pay more than expected because of unanticipated mortality decline. This risk is composed of *systematic* longevity risk and *non-systematic* longevity risk. The latter risk can usually be reduced by increasing the portfolio size, but the former cannot be mitigated in the same way. In general, governments and financial institutions are very cautious about taking on too much longevity risk.

Tackling longevity risk

Currently, there are three ways for financial institutions to tackle longevity risk:

1). Traditional insurance and reinsurance, in which the risk is passed on to an insurer or reinsurer after paying a premium. For example, an insurer can purchase a reinsurance contract to hedge away the risk, or a pension plan can buy annuities from an insurer to cover the risk for its members. (A recent alternative is the group self-annuitisation approaches.)

2). Natural hedging, which exploits the opposite movements between the values of annuities and life insurances (Li and Haberman, Insurance: Mathematics and Economics, 2015). This diversification approach may be viable for larger institutions with the financial resources and structure to sell both kinds of products. It may also be implemented by using a customised

mortality swap to build an external hedge between two separate parties who have life insurances and annuities respectively on their books.

3.) Capital market solutions, including insurance securitisation, mortality- or longevity-linked securities, and derivatives. This method has seen much development in the UK in recent years. Insurance securitisation means securitising a class of business as a complex bundle into highly structured securities for sale to market investors. Some popular de-risking solutions such as buy-ins, buy-outs, and longevity swaps are also bespoke transactions for hedging specific portfolios.

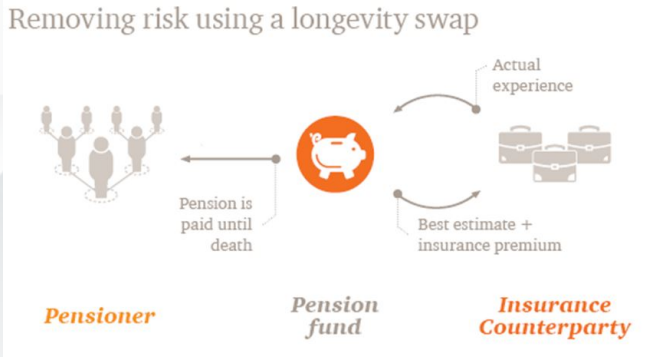
Table 1 shows a few examples of the recent longevity swaps transactions (www.artemis.bm), and Figure 1 demonstrates how a bespoke longevity swap works.. Figure 2 (Li et al., Assessing Basis Risk for Longevity Transactions - Phase 2, 2017) illustrates that the UK de-risking market has grown in size significantly since 2007.

On the other hand, *standardised* mortality- or longevity-linked securities and derivatives have their cash flows linked to a selected *reference* or *index* population, instead of the population underlying the portfolio to be hedged. There would then be a potential mismatch between the hedging tool and the portfolio, in terms of demographic differences. Moreover, a small portfolio would have high sampling variability, which makes it more likely to deviate from the index population. Also, the payoff structures would often be different between the hedging instrument and the portfolio being hedged. All these discrepancies are referred to as *longevity basis risk*, and are under intense research. The major types of standardised, index-based securities proposed in the longevity literature are listed in Table 2.

Table 1 transactions

Pension Fund / Sponsor	Provider(s)	Solution(s)	Amount	Date
Delta Lloyd	RGA Re	Index-based longevity swap	€12 billion	Jun 2015
Aegon	Canada Life Re	Longevity swap and reinsurance	€6 billion	Jul 2015
Manweb (ScottishPower)	Abbey Life	Longevity swap	£1 billion	Aug 2016
AXA France	RGA Re	Longevity swap and reinsurance	€1.3 billion	Nov 2016
Pension Insurance Corporation	SCOR	Longevity swap and reinsurance	£1 billion	Jul 2017
MMC UK Pension Fund	Canada Life Reinsurance, The Prudential Insurance Company of America (PICA)	Longevity swap and reinsurance	£3.4 billion	Sep 2017

Figure 1 A bespoke longevity swap

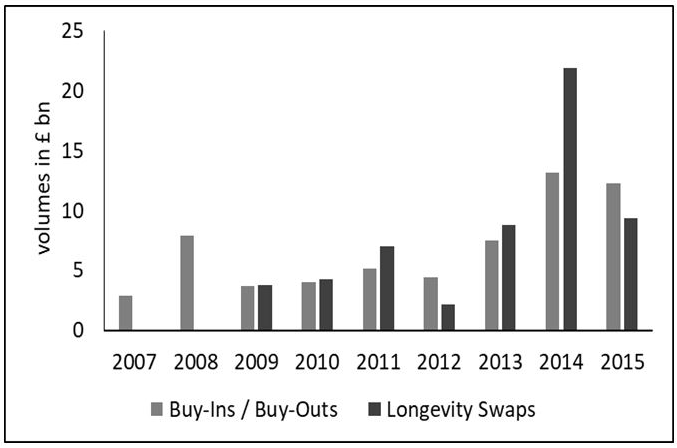


*Graph source: PWC

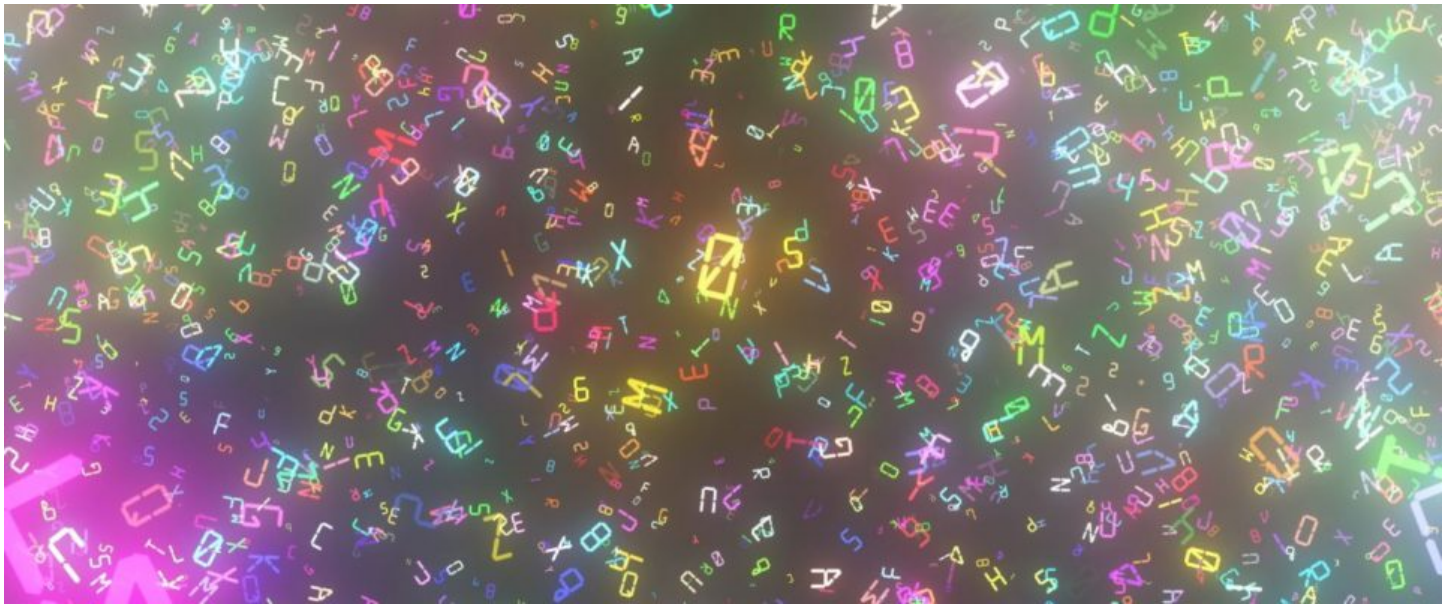
Table 2 Index-based longevity-linked and mortality-linked securities

Security	Main Features
Longevity bond	Coupons are linked to the percentage of the index population who are alive on the coupon payment dates
Longevity swap	Two series of future cash flows are exchanged, one of which is linked to the percentage of the index population who are alive on the payment dates, and the other series is fixed at the start
q-forward	To a fixed rate receiver, a payoff of $\left(q_{x,T}^{\text{forward}} - q_{x,T}\right)$ is made after $T+1$ years (maturity), in which $q_{x,T}^{\text{forward}}$ is the forward mortality rate set at the start, and $q_{x,T}$ is the actual mortality rate of the index population observed in year T; for a floating rate receiver, the payoff is $\left(q_{x,T} - q_{x,T}^{\text{forward}}\right)$ instead
S-forward	The payoffs are similar to those of the q-forward, with the mortality rate being replaced by the percentage of the index population who are alive on maturity
K-forward	To a fixed rate receiver, a payoff of $\left(\kappa_{T,i}^{\text{forward}} - \kappa_{T,i}\right)$ is made after $T+1$ years (maturity), in which $\kappa_{T,i}^{\text{forward}}$ is the forward CBD mortality index set at the start, and $\kappa_{T,i}$ is the CBD mortality index calculated from the actual observations of the index population in year T; for a floating rate receiver, the payoff is $\left(\kappa_{T,i} - \kappa_{T,i}^{\text{forward}}\right)$ instead
Mortality option	To a call holder, a payoff of $\max\left(q_{x,T} - q_{x,T}^{\text{strike}}, 0\right)$ is made after $T+1$ years (maturity), in which $q_{x,T}^{\text{strike}}$ is a fixed rate (strike price) set at the start, and $q_{x,T}$ is the actual mortality rate of the index population observed in year T; for a put holder, the payoff is $\max\left(q_{x,T}^{\text{strike}} - q_{x,T}, 0\right)$ instead
Survivor option	The payoffs are similar to those of the mortality option, with the mortality rate being replaced by the percentage of the index population who are alive on maturity

Figure 2 Buy-ins, buy-outs, and longevity swaps volumes from 2007 to 2015 in UK



The Life and Longevity Markets Association (LLMA) was established in the UK by several global insurers, reinsurers, and investment banks in 2010 to develop a liqui 'life market', which serves as a platform for insurers, reinsurers, and market investors to trade various longevity- and mortality-linked assets and liabilities. Market investors may accept longevity risk from insurers and pension plans in exchange for appropriate risk-adjusted returns. Some may want to diversify across a new market sector of longevity, which is arguably uncorrelated with traditional asset classes. Those who have life insurances on their books may want to take on longevity exposures to offset their own risks. Since then, there have been many interesting and innovative developments in the life market (Tan et al., Insurance: Mathematics and Economics, 2015).



The Critical Line - Volume 17, Christmas Edition

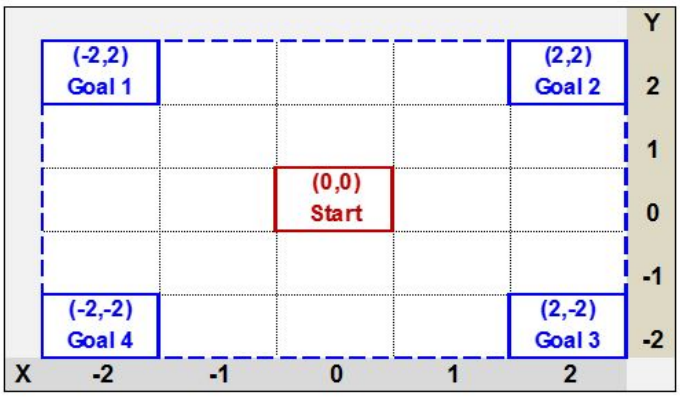
By Dan Mayoh *(dan@fintega.com)*

Reading time: 2 mins

Dan Mayoh delivers this random-walk inspired puzzle, just in time for Christmas. Get your answer in for a chance to win a $50 Dymocks voucher!

You start in the middle of a 5*5 grid at co-ordinates (0,0). Each of the 4 corners of the grid is a Goal, and when you reach a goal your walk is over. The goals and there co-ordinates are as follows:

- Goal 1 is at (-2,2)
- Goal 2 is at (2,2)
- Goal 3 is at (2,-2)
- Goal 4 is at (-2,-2)



Each time you take a step from the location (X,Y) you move either Up, Down, Left or Right with the following probabilities:

- P(Up) = 0.25 - 0.03*Y
- P(Down) = 0.30 + 0.05*Y
- P(Left) = 0.30 + 0.02*X – 0.02*Y
- P(Right) = 0.15 – 0.02*X

So there is a small tendency to be drawn back towards the centre of the grid.

Finally, this is a magic grid where the top and bottom are connected, and the left and right sides are connected. Being on the edge and moving "off" the edge will take you to the opposite edge. So for example if you are at (0,2) and take a step up, you will move to (0,-2). If you are at (2,1) and take a step right, you will move to (-2,1).

The challenge is to determine the following:

- For each of the four Goals, the probability of your walk terminating at that Goal
- The probability your walk will take more than 20 step
- The expected value of the number of step in your walk

For your chance to win $50, send your solutions to ActuariesMag@actuaries.asn.au

The Critical Line Volume 16 Solution

An Arithmetic Progression

For any number n let $D(n)$ denote the sum of the digits of that number. For instance $D(1234)=1+2+3+4=10$. Does there exist a strictly increasing arithmetic progression with 1000 terms, $a_1,a_2,a_3,\cdots,a_{1000}$ such that $D(a_1),D(a_2),D(a_3),\cdots,D(a_{1000})$ is also a strictly increasing arithmetic progression?

Solution

The answer is yes! Below is the proof submitted by this month's only correct entry and winner Andrew Parker.

The proof is by way of construction. The arithmetic progression is of the form $t_n=a+(n-1)\cdot d$ for $n=1,2,3,\cdots,1000$ where

$$a=\sum_{k=1}^{200}(1000-5k)\cdot 10^{4(k-1)}$$

$$d=\sum_{k=1}^{200}5k\cdot 10^{4(k-1)}$$

This arithmetic progression has the property that

Note that while $1 \leq n \leq 1800$, the last two expressions will have at most four non-zero digits and we can write

$$</p><p>D(t_{n+1}) = D(10^4 t_n) + D(10^4 + 5(n-1))) - D(5(n-1)10^{800})$$
$$</p><p> = D(t_n) + D(1000 + 5n - 5) - D(5n - 5)$$
$$</p><p> = D(t_n) + 1</p><p>$$

And therefore the sequence $\{D(t_n)\}_{n=1}^{1000}$ is also an arithmetic progression with common difference 1.

Highlights from the Banking Seminar with Pat Brennan and Elliot Clark

By John McLenaghan *(john.mclenaghan@actuaries.asn.au)*

Reading time: 3 mins

John McLenaghan, Public Policy Advisor at the Actuaries Institute and member of the Banking Practice Committee gives an overview of highlights from last week's annual Banking Seminar. This special session on developments in the banking industry provided relevant insights from Pat Brennan (APRA) and Elliot Clark (Westpac).

The 3rd Annual Banking Seminar was held at the Institute's Forum on 7 December, 2017. An audience of over 100 members (including webinar participants) heard APRA's Pat Brennan explain the rationale behind the objectives and operations of the countercyclical capital buffer – the first internationally agreed macroprudential tool. The second session contained a comprehensive economic analysis by Westpac economist Elliot Clarke.

Acting CEO Elayne Grace of the Institute opened proceedings and the event was facilitated by Banking Practice Committee (BPC) Convenor, Jason Slade. President-elect John Evans was also present. APRA Chairman Wayne Byres was an apology due to overseas commitments regarding the finalisation of the Basel III bank capital framework.

Pat Brennan heads up APRA's Policy and Advice Division and he was keen to explain how the counter cyclical buffer is intended to work and what factors would trigger its deployment. The buffer came into effect from January 2016 and applies to all Australian ADIs. It has several uses:

- Raising capital resilience when there is a build-up of systemic risk
- Moderating the cycle of credit growth and asset prices when credit demand increases by increasing capital requirements
- Improving the flow of credit during a downturn by releasing additional capital when the system is under stress

Pat advised that APRA based its decisions on buffer movements on a set of core indicators of systemic risk – not just on a formula but a broader set of credit conditions. The buffer is currently set at 0% and can be set between there an up to 2.5% of risk-weighted assets. It has not been utilised, to date, because APRA feels it can manage the risks to the stability of the banking system through other means such as focussing on loose lending standards.

Elliot Clarke's presentation focussed on several themes:

- Central banks and confidence: from inflation to growth.

- The cautious consumer and financial uncertainty.
- Macroprudential policy's significance.
- Investment in a low-growth environment.
- Global liquidity, fiscal policy and risk assets
- The Australian dollar: opportunities and risks.

From the slides presented, Elliot concluded that international monetary policy's focus has shifted from holding back inflation to promoting growth. This is beginning to show positive signs in the US. Another key observation is that growth at or above trend is very difficult to achieve when the consumer is under stress. In Australia, wages; cost of life's essentials and debt are major, long-lasting concerns and hampering overall growth.

- While the business investment outlook has improved, its contribution to growth is likely to only offset the loss of support from housing in 2018 and 2019. These factors will keep domestic demand and GDP growth below trend. Elliot predicted that, 2018 will be a testing time globally, although the Australian dollar is expected to fall in 2018, providing stimulus to our economy. Commodity prices are the key risk to this view.

A very active question time followed both presentations and a variety of topics were discussed from the bitcoin price surge to the timing of the revised Basle III framework. Jason Slade closed the session and encouraged members with a banking role to engage with the BPC and become involved in building the banking actuaries' network.

Chief Risk Officer Survey Results

By Brett Riley *(brett.riley@finity.com.au)*

Reading time: 2 mins

Brett Riley reports on the results from the first survey of Chief Risk Officers by the Actuaries Institute.

The Risk Management Practice Committee (RMPC) recently invited Chief Risk Officers (CROs) in financial services to complete a short survey about how they manage risk. The results were presented at the Institute's 2017 ERM Seminar and distributed to participants. This article summarises the results.

Objectives

The objectives of running the survey were to:

- Understand practice in each industry, so that CROs can benchmark their approach to their peer group;
- Compare practice across industries; and
- Promote the actuarial profession's risk management expertise to industry.

Results

The top risks identified by the group for the coming year are (in descending order):

- regulatory or legislative change;
- increased industry competition / lower profitability;
- cyber risks;
- an economic slowdown / recession;
- a failure to meet customer needs or to innovate: and
- damage to the company's brand or reputation.

Some other interesting results are as follows:

- surveys of all staff are the most common tool used to assess risk culture. However, other objective measures are also used, with banks leading the way in this regard;
- private health insurers tended to show that they have further to go in their risk management journey. This is unsurprising, as PHIs are not currently covered by APRA's Prudential Standard CPS 220 *Risk Management*. This relatively strict standard promotes better practice in this area. Based on consultation in early 2017, it is expected that CPS 220 will be applied to PHIs by APRA;
- key challenges faced by CROs and their departments include embedding risk management in their businesses, using risk management as a strategic enabler, demonstrating the value add of sound risk management and resourcing pressure; and
- most companies use their risk appetite statement strategically, and not just for compliance purposes. Common applications include to support corporate strategy, reinsurance purchasing and setting investment strategy.

Our profiling questions indicated that responses came from different parts of industry, based on their:

- size, measured by their total Australian staff; and
- ownership (i.e. if they were part of an Australian or overseas group).

This is only a small sub-set of the results. **The full survey results may be found here.**

Structure and Participation

The survey was emailed to CROs of APRA-regulated banks, general insurers, life insurers and private health insurers. One response was permitted per person, with 20 questions asked.

We sent the survey to each company where RMPC could identify the CRO and obtain their email address. The following table shows the proportion of the industry that we contacted, both by the number of regulated companies and adjusted for their size (measured by net assets):

Industry	% by Number of Entities	% by Value of Net Assets
Authorised Deposit-Taking Institutions (Banks)	14%	84%
General Insurers	71%	95%
Life Insurers (including Friendly Societies)	59%	90%
Private Health Insurers	85%	79%
Total	**44%**	**85%**

This table shows that we were unable to contact the CROs for a number of smaller companies. However, adjusting for company size we were able to contact 85% of all companies.

In total, 43 (15% of 291) survey recipients completed the questionnaire, with broad participation across the industries listed above (particularly insurance). The overall number of responses was disappointing, but perhaps not totally unexpected for the first iteration of this analysis. We expect a stronger response rate in future.

RMPC would like to thank everyone who participated in the 2017 CRO Survey. Any CROs who did not take part this year are encouraged to contribute to the next survey.

Making a career move – the importance of the preparation stage

By Lesley Traverso

Actuarial recruiter Lesley Traverso describes the importance of clarifying your own aspirations, passions, interests and expectations, before making a move - at any stage of your career.

The beginning of a New Year always brings along a period of reflection of life, family, and career. Exam results are out in early December and with them come elation or disappointment. Some will have passed their final exam for Fellowship, others still have a long road to go. Both scenarios provide opportunities to reflect on your current employment. If there are still exams to take, consider if your employer is able to provide the right environment for you to learn and study. Do you get all that study leave promised? Are you having the right practical experience to help you understand the theory learning? If you have finished your exams, after the champagne – what next?

Even if you're mid way through your career, the start of a New Year is still a great time for reflection.

'Making a career move' is not only about changing employers, it may mean making changes within your current employment situation. Whether that is a change of team, department, or role. The important factor is that you take stock of where you are, look at where you want to get to, and make sure that you are taking steps to get there.

The actuarial training provides an excellent platform for further learning. For example, if you want to move into as Data Analytics or Risk Management in the future, make sure that you discover what other skills you will need to enhance your career prospects. For Data analytics, it is not just SQL it is now R, Python etc. For Risk Management, it is CERA.

"If there isn't anything in your current role that can be changed, then it's time to look outside. But, STOP! Don't rush to Seek quite yet! Taking some time to get real clarity around your strengths and weaknesses..."

Once you have worked out what your career aspirations are, make a list of all those that are provided by your current employer, and all those that aren't. Before you even think about applying for other roles, consider what your current employer can do to help you achieve those objectives. Consider if there are things you could have done differently in the past year to work towards your objectives. Then have a conversation with your Manager that you treat like an interview, outline your career objectives, outline what you have learnt in your role so far, what new learnings you would like to get exposure to, and see if it is possible to change some areas so that it is more closely aligned with your goals.

If there isn't anything in your current role that can be changed, then it's time to look outside. But, STOP! Don't rush to Seek quite yet! Taking some time to get real clarity around your strengths and weaknesses, what you are passionate about, what you do and don't want in a role. Many times, when I ask the question – "what type of role are you looking for" – I get the answer – "something interesting"! It is important to define what, for you, is 'interesting'. What is, for you, a good environment. Organisations are not 100% 'good' or 'bad', it is all about a fit, a match for you as an individual. Therefore, you should do some deep self-analysis first.

Once you are clear in your mind, then you are better able to articulate when you meet someone, better able to write a clear, concise and appropriate resume, and not end up going for interviews for inappropriate roles.

Listen out for the Institute's **Careers Podcast** launching in early 2018! In the first episode, Actuary Elayne Grace (the Institute's Acting CEO) will be in conversation with Lesley on the initial planning stage of making a career move, plus lots more to come!

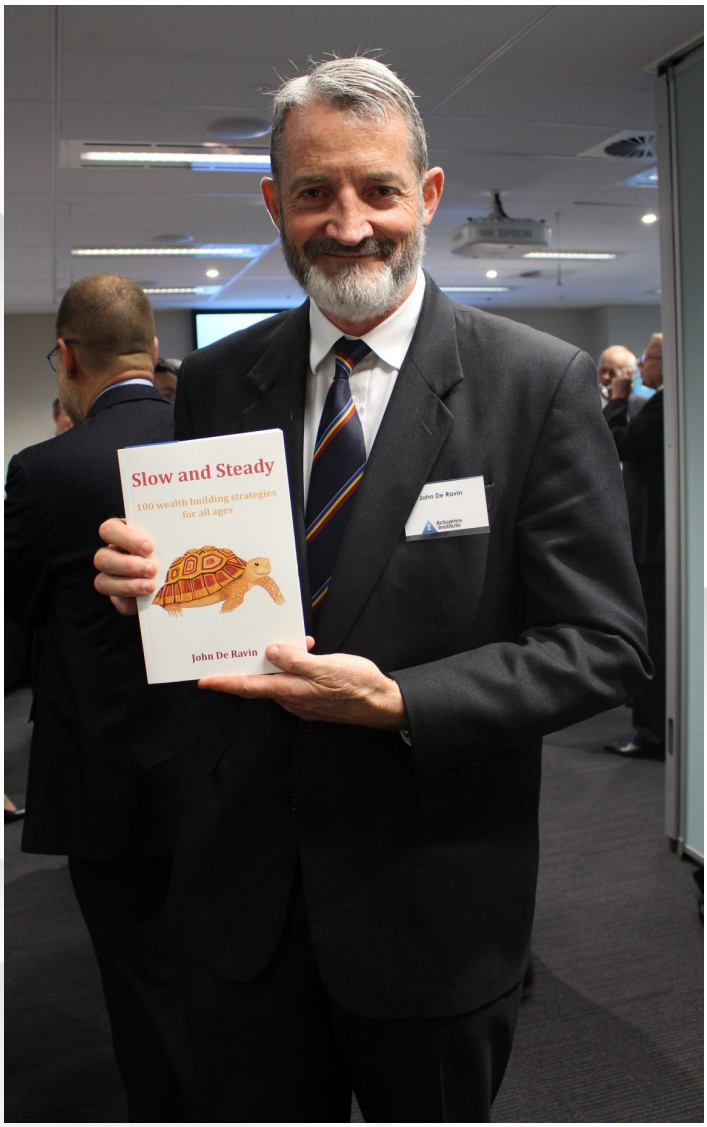
SLOW AND STEADY

100 WEALTH BUILDING STRATEGIES FOR ALL AGES

7 financial strategies for retirement

By John De Ravin

In this last installment of a four-part series, actuary John De Ravin shares some of his top tips from his recently released book on personal financial strategies.



The strategies in this article are drawn from Chapters 6 and 7 ("Pre-retirees" and "Retirees") of my book Slow and Steady: 100 wealth-building strategies for all ages. This article covers seven of the twenty strategies in those Chapters.

1.) Work out how long you are going to live.

You are an actuary or an actuarial student, so you recognise the multiple conceptual problems involved in simply deducting your intended retirement age (say 65) from the life expectancy at birth from the latest Australian Life Tables. But many Australians significantly underestimate their likely life expectancy; perhaps they look at the ages at which their parents or grandparents passed away, but forget to allow for generational improvements in life expectancy.

Your remaining life expectancy depends on many variables other than age and gender. There are at least three online life expectancy calculators that attempt to allow for some of those other variables: check out the calculators available from the MyLongevity website, AMP and the Living to 100 website.

Of course, remaining life expectancy is a mean, and about half of a sample retiree population should expect to live beyond the mean.

2.) Work out how much you need to live on.

Anecdotally, many impending retirees struggle to know how much annual income they would like to fund their regular consumption expenditure. Of course one way to address this is to prepare a bottom-up prospective budget. But a worthwhile alternative that might validate your budget (or replace it altogether, if you REALLY hate the budgeting process) is to look at your consumption expenditure in the years preceding retirement and adjust that for inflation and for the changes that you expect to occur at the point of retirement. You would certainly expect some of your pre-retirement expenses to reduce (costs of travel to and from work, other expenses associated with your involvement in the workforce, mortgage commitments if they will be paid off on retirement, etc) but don't forget to include extra costs associated with your travel or leisure activities that might increase in retirement.

3.) Work out what total amount you need to retire.

Once you have an estimate of your life expectancy and an idea of how much you need to fund your annual consumption, you can form some sensible estimate the lump sum amount you need to retire on. This calculation is a bit easier if you expect to be comfortably self-funded (so that there is no need to allow for any age pension entitlement). In that case, if $X is your annual consumption requirement and you expect to earn investment return at real rate r%, you can just apply a life annuity function at rate r% to $X, or alternatively use a term certain annuity factor at rate r%, with your chosen term being somewhat longer than your life expectancy to allow for the possibility that you live beyond your expectancy.

If your projected asset balance at retirement (for asset test purposes, excluding the value of your home) is less than the lower threshold for the age pension, you would probably assume you will receive the full age pension and target the retirement asset balance which will provide the difference between your target spending requirement and the age pension.

Of course if you have one-off expenditure items (or any expected lump sum receipts such as legacies) you would need to allow for those as well.

The task is more challenging if you expect your projected asset-testable balance at retirement to fall between the lower and upper threshold of the assets test because you have to allow for the impact of means testing on your pension entitlement. In this situation you will either need to build an Excel workbook to take into account the means testing of the age pension, or alternatively rely on one of the superannuation fund calculators that project income allowing for the age pension. A point to note if you are a pre-retiree with projected assets at retirement between the lower and upper asset test thresholds it that it is difficult to improve your sustainable retirement income (at least, until the government acts to reduce the current prohibitive 7.8% asset test taper rate) because much of your additional savings will go not to improving your retirement lifestyle but to reducing the government's liability to pay you your part age pension.

4.) Renovate your home.

The last paragraph of Strategy 3 above alluded to the current penal asset testing parameters. As long as the asset test is as harsh as it currently is, there will be strong incentives for those retirees impacted by the assets test to spend down their asset testable funds until they reach the lower asset test threshold. By so doing they increase their income as well as enjoying the benefits of their spending. For example, they can get to live in a nicely renovated home **and** get more total income (because the increase in age pension receipts is likely to significantly exceed the income they would have earned on the assets that they used to hold in excess of the lower asset test threshold).

5.) Buy a prepaid funeral plan.

If you receive a part pension governed by the Assets Test, prepaying your funeral is another permissible method of putting your assets to good use and at the same time increasing your total income via an increased age pension entitlement.

6.) Drawdown at the right rate.

As noted above, if you receive a part age pension because your asset testable assets fall between the lower and upper asset test thresholds, there is an incentive to spend down quickly to maximise your age pension. But if you are a self-funded retiree, at what rate should you spend given your financial assets?

This is really the inverse of Strategy 3 above (how much do I need to retire?) and you can apply the same approach. Compute the annuity value for a fixed term somewhat greater than your life expectancy (maybe to age 95, for example) at the real rate of interest you expect to earn given your asset allocation. (The target real rates of return adopted by large superannuation funds will give you a guide as to the reasonable range of real returns for your selected asset class in retirement, although the target returns are typically quoted for accumulation funds net of fees and taxes – but in retirement phase, provided that your assets are less than the Transfer Balance Cap, there should be no tax on your investment returns.) Divide your financial assets by the annuity value you calculated. The result of this calculation represents the average real sustainable annual expenditure. However, if your retirement assets still include a significant proportion of growth assets that fluctuate markedly in value, you might want to consider some approach to avoiding too much volatility in your annual expenditure such as:

- Spending the calculated percentage of some sort of normalised or averaged value of your portfolio rather than the actual market value of the portfolio; and/or
- Imposing some sort of self-selected "speed limit" on your real spending increases or reductions to avoid too dramatic changes (for example, deciding to limit consumption increases or decreases to a maximum of 5% per year).

Of course, if you wish to maintain a certain level of assets for bequest purposes, or as a potential Refundable Accommodation Deposit (RAD) for an aged care facility, you would need to treat such components of your financial assets separately rather than draw down on capital maintained for those purposes. Also you could adjust the capital available to draw down if you intend to make a substantial change to your lifestyle assets (for example, if you propose to downsize your home in future and thereby substantially increase your financial assets).

7.) Buy a life annuity.

Whilst it is well known that current annuity rates are not very popular, perhaps due to the low-interest rate environment, there are still arguments for at least partial annuitisation of your retirement financial assets. These arguments are stronger if:

1. You invest very conservatively anyway.
2. You are considering annuitizing later in life (say at age 80 or 85) where longevity risk is relatively more significant by comparison with investment risk than for young retirees.
3. You are only annuitizing part of your assets, and your annuity will cover your "needs" rather than your wants.
4. You are healthy and the life expectancy calculators (see Strategy 1 above) indicate potentially longer than average expectancy.

By way of illustration of the rate of return implicit in a life annuity, assuming Australian Life Table 2010-2012 mortality rates, I estimated that the internal rate of return achieved by a 65 year-old male from purchasing an annuity (without indexation) from a leading annuity provider was 1.95% per annum and that the corresponding rate of return for a 65 year-old female was 2.6% per annum. The true internal rates of return would be higher due to the mortality selection effect and future mortality improvements. Whilst these rates of return are not very high, the credit risk implicit in the annuities is low, the quoted yields are better than the retirees could do by putting money conservatively in bank deposits, and by investing in this way, retirees can solve their longevity risk as well as locking in the implicit (somewhat modest) investment returns.

You can download a free list of all 100 strategies in *Slow and Steady* from the book's website.

Read the third installment "8 financial strategies for your superannuation", the second installment "10 financial strategies for wealth accumulatorsfor wealth accumulators"",, and first installment ""10 financial"10 financial strstrategies for teenagers and young adultsategies for teenagers and young adults""

Towards greater diversity - member and committee demographics

By Ashish Ahluwalia *(ashish.ahluwalia@finity.com.au)*

Reading time: 4 mins

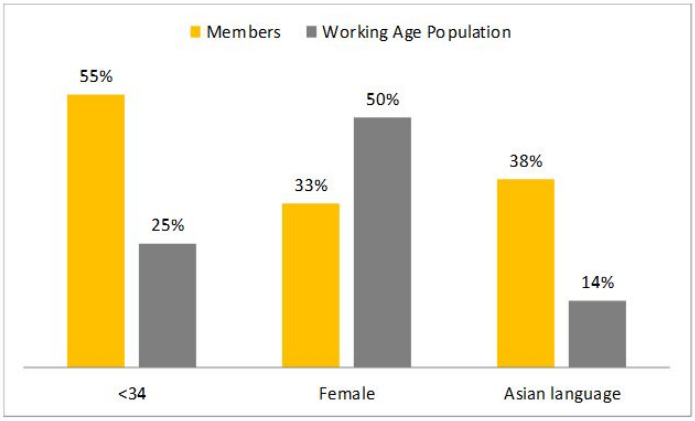
Ashish Ahluwalia outlines Actuaries Institute member and committee demographics as he describes the goals of the Institute's Diversity and Inclusion Working Group to promote awareness and inclusiveness.

Regular readers might recall that earlier this year the Institute announced the formation of a Diversity and Inclusion Working Group (DIWG). I won't revisit the benefits and importance of increasing diversity in the workplace and amongst professions. These benefits are well documented and have broad acceptance across most industries. Most organisations (both private and public sector) have Diversity and Inclusion as an area of focus, usually with initiatives underway to improve diversity. So it was only natural that the Institute has made the issue an area of strategic focus.

Where to start?

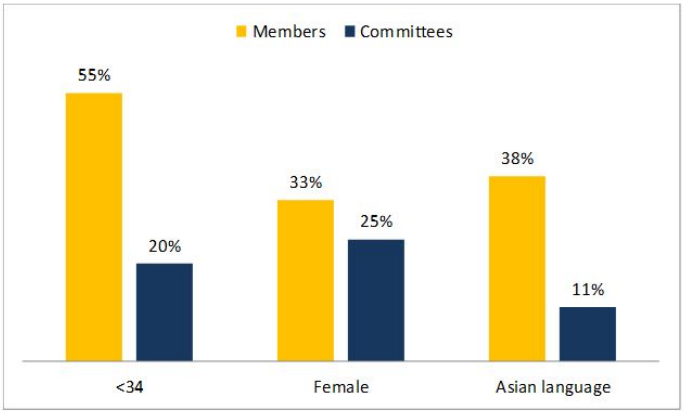
Let's start with some facts

Writing for an audience of data people, it's appropriate I start with some facts and figures. The chart below shows how the member demographic profile looks compared to the working age population (which I've defined as being 23 to 75 year olds).



These figures highlight a clear difference in the member profile compared to the broader population. There are far more under-35 "millennial" types and members with Asian heritage; and far fewer women.

Let's now compare the composition of Institute committees to the member profile.



Again, note the differences. Now, some of the differences can be put down to the fact that there are more young members and

members of Asian heritage amongst the student member group, who are typically not part of Institute committees. Furthermore, the nature/purpose of the existing Committees will tend to attract members with a reasonable level of experience and will therefore be older. However, even accounting for these factors, there remains a noticeable difference in profile.

A few takeaways from this:

- We're not getting nearly enough women into the profession in the first place
- We have lots of young members
- We have lots of members of Asian heritage (and indeed some of us live and work in Asia)
- Our committees aren't always representative of our member profile

In other words, there clearly exist areas of opportunity for the profession to improve diversity. Other areas that we need to think about include enabling increased collaboration with other professionals and greater exposure to, and adoption of, other styles of thinking. That's not necessarily an exhaustive list, but it is certainly a starting point. Of course, we're really interested to hear what members think, so if you have some thoughts then please do reach out to the DIWG and share your views on what you think we should work on.

So what's going to happen?

The work of the DIWG so far has been to reflect on the facts as they stand, understanding the strategic goals set by Council, and to agree the Terms of Reference for the group. In other words, defining the issues and the so-called "mission". The stated goals in this article, and some of the issues set out above hopefully give you some understanding of what the DIWG is setting out to work on. The group has a number of questions and issues it will seek to address, so expect to see more emerge on the following fronts:

- More active discussion and promotion of issues relating to diversity and inclusiveness – at conferences and seminars as well as through insights sessions and other forums through which we can engage members. We want to get people talking and thinking about this issue more often.
- Awareness is a good starting point, and we'll look to find ways to bring forward solutions and alternatives to the status quo that can help improve diversity.
- Strategies for improving diversity at a grassroots level - there's clearly a need to get more diverse high school graduates wanting to pursue a career in the actuarial field. At current rates, gender and Asian representation is likely to become more skewed. Similar to other STEM fields, finding ways to get more females taking up an actuarial education will need to be a priority area, otherwise there will be long-term implications. We need to also think about the implications of any potential advantages or disadvantages from our larger than average population attraction to those of Asian backgrounds.
- Inclusiveness initiatives to ensure that the composition of Institute Committees, Working Groups etc. is aligned with the membership profile and appropriately reflects the diversity of members.

The DIWG itself is a suitably diverse group, and the discussion to date has shown a high level of energy and enthusiasm. We hope that over the coming months and years we can help push the Institute's diversity agenda successfully, and look forward to helping meet the Institute's diversity and inclusiveness goals.

A not-so-actuarial look at the marriage equality ballot

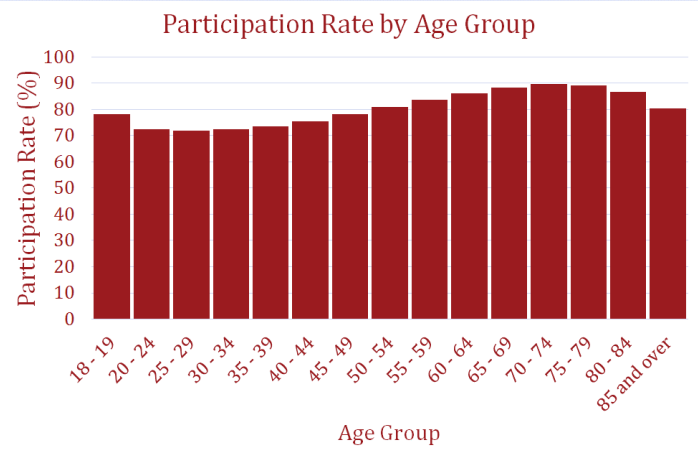
By David Kwak *()*

Reading time: 3 mins

David Kwak from Actuarial Edge, wanted to take a closer look at the demographic data of the marriage equality ballot carried out earlier this year. He finds some interesting facts regarding participation rates, proportion of yes votes and difference in votes across States and Territories.

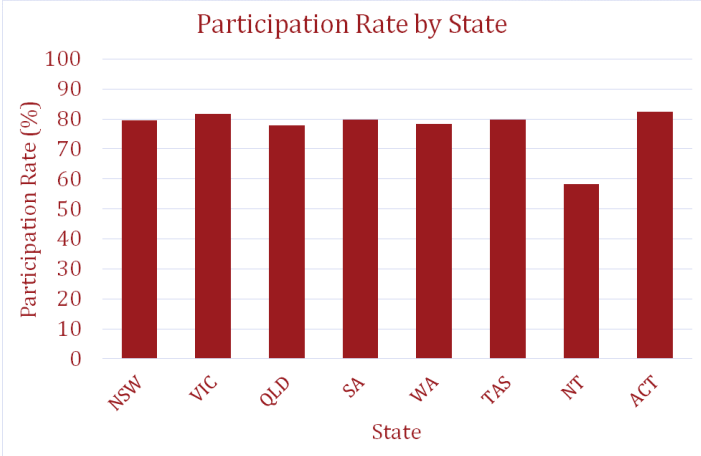
On the 15th of November 2017, the result of one of the most polarizing ballots was revealed; Australia had voted for Marriage Equality. Of the 158 Federal Electorate Divisions (FEDs), 141 (89%) had 'Yes' as their majority vote. Not satisfied with just knowing the result of the vote, we decided to have a brief look into the demographics underpinning this monumental ballot, using data available from the Australian Bureau of Statistics (ABS)[1].

PARTICIPATION



The ABS offers data on participating voters by FED, age and gender. Consistently across the different stats, women were more interested in the vote than men were, beating them in participation across all age groups.

25-29 year olds had the lowest of participation rates, while those aged between 70 and 74 had the highest participation rate.



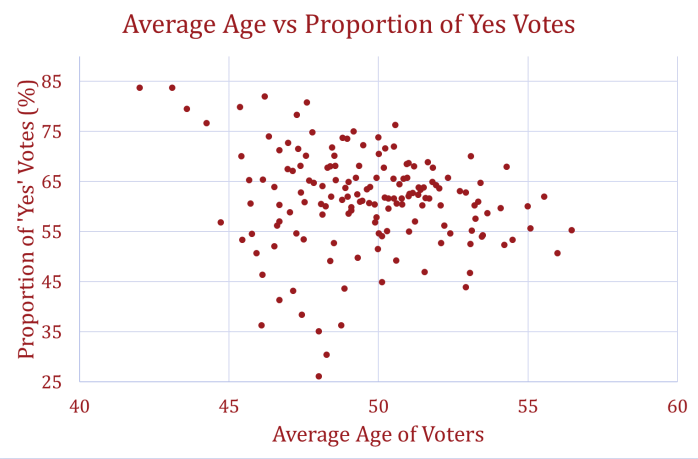
The spike in participation rates for 18-19 year olds is reminiscent of the 'accident hump' in mortality curves - though I'm sure the voters in that age group did not vote by accident!

There was little difference across states, with the exception of the Northern Territory, where 58.4% of the eligible voters participated in the ballot.

RESPONSE

At the end of the day, the most important statistic is the proportion of votes for and against marriage equality.

A quick calculation of average voter age for each FED suggests that the older the voter, the less likely they were to vote yes. The voting outcome range is greatest for FEDs with average ages between 46 and 50. This trend may be indicative of the old traditional values, where same-sex relationships were frowned upon.



When we rank the FEDs by the proportion of voters who voted yes, we see that the following FEDs are the most and least supportive of Marriage Equality:

Federal Electoral Division	Yes	State
Sydney	83.7	New South Wales
Melbourne	83.7	Victoria
Melbourne Ports	82.0	Victoria
Wentworth	80.8	New South Wales
Grayndler	79.9	New South Wales
Fowler	36.3	New South Wales
Werriwa	36.3	New South Wales
McMahon	35.1	New South Wales
Watson	30.4	New South Wales
Blaxland	26.1	New South Wales

FEDs in New South Wales were polarized in their support for or against marriage equality. Whilst 3 FEDs in NSW were in the top 5 FEDs with the highest yes votes, the bottom 5 FEDs with the lowest yes votes were also all from NSW.

So what makes these FEDs different from each other? A quick demographic check[2] revealed the following statistics:

[1] Source: Australian Bureau of Statistics, released 15 November 2017, http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1800.0Main+Features12017, accessed 23 November 2017

[2] Source: Sydney Morning Herald, http://www.smh.com.au/federal-politics/electorate-map/, accessed 23 November 2017

	Born Overseas	Considers themselves to be Religious	Couples with Children	Median Household Weekly Income	Bachelor Degree	Haven't Completed Year 12
Sydney	42.8%	59.6%	11.4%	$1,643	25.0%	35.9%
Melbourne	38.4%	58.3%	12.8%	$1,380	25.6%	35.9%
Melbourne Ports	33.2%	66.2%	16.1%	$1,689	25.9%	37.3%
Wentworth	34.8%	70.3%	17.9%	$2,021	25.5%	39.1%
Grayndler	35.7%	66.7%	24.1%	$1,755	19.4%	45.9%
Fowler	48.5%	91.5%	39.6%	$1,014	5.8%	65.7%
Werriwa	31.0%	90.2%	41.1%	$1,294	7.5%	65.1%
McMahon	40.9%	92.0%	42.5%	$1,202	7.2%	64.4%
Watson	49.3%	87.9%	37.3%	$1,040	11.0%	56.3%
Blaxland	43.8%	91.3%	36.8%	$992	7.4%	64.3%

The electorates with the least support for marriage equality tended to have:

- a significantly higher proportion of people describing themselves as religious;
- more couples with children;
- lower average income levels; and
- lower levels of attained education.

While many have argued the necessity of politicians taking the marriage equality vote to the public, it has certainly provided some interesting statistics; it would be very exciting to see how the distribution of married couples evolves over time due to this monumental ballot.

Spreadsheet to the Head Seat: Perspectives from actuaries turned leaders - Part 2

By Byron Wong and Danny Bechara

This is the second instalment of a four-part series where Byron Wong and Danny Bechara interview four actuaries-turned-leaders. In this instalment the interviewees outline the key leadership strengths of actuaries, how to reach leadership positions, and the role of actuarial education and mentoring in forming leaders.

Interviewees

The first instalment of the series covered the career journeys of each of the interviewees, as well as overcoming barriers to leadership.

Brett Clark
Group CEO and Managing Director of TAL

James Collier
National Managing Partner of Finance and Risk Consulting at KPMG Australia

Natalie Eckersall
Outcome Director of New Policy and Customer Services at MLC Life Insurance

Leigh Watson
Head of Life and Health in Australia and New Zealand at Swiss Re

Actuarial Traits Suited to Leadership

The interviewees all agreed that actuaries bring a technical ability largely unrivalled in business, which provides a good platform for actuaries to step up and lead.

As Natalie put it: "actuaries have the ability to synthenise large volumes of data and make sense of it." She said this invaluable skill extends beyond just financial data, but includes understanding industry trends, gauging different parties' perceptions and ultimately bringing interpretation and opinion to data. This is composite skill set means actuaries get "instant credibility" when it comes to analytical tasks.

James mentioned that the strength of an actuary in leadership, for example as an executive in the insurance industry, is that they can make sense of the technical information themselves, rather than having to rely on others' interpretations.

Brett said that when technical knowledge is combined with a commercial understanding of a business this can lead to highly effective leadership. Leigh echoed similar thoughts in that the actuarial grounding gives great knowledge and credibility to an individual and their opinions.

Actuaries have the skills to interpret data, model uncertain outcomes and draw insights from complicated problems, skills which provide a solid foundation to transition into leadership roles.

Reaching Leadership Roles

We asked the four interviewees to share what they would describe as the 'big break' in their career and advice they had for actuaries aspiring to reach leadership positions.

Perspective 1: Leigh Watson

Leigh's big break occurred early in his career when he was working for Manulife, a multinational insurer based in Canada. This role initially began in Hong Kong, but led him to taking on the role of CEO of Manulife in South Korea. Still relatively young at the time, Leigh ran the insurer for three years while being the only ex-pat in the teams he was leading. It was here where he saw the potency of combining his technical actuarial background with communication and leadership skills, allowing him to meet the challenges of working as a CEO.

Leigh found these regional leadership roles very formative, but he highlighted several challenges leading remote teams can bring -the requirement for frequent travel, the importance of spending time "on the ground" face-to-face with people you lead, and the balance between the local culture/market and (working for an Australian-owned business in Asia) the Australian business culture.

Given his experience, Leigh's advice for actuaries looking to attain leadership roles is to broaden your experience. As Leigh put it, overseas experience "can be a great accelerator of your career", allowing one to work with a variety of different individuals within different practices while also broadening your skillset. He looks for similar breadth of experience when he hires new team members.

Perspective 2: Natalie Eckersall

Natalie shared the story of when she was at an advisor conference and was asked why a certain medical definition was not being covered within an insurance product her company was offering. She confidently gave reasons from an actuarial perspective – namely that it wasn't feasible from a pricing perspective. She went on to describe how her response was "ripped apart" by the audience, as she hadn't thought about source of the question and had not put herself in the shoes of an adviser or a policyholder. Natalie said that her varied experience had provided many valuable lessons, including the importance of empathy and vulnerability.

Her advice to aspiring leaders was to take ownership and stretch yourself, look for leadership opportunities in your current role, by doing that other individuals will begin to entrust more responsibilities upon you, which will eventually lead to formal opportunities. Natalie reinforced that there is no substitute for a strong work ethic and delivering on the responsibilities you currently hold.

Perspective 3: James Collier

James' journey was steadier in nature as opposed to having a 'big break'. He found that working in consulting has given him a range of projects and good opportunities across the entire industry. He stated that a valuable quality is being able to see the market from a wide lens; over time this allows you to gain a seat at the table and have a role in shaping the industry.

James reminded young actuaries not to hurry, and that sitting under good leadership allows you to develop your skills a lot quicker than working by yourself. He also emphasised that you shouldn't get complacent; instead look to be continually growing yourself. To reach leadership positions you need to be self-driven, and his advice was to keep setting goals (including genuine stretch targets), work hard, ask questions, seek more responsibilities, ask to be given new opportunities and continue to stretch yourself in a safe environment.

James also highlighted the importance of always seeking specific feedback. For example, if you are in a meeting with a more senior actuary, after that meeting ask them "how was my tone? Did I handle that question about implications appropriately, or should I have provided a shorter response?" His perception is that analysts and junior actuaries may avoid approaching senior leaders (including actuaries) in their business because they are always busy. His advice was to "just ask them" – they are often more than happy to set aside time to chat.

Perspective 4: Brett Clark

Brett shared his experience when he was given the opportunity to move out of the Chief Actuary role into leading the product and distribution team at AIG Life (now AIA). It was the first time he had real commercial accountability for business performance and he found himself leading a diverse team which included non-technical specialists and non-actuaries including sales teams. Through his experiences he learnt about individuals have very different motivations and that understanding these personal drivers is key to mobilising them.

Brett's advice for young actuaries was to "be true to yourself, don't try to manufacture a different version of yourself". He went on to say that you can read a wide range of leadership literature however what is most important to leadership is staying true to your own values.

Role of Education

When asked about education, all four interviewees expressed pride and passion in the industry's willingness to help people through the actuarial exam process and each echoed similar thoughts that the actuarial education process is one which is rigorous and challenging, but forms a very effective foundation for actuaries to stand upon.

Brett also mentioned the additional formal training that he undertook. This came in the form of a leadership program through INSEAD, in France. He described this as a valuable experience in broadening his management skills particularly in areas of leadership communication and leadership Brett also emphasised the value of internal leadership programs within organisations, citing TAL's firm-wide leadership program as being an important tenet in nurturing and growing leaders. The benefit of an internal program means leadership is both taught and applied in the same environment.

Role of Mentoring

Leigh mentioned he had a mentor early in his career who assisted with his work his initial steps into broader leadership. Leigh's advice was to find someone who is in a role you want to explore in the future.

The other interviewees stated they didn't have a formal mentor, but each encountered informal mentors (many were their own managers) who pushed them outside their comfort zone. They mentioned that a large part of reaching leadership roles is surrounding yourself with a small group of trusted people who you can be vulnerable with and who can push you in the right direction. James also emphasised listening to the views of others and questioning points you don't understand or want to explore more, whether this is through your peers, your boss or a mentor.

The next instalment will explore how to build effective teams and what it takes to be an effective leader.

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

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