How Seismic Activity Changes the Actuarial Landscape
REQUEST FOR EXPRESSIONS OF INTEREST

Under section 180A of the National Disability Insurance Scheme Act 2013 (Act) the Board of DisabilityCare Australia must nominate an actuary to be the ‘scheme actuary’ for DisabilityCare Australia. The Board intends to nominate the first scheme actuary for a fixed term of two (2) years.

The Board must nominate an actuary:
- Who is a Fellow of The Institute of Actuaries of Australia; and
- Who the Board considers is a fit and proper person, and has appropriate skills, experience or knowledge, to be the scheme actuary; and
- Who is not the reviewing actuary (which in the first three years of DisabilityCare Australia will be the Australian Government Actuary as provided in the Act).

The key duties of the scheme actuary are summarised below and are specified in section 180B of the Act, as well as the National Disability Insurance Scheme - Rules for the Scheme Actuary 2013, made by the Minister for Financial Services and Superannuation under section 180C of the Act. In broad terms, the duties involve providing actuarial advice, reports and information to the Board, the CEO and DisabilityCare Australia in relation to the financial sustainability of DisabilityCare Australia and related issues.

Summary of scheme actuary’s statutory duties

Duties relating to annual financial sustainability report

The scheme actuary must do all of the following each time an annual report on DisabilityCare Australia under section 9 of the Commonwealth Authorities and Companies Act 1997 is being prepared:

(a) assess:
   - i. the financial sustainability of the National Disability Insurance Scheme; and
   - ii. risks to that sustainability; and
   - iii. on the basis of information held by DisabilityCare Australia, any trends in provision of supports to people with a disability;
(b) consider the causes of those risks and trends;
(c) make estimates of future expenditure of the National Disability Insurance Scheme;
(d) prepare a report of that assessment, consideration and estimation;
(e) Prepare a summary of that report that includes the estimates described in (c).

Duty to make quarterly estimates of future expenditure

At least once each quarter, the scheme actuary must make estimates of the future expenditure of the National Disability Insurance Scheme and advise the CEO of the estimates. For this purpose, quarter means a period of 3 months starting on 1 July, 1 October, 1 January or 1 April. Note: The CEO must give the Board a copy of the advice under subsection 159(2) of the Act.

Duty to provide information and advice on request

The scheme actuary must, on request from the Board or the CEO, provide actuarial information or advice.

Duty to report concerns to Board

If the scheme actuary has significant concerns about the financial sustainability of the National Disability Insurance Scheme, or the risk management processes of DisabilityCare Australia, he or she must report those concerns to the Board as soon as reasonably practicable.

Expressions of Interest

The Board is seeking expressions of interest from appropriately qualified actuaries who wish to be considered for nomination as the scheme actuary. This is a personal appointment by way of contract. The scheme actuary is expected to be available full-time and exclusively for DisabilityCare Australia. The position will be located in Sydney and supported by a Division of the Agency being established to undertake this work. The scheme actuary will be expected to travel to present at monthly Board meetings, in addition to regular travel to both Geelong and Canberra.

The Board requests that interested actuaries provide information against the criteria specified below. Other desirable attributes of the scheme actuary are specified below. The Board will use this information to inform its decision about who is to be nominated as the scheme actuary having regard to the requirements of section 180A of the Act.

Criteria
- Fellow of The Institute of Actuaries of Australia
- Demonstrated experience in undertaking valuation and analysis of long term costs of disability
- Familiarity with disability data and experience using disability data sets for actuarial analysis
- Experience in disability research evaluation, outcome measurement and cost benefit analysis
- Demonstrated experience in building productive working relationships
- An understanding of the disability sector and the role of DisabilityCare Australia and the NDIS

Security Clearance

The scheme actuary will be required to obtain and maintain a Negative Vetting Level 1 security clearance.

Remuneration and Insurances

An actuary expressing interest is invited to suggest the remuneration level they regard as appropriate to the position. The actuary expressing interest is expected to cover the costs of required professional indemnity and other insurances.

Costs

DisabilityCare Australia will, however be responsible for any travel expenses and other similar disbursements.

Expressions of Interest to Comprise

- A covering letter;
- Statement of claims, detailing relevant skills and experience against the criteria;
- A copy of your Curriculum Vitae or Resume that sets out relevant qualifications and experience; and
- The names and contact details of two referees.

Further Enquiries

The first step in expressing interest in nomination as the scheme actuary is to obtain the nomination documentation by emailing Jo-ann.rose@disabilitycareaustralia.gov.au

Closing Date for Expressions of Interest

All expressions of interest must be lodged electronically at Jo-ann.rose@disabilitycareaustralia.gov.au by 4pm (Canberra time) 31 August 2013.
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CONGRATULATIONS
COV Welcome to New Members – July 2013
Contributions should be sent to the Actuaries Institute, marked to the attention of Katrina McFadyen (Head of Communications and Marketing) and Nicole Sitosta (Communications and Marketing Coordinator) at:

katrina.mcfadyen@actuaries.asn.au
nicole.sitosta@actuaries.asn.au

All contributions must conform to our submission guidelines which are available from the Communications and Marketing Team.

Next Edition
A183 - September 2013
A184 - October 2013
Deadline for contributions: 1 September 2013

Actuaries on the move
Andrew Boldeman is the CEO of the Avant Group as of 26 August 2013.

Trang Duncanson is the Head of Actuarial, Capital and Risk Management at NAB Wealth as of 6 August 2013.

Peter Hodgett has been appointed to the Medibank Board for a three-year term.

Melinda Howes is a Non-Executive Director at Hollard Holding Australia and Hollard Insurance.

Congratulations to all on their achievements.

If you would like to share news on any other actuaries on the move, including yourself, send an email to comms@actuaries.asn.au.
Dear Reader

With the federal election just weeks away, innocent conversations everywhere — including birthday dinners and the queue for the filtered tap at work — invariably turn to the blood pumping question: what will YOU do in that voting booth?

The controversy over the last few months and ensuing political attacks have made for blaring headlines and endless smear opportunities. Who knew political spectating could be so captivating?!

One controversial ‘attack’ that occurred a couple of months ago involved the infamous menu starring “Julia Gillard Kentucky Fried Quail” (best to Google this one if you don’t follow the press or engage in the twittersphere). While it is a matter for discussion whether the menu constitutes sexism, a personal attack on Ms Gillard or just plain light-hearted fun, it did remind me of someone I know who experienced gender discrimination in her workplace.

She was chugging along happily at work one day when someone ‘important’ dropped the bombshell that her future prospects there were limited because she was female. It was made clear that the culture in her office did not support women in senior positions. The most shocking part might be that she is an actuary, working in an actuarial role in Australia with other actuaries, and it was another actuary who had said this to her.

Perhaps my meagre years of experience have allowed me to remain naive and ignorant, but I would have thought the actuarial profession would rise above gender discrimination or any other form of discrimination, for that matter. I’d have thought that discrimination is more likely to occur in workplaces with poor leaders, sub-standard HR practices and powerless employees who put up with what they cannot change. Not a workplace that employs actuaries.

If you thought along the same lines, apparently we have both been mistaken. Apparently gender discrimination does exist in our industry. Perhaps my friend’s nasty encounter is the first and only time it has occurred, which would afford some relief, or perhaps she is one of many actuaries who have learnt from experience that discrimination is very real in our industry.

If that is the case, what can we, as a profession, do about it? Should individuals who have experienced or witnessed discrimination anonymously name and shame these toxic workplaces? Would other actuaries take them seriously or wish they would stop stirring the pot? Send me an email if you have any ideas or can relate to such an experience.

That aside, I’ll see you in Spring. And don’t forget to update your electoral enrolment details.

Yours truly
Keri Lee
Large seismic events have destroyed cities and brought about the decline of civilisations. With the increase in the size and urbanisation of the world’s population over the last hundred years, there are now more people than ever living in or near areas of seismic risk. This means that despite our better understanding of the risks, the threat is greater than ever.

Seismic events are any movement in the Earth leading to a release of energy via an earthquake, tremor or volcanic eruption. They occur predominately due to the release of built up pressure deep underground, and can cause widespread damage on the Earth’s surface. The main risk to humans is from man-made structures collapsing, igniting or critical infrastructure failing. These events can also trigger secondary events such as tsunamis, landslides, fires, floods and further seismic activity.

To adequately price and reserve for these risks as an insurer or reinsurer, seismic risk models need to be built, which incorporate scientific expertise and many years of global experience.

Q&A
Q1 What do the Turkey (1999), Indian Ocean (2004) and Christchurch (2011) earthquakes all have in common?
Q2 What do the San Francisco (1906), Indian Ocean (2004) and Tohoku (2011) earthquakes all have in common?

Earthquakes of magnitude 4.0 or greater from 1898 to 2003; each is marked in a lightning-bug hue that glows brighter with increasing magnitude.

Source: Mustain (2012)
Map by Nelson J, IDV Solutions
A BRIEF OVERVIEW OF SEISMIC RISK

The Earth’s crust is constantly moving and changing, so the conditions causing, or the consequences of each event are never identical. As human activity changes, so does the impact that events have on us. The key seismic risk factors that need to be considered are listed below:

<table>
<thead>
<tr>
<th>Geo-Scientific Risk Factors</th>
<th>Insurance Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous seismic activity</td>
<td>Risk concentration and reinsurance coverage</td>
</tr>
<tr>
<td>The amount of energy</td>
<td>Level of insurance in the market, including policy exclusions or government schemes</td>
</tr>
<tr>
<td>Depth of the event</td>
<td>Vulnerability of insured properties</td>
</tr>
<tr>
<td>Location and fault lines</td>
<td>Claims for other classes of business (e.g. Business Interruption or Worker’s Compensation)</td>
</tr>
<tr>
<td>Wave types and direction</td>
<td>Cost of repairs and rebuilding, including land remediation and potential demand surges</td>
</tr>
<tr>
<td>Soil type</td>
<td>Secondary events such as aftershocks, landslides, fires, floods and tsunamis</td>
</tr>
</tbody>
</table>

AFTER AN EVENT

1. **Reassess the Risk Factors**
   
   When a seismic event occurs, the risk factors for future activity should be reassessed to ensure that the models used reflect the most recent information. New areas of risk may be identified, and a reassessment of return periods for similar events may be required. An event may also be the beginning of a period of heightened seismic activity in the area.

2. **Is it a Foreshock?**
   
   Around 70% of seismic events of magnitude seven or greater have been preceded by foreshocks. Whilst there is a need to consider and allow for the possibility that an event is a foreshock when modelling the short-term seismic risks, it is currently very difficult to quantify.

3. **Aftershocks**
   
   It is well-established in the scientific community that the frequency of aftershocks follows an exponential decay pattern over time, as does the distance of aftershocks from the event epicentre. Although aftershocks are more often close to the event epicentre, aftershocks have been recorded up to 2,000km away after 10 days. This distance reduces to 600km after 100 days and 150km after 1,000 days.

4. **Changes in Seismic Stress**
   
   Recent studies have shown that when stress is released from a seismic event, it does not simply disappear, but can cause changes to the stress levels up and down the fault line which can then lead to further events. This theory is called Coulomb Stress Triggering, and is a promising advancement in seismic forecasting.

The figure above shows the changes in Coulomb Stress along the North Anatolian fault line following the 1939 earthquake in Turkey. The first event can be seen by the white line. The colour indicates the stress release or increase as a result of the seismic event, with large decreases in Coulomb Stress being represented by purple, and large increases by red.

Stress has been released mainly within the fault rupture area, however there have been increases in the Coulomb stresses in nearby locations concentrated along the rupture plane boundaries, which could increase future seismic activity in those locations. The next rupture can be seen by the dotted line and occurred where the stress increased.
5. Secondary Events
Seismic events can also trigger secondary events, such as:
• tsunamis which can cause widespread damage to coastal areas, offshore infrastructure and shipping facilities;
• fires from damaged gas pipes, power cables and electrical equipment; and
• landslides and flooding due to changes in the local topography and water table, or damage to man-made hydrological structures such as dams, levees, dykes or flood barriers.

ACTUARIAL CONSIDERATIONS
What should actuaries change after an event? Unfortunately, there is no one-size fits all response. The areas that should be considered once the seismic risk models have been updated are:

1. Pricing
Technical pricing of new business and reinsurance treaties may change as the risk models are updated, however market conditions and commercial decisions will also play a role.
In the short-term the potential that the event was a foreshock, or that aftershocks may cause further damage needs to be considered. It is also possible that a lot of the damage that could be done from seismic movements has already occurred from the initial event, i.e. that the buildings likely to collapse already have.
Reinsurance arrangements may also need to be reviewed. If an Insurer’s reinsurance limits have been fully utilised, then additional reinsurance coverage may need to be purchased.

2. Outstanding Claims Liabilities
As with any major catastrophe, estimating the insurance liabilities of large seismic events is difficult. Claims can emerge over a long period of time, and estimates of the costs of repairs and rebuilding may vary due to supply constraints in assessors, labour and building materials. If there are a significant number of aftershocks, rebuilding may be delayed, and land remediation can be expensive.
There may also be event-specific aspects that need to be considered that relate to the Outstanding Claims Liabilities. An example is Christchurch, where the government proposed to increase the building standards in respect of earthquakes.
On the other hand, the response could lead to decreased costs, for example if the government provides assistance with claim payments or gains efficiencies through streamlining the claims or dispute resolution procedures.
The Claims Handling Expenses (CHE) assumption for the Outstanding Claims may also need to be reassessed. Large events generally have higher CHE due to the need for increased additional staff at short notice (often on a contractual basis), overtime payments, loss assessing costs, and sometimes project management costs.

3. Premium Liabilities
Once an event occurs, the unexpired risk will change. When assessing the Premium Liabilities, actuaries need to consider that the event could potentially be a foreshock, there could be many aftershocks in the vicinity, and the Coulomb Stress changes may lead to an increased or decreased chance of another event in the future depending on the new stress pattern and potential new faults that could be activated.
Actuaries should also consider the amount of claims already in the insurance or reinsurance portfolio. If many of the properties have been destroyed or damaged, there may be little potential for future losses, however further seismic activity may weaken already damaged structures. Similarly the reinsurance limits and reinstatements may need to be examined to ensure that adequate coverage is in place for future events.

4. Risk Margins
After a major event the uncertainty around both the Outstanding Claims and Premium Liabilities increases. One way that actuaries can allow for this uncertainty and volatility is through changes to the Risk Margins.
For the Outstanding Claims Liabilities, the Risk Margins could reflect the potential volatility in claims costs due to demand spikes, event-specific aspects and general uncertainty surrounding the initial estimate of reserves.
For the Premium Liabilities, changes to the Risk Margins could reflect changes to the seismic models, and the potential increase in future seismic activity should the event: be a foreshock, trigger many aftershocks, or significantly alter the underlying risks due to Coulomb Stress changes.
Any such changes will need to consider the particulars of the insurance or reinsurance portfolio, including the amount of coverage and the reinsurance limits and reinstatements still available.
CONCLUSION
Seismic events are unique and can lead to further local activity. To ensure the risk is correctly priced and reserved, the assumptions used in actuarial models need to be re-examined after such an event.

Once the model has been recalibrated, actuaries need to consider the short-term impact of continued seismic activity, including aftershocks and secondary events and the change in risk due to the change in Coulomb stresses in the area.

Actuaries should also consider re-assessing the technical pricing basis, and allowing for future seismic activity in the reserves.

This area is a challenge for actuaries, who should ideally utilise any available expertise in geophysics, seismology, geology, volcanology, underwriting and claims when forming an opinion.

The full version of this paper was presented at the 2012 General Insurance Seminar and can be downloaded from http://www.actuaries.asn.au/GIS2012/Program/Media.aspx

Q&A (p4 Answers)
A1. They were all preceded by foreshocks.
A2. The secondary events following (fire and tsunamis) caused more destruction than the earthquake.
NEW SURVEY QUESTIONS WILL BE AVAILABLE IN AUGUST 2013.
WHAT WOULD YOU LIKE TO KNOW? IF YOU HAVE A QUESTION
YOU WOULD LIKE TO PUT TO THE MEMBERSHIP, EMAIL IT TO
EDITOR@ACTUARIES.ASN.AU

REPORT GENERATED ON 19 JUNE 2013. 299 RESPONSES.

BRILLIANT MATHEMATICAL MINDS are often linked to mental
illness in the movies. For example:

• A Beautiful Mind in which Russell Crowe portrays Game Theory
  expert John Nash’s experience of schizophrenia.
• Good Will Hunting’s title character (Matt Damon) is a
  mathematical prodigy with Post-Traumatic Stress Disorder after
  suffering child abuse at the hands of his father.
• In Rain Man, Dustin Hoffman’s character displays autistic savant
  abilities, such as the ability to count cards. This mimics real-life
  Daniel Tammet’s Asperger syndrome which enables him to recite
  pi from memory to 22,514 digits in five hours and nine minutes.

Actuaries can often also be described as brilliant mathematicians,
so we wanted to explore how mental illness affects the profession
in the real world. The 2007 Australian Bureau of Statistics survey
showed that one in five Australians had been ‘personally’ affected
by mental illness in the past 12 months and 45% had been affected
across their lifetimes.1

Against a backdrop of rising mental illness2, the disabling
effects of mental illness have had a significant impact on the life
insurance industry. In recent years, the industry has observed rising
claims costs for income protection business which, in turn, have hit
insurers’ profits.

According to Financial Services Council Chief Executive John
Brogden3, “The number of people who are claiming for mental
illness is increasing strongly – and in many cases they are also
large claims.” At the same time, beyondblue have questioned the
fairness of life insurers’ underwriting approach for those with a
history of mental illness. The sustainability of the life insurance
industry requires consideration when assessing the ability to
provide affordable, comprehensive cover for those with a history
of mental illness.

We asked the actuarial profession about their attitudes to mental
illness, including the role of the community, workplaces and the life
insurance industry.

PART 1: PROFILE OF SURVEY RESPONDENTS

Survey respondents covered a wide range of ages, and were
generally representative of the age profile of the profession.
Approximately two-thirds of survey respondents were male, which is
representative of the profession’s gender profile.

Q1: WHAT HAS BEEN YOUR EXPERIENCE WITH
MENTAL ILLNESS (E.G. DEPRESSION, ANXIETY,
SCHIZOPHRENIA, BIPOLAR, ETC.)?

Respondents fell into one of three categories:

• those with personal experience (‘Personal’);
• those who had not experienced mental illness personally, but who
  knew of family, friends or colleagues who had experienced mental
  illness (‘Related’); and
• those with limited experience, i.e. they don’t know anyone
  personally who has dealt with mental illness (‘Limited’).

Overall, 19% of the respondents have had personal experience with
mental illness, with no apparent gender disparity. Two thirds
of the respondents have not experienced mental illness
themselves, but know of someone who has, while only
14% of respondents don’t know anyone who has experienced
mental illness.

This is a lot lower than the 45% in the ABS survey of Australians,
which also showed that the unemployed and people in low-income
households had higher rates of mental illness.

Given our higher than average salaries and the fact that most
respondents were currently employed, it is not surprising that the
profession has lower rates of mental illness than the Australian
population. It is clear, however, that our profession is most certainly
not immune.
PART 2: VIEWS ON HOW YOU, YOUR WORKPLACE AND THE COMMUNITY HELP WITH MENTAL ILLNESS

Q2: TO WHAT EXTENT SHOULD EMPLOYERS PLAY A ROLE IN ADVOCATING MENTAL HEALTH AND REDUCING WORK-RELATED STRESS?

96% of respondents believed employers have a role to play in the mental health of their staff, with almost 40% considering a high degree of employer involvement to be critical to ensuring healthy, high performing teams.

Q3: DOES YOUR WORKPLACE ENCOURAGE YOU TO TAKE CARE OF YOUR MENTAL HEALTH BY PROVIDING ANY OF THE FOLLOWING INITIATIVES?

<table>
<thead>
<tr>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing EAP (free, confidential counselling)</td>
<td>78%</td>
</tr>
<tr>
<td>Encouraging work life balance</td>
<td>73%</td>
</tr>
<tr>
<td>Providing sponsored wellbeing programs</td>
<td>38%</td>
</tr>
<tr>
<td>Raising mental health awareness (e.g. factsheets)</td>
<td>16%</td>
</tr>
<tr>
<td>Providing speaker presentations to improve resilience</td>
<td>11%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
</tbody>
</table>

Most respondents said their workplaces encourage employees to take care of their mental health, primarily through access to free, confidential counselling through the Employee Assistance Program (78%) and a focus on work life balance (73%). A small number of respondents said their employers didn’t do anything to help in this regard, or that if they did, they “talk the right stuff, but don’t act it.”

Q4: WHICH OF THE FOLLOWING ACTIVITIES DO YOU FIND USEFUL IN MANAGING YOUR STRESS LEVELS

<table>
<thead>
<tr>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep</td>
<td>87%</td>
</tr>
<tr>
<td>Exercise</td>
<td>81%</td>
</tr>
<tr>
<td>Time away from work</td>
<td>72%</td>
</tr>
<tr>
<td>Hobbies and interests</td>
<td>69%</td>
</tr>
<tr>
<td>Catching up with friends and family</td>
<td>66%</td>
</tr>
<tr>
<td>Healthy diet</td>
<td>64%</td>
</tr>
<tr>
<td>Helping others</td>
<td>33%</td>
</tr>
<tr>
<td>Pampering</td>
<td>18%</td>
</tr>
<tr>
<td>Meditation</td>
<td>17%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
</tbody>
</table>

Many respondents agreed that basic physical survival needs including sleep, exercise and a healthy diet are good ways to manage their stress, irrespective of age or gender. This suggests that a healthy body supports a healthy mind. Taking time away from work is a popular stress-busting activity, although a few found that time at work can actually provide stress relief when there is stress at home! Two thirds of respondents agreed that time with family and friends is useful to manage stress, including time with (and breastfeeding!) new babies as well as having someone to talk to as particularly helpful. Hobbies provided a great outlet for 69% of respondents, including anything from playing the piano to emu farming. Further ‘Other’ activities were wide-ranging including lotto, sex and drinking as mechanisms to let off some steam. Church and prayer also provided solace to help manage stressful times.

Q5: DO YOU HAVE ANY FURTHER THOUGHTS ON HOW OUR COMMUNITY DEALS WITH MENTAL ILLNESS?

The respondents’ views on this topic were wide and varied. Many viewed the community as “unsupportive and unsympathetic” and “very ignorant”, which, to our surprise, was borne out by a small number of respondents who didn’t feel that mental illness was real – “No way is ‘mental illness’ a disability”.

It was interesting to note that these respondents generally had limited experience with mental illness themselves, reflecting the view that “until you’re affected by it you don’t really understand its complexities and manifestations”.

It appears that mental illness may still be regarded as a ‘taboo subject’ which is not openly discussed, potentially as “frighteningly it seems like a diminution of our humanity”. Some feel it is a ‘behind closed doors’ illness with a significant stigma that leaves sufferers in a “struggle to open up...for fear of being judged” or seen as “a sign of weakness”.

Some felt that “awareness campaigns have been effective in recent years” as mental illness “is becoming more widely known and accepted”, although “still needs much greater understanding”. Respondents saw that important changes to attitudes to accept “mental illness as real, and a cause of incapacity” were happening, albeit slowly.

The survey found that “we need to make it more acceptable for people to admit mental illness and make it easier for people to get appropriate treatment.” Catching mental illness early and ensuring help was sought in a timely manner was seen as an effective way for the community to cope with the effects of mental illness.

A range of organisations were pointed out by respondents as critical in addressing mental illness, from the government (including the NDIS, Medicare, social security) and schools to welfare organisations and employers. Respondents suggested that both “public sector and private sector support” was required to improve what are viewed as inadequate and insufficient services.

Respondents stated that “mental illness is one of life’s disabilities” and “it seems random”. There is a “perception that people should have more control over a mental illness” or that it is “chosen by the sufferer” or “something people should get over”. “Further change in mindset and perception is required” through “improved education and research”.

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Julia.lessing@au.ey.com

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Most life insurance policies cover suicide after an initial exclusion period. There is generally a spike in suicide claims after the waiting period, suggesting a correlation between insurance cover and suicide. We wanted to canvas respondents’ views as to whether insurance should include cover for suicide.

Q6: DO YOU THINK LIFE INSURERS SHOULD COVER SUICIDE?

Nearly two thirds of the respondents believe that suicide should be covered in one way or another. However, one third of all respondents agreed that a reduced benefit should be payable. Most respondents who agreed that suicide should not be covered said this was because it leaves insurers open to moral hazard. These views were similar for males and females, but for those with limited mental health experience only half of the respondents believe cover should be provided for suicide.

In general, respondents saw a need to balance the “moral responsibility to reduce the attractiveness of suicide” and “excluding moral hazard” with the “responsibility to give families benefits when the suicide occurs”. The promise of an insurance payment could be used to “rationalise that your family is going to be better off without the suicide occurs”. The difficulty in establishing the cause of death as suicide instead of other causes (e.g. single vehicle accidents) was also a strong argument against treating suicide claims differently.

There were a variety of views regarding suicide. For example, some respondents thought it was “a choice”, “planned action” and “intentional harm” and therefore some believed it should not be compensated. Others thought that by insurers having “some skin in the game” it would better align their interests to ensure the “appropriate community support”.

Methods considered to achieve this balance included longer exclusion periods or phasing in cover (e.g. increases at 25% each year with policy duration) as well as excluding those with a history of mental illness. The promise of an insurance payment could be used to “rationalise that your family is going to be better off without you, which is unlikely to be the case.”

There was a general eagerness to “help reduce the burden of illness” with “initiatives for sufferers”; “before their condition deteriorated”. We agree, insurers have a role to support proactive rehabilitation of their claimants. Both “economically and personally that’s a better outcome”.

Q7: DO YOU THINK INSURERS SHOULD COVER PEOPLE WITH A HISTORY OF MENTAL ILLNESS?

73% of respondents believe that people with a history of mental illness should be covered by insurance, at least to some extent (albeit potentially attracting exclusion for mental illness related claims or attracting a “risk rating”), with 46% agreeing that families of people suffering from mental illness required the same extent of financial support as those suffering from physical illnesses. Those with personal or related experience of mental illness were more likely to support insurers offering this cover.

Again, most respondents considered the preferred approach would be a compromise between social responsibility and profit considerations. It was considered “insane (pun intended) to exclude so many people from insurance”; but that, similar to those with other health issues, “objective research” and statistically validated responses were appropriate. Just what we would expect from a survey of actuaries!

Respondents didn’t generally believe in an ‘automatic’ or ‘blanket exclusion’, instead highlighting the importance of individually assessing conditions “with the appropriate underwriting” (e.g. is it stable with medication? Reactive based on trigger event?) Respondents considered a number of options to adjust cover based on an individual’s history of mental illness as essential to adequately protect the insurer’s ‘risk’ exposure and ‘profit’ to enable cover to be offered.

These options included:

- loading premiums (potentially decreasing with duration) or pricing for individual risks – although the impact on affordability was recognised;
- exclusions for mental illness as “insurance is not really about providing support for a probable event”;
- extending waiting periods or limits to cover and duration; and
- offering group or minimum default cover only.

It was noted that this is the way the life industry approaches mental illness today.

Some respondents were concerned about the ability to protect against moral hazard and fraud through pricing and underwriting alone, suggesting a potential industry wide exclusion or alternatively “specific benefits to seek professional help”.

Many respondents agreed that “mentally ill people have at least as much need for insurance as others” and that “there is always a way to make it work if there’s a will”.

There was also a concern that limiting access would go against the function of insurance as “people who need help won’t get help fearing they will officially have a history”, highlighting the need to underwrite based on individual circumstance, including type and degree of illness and its expected impact on current and future functioning. Treatment alone does not warrant exclusion and can in fact improve the underwriting outcome where treatment has stabilised symptoms.

There was a general eagerness to “help reduce the burden of illness” with “initiatives for sufferers”; “before their condition deteriorated”. We agree, insurers have a role to support proactive rehabilitation of their claimants. Both “economically and personally that’s a better outcome”.

The Actuarial Pulse continued
PART 4: CONSIDERATIONS WHEN OFFERING COVER TO PEOPLE WITH MENTAL ILLNESS

Q8: HOW DO YOU THINK THE LIFE INSURANCE INDUSTRY SHOULD SUPPORT THOSE SUFFERING THE DISABLING EFFECTS OF MENTAL ILLNESS WHILST ENSURING AFFORDABLE PREMIUMS FOR EVERYONE?

<table>
<thead>
<tr>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holistic claims management/rehab for claimants</td>
<td>66%</td>
</tr>
<tr>
<td>Load premiums if history of mental illness</td>
<td>62%</td>
</tr>
<tr>
<td>Wellbeing programs for group policies</td>
<td>47%</td>
</tr>
<tr>
<td>In-house psychologist to support claims teams</td>
<td>42%</td>
</tr>
<tr>
<td>Provide online wellbeing support for retail customers</td>
<td>32%</td>
</tr>
<tr>
<td>Offer cover only if no history of mental illness</td>
<td>17%</td>
</tr>
<tr>
<td>Psychometric testing in underwriting</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
</tbody>
</table>

Two thirds of respondents thought holistic claims management focusing on rehabilitation is a role of the life industry. A similar number believe the industry needs to undertake appropriate underwriting to ensure cover is available, albeit at a loading for those where a history of mental illness was thought to impact their chance of claim, in “the same way as other illnesses”.

Some respondents were sceptical of the benefits of general policyholder wellbeing programs. Although almost a third thought they should be a part of the industry’s offering, commentary highlighted that they would only be valuable if they were effective at reducing the underlying problem. For the cost involved, it was suggested that a more effective way to achieve this would be to “work alongside the Government to obtain additional funding to cover mental illness”. Almost half of respondents thought the industry should “work with employers on creating suitable support”.

These approaches are considered industry best practice and are implemented to varying extents today.

Q9: DO YOU HAVE ANY FURTHER THOUGHTS ON INSURING DISABILITY AS A RESULT OF MENTAL ILLNESS?

Many respondents mentioned the challenges involved in differentiating between genuine mental illness and moral hazard or fraud, including over-representation of symptoms and over-diagnosis by the medical profession.

Some respondents suggested that diagnosis of mental illness can be highly subjective, lacking classification of severity and requiring more accurate statistics, testing and diagnostic tools. For this reason it is important for the life insurance industry to continue to work closely with the mental health sector to stay across the latest diagnostic tools and testing to ensure objective measurement approaches are taken.

It was also raised that “mental illness is to a certain extent no different to other illnesses”, it “doesn’t make it any less of an illness” and “it is just as much a legitimate illness as any other”. Mental illness claims management was likened to management of claims for “bad back, it is not an exact science to be able to distinguish between real and fraudulent claims”.

While it is harder to assess and manage, it is a key area of disability that needs to be covered.” “It is up to insurers to work with the medical profession on ways to identify mental illness and to assist its sufferers to recover”. This will ensure “at claim time, genuine claimants are treated with empathy and not add to their existing stress”. “A quality insurer needs to be seen to be fair and make payment to people in need, especially those responsible enough to take out insurance ahead of their need for claim.”

“Insurers could perform some integrated care role” to manage claims, “educate society to improve awareness” and provide “early intervention” such as “counselling, treatment and support services.” It was highlighted that there were aligned interests for insurers with “some skin in the game... interested in ensuring appropriate support.”

Respondents suggested that “the last thing people who have a mental illness need is added stress caused by finances”. “Sufferers deserve the same right of being insured (as other illnesses) but it is up to (the industry) to mitigate the risks to make sure the product is appropriate for both provider and consumers.”

CONCLUSION

Members of the actuarial profession have a wide range of conflicting views which vary according to their level of experience with mental illness. Many agree that "society needs the coverage" of insurance for people with mental illness, and the insurance industry has a role, alongside the government, community and workplaces, to provide assistance. However, recent rising claims costs suggests that there is more that could be done to provide cover for people with mental illness while maintaining the sustainability of these products.

Imagine if life insurance provided financial support if you became mentally ill, and also helped you to recover faster? Now that’s worth aiming for!

1 ABS, 2007 National Survey of Mental Health and Wellbeing
2 The World Health Organisation estimates that depression will be the number one cause of disability by 2030.
3 Liew, R., Insurers feel mental health pain, AFR, (26 June 2013)
4 Joint paper by the Mental Health Council of Australia and beyondblue Mental Health, Discrimination & Insurance, A survey of consumer experiences 2011

If you need immediate assistance, call Lifeline on 13 11 14.

For further information about depression, contact beyondblue on 1300 22 4636 or www.beyondblue.org.au or talk to your GP, local health professional or someone you trust.
The financial and emotional burden of natural disasters in Australia has been great and the costs of extreme weather events continue to rise. Protecting lives and property is an enduring issue for all Australians and the opportunity remains to develop a national, long-term preventative approach to managing natural disasters and protecting our communities.

Over the last four years, natural disasters around Australia including the Black Saturday bushfires in Victoria, Cyclone Yasi in Northern Queensland, and widespread flooding across Queensland, Victoria, Tasmania and NSW have claimed more than 200 lives and directly affected hundreds of thousands of people. In 2012 alone, the total economic cost of natural disasters in Australia is estimated to have exceeded $6 billion. Further, these costs are expected to double by 2030 and to rise to an average of $23 billion per year by 2050, even without any consideration of the potential impact of climate change.

Each year an estimated $560 million is spent on post-disaster relief and recovery by the Australian Government compared with an estimated consistent annual expenditure of $50 million on pre-disaster resilience: a ratio of more than $10 post-disaster for every $1 spent pre-disaster.
These material social and economic costs have, understandably, generated considerable discussion on how we might reduce our vulnerabilities to natural disaster threats. As recognised in the National Strategy for Disaster Resilience (NSDR), the task of building more resilient communities is complex and requires greater collaboration between government, business and community.

In response, the Australian Business Roundtable for Disaster Resilience and Safer Communities was formed with the aim of working constructively with governments by contributing expertise, research and resources to address the challenge.

The research outlined in the paper demonstrates that the opportunity exists for Australia to design a more sustainable and comprehensive national approach to making communities safer and more resilient.

It shows that the budgetary impact of responding to and recovering from natural disasters could potentially be significantly reduced through carefully considered and directed investment in pre-disaster resilience.

For example, an annual program of Australian Government expenditure on pre-disaster resilience of $250 million at the national level has the potential to generate budget savings of $12.2 billion for all levels of government (including $9.8 billion for the Australian Government) and would reduce natural disaster costs by more than 50% by 2050.

While different resilience measures show a wide range of benefit-cost ratios (BCRs) (see Chart 2), investments that target high-risk locations using appropriate combinations of infrastructure, policy and procedure carry the highest BCRs.

As demonstrated in the case studies contained within the paper, cost effective action can be taken:

- A program focusing on building more resilient new houses in high cyclone risk areas of South-East Queensland would reduce the risk of cyclone-related damage for these houses by around two thirds, and generate a BCR of up to three. Existing houses can be particularly challenging to retrofit but the BCR approaches one in high-risk areas.

- Raising the Warragamba Dam wall by 23 metres would reduce annualised average flood costs by around three quarters, and generate a BCR of between 2.2 and 8.5. This would result in a reduction in the present value of flood costs between 2013 and 2050 from $4.1 billion to $1.1 billion, a saving of some $3.0 billion.

- Building more resilient housing in high-risk bushfire areas generates a BCR of around 1.4; improved vegetation management a BCR of around 1.3, and undergrounding electricity wires results in a BCR of up to 3.1.

These case studies represent only a small selection of the natural disaster risks present in Australia but they highlight the need for new approaches to tackle the most complex challenges, such as:

- Prioritisation of mitigation and investment options based on appropriate economic value and risk assessment. This includes finding mechanisms that allow key investment decisions to be taken at a localised level, often property by property. Those decisions can be supported by government through the provision of information and incentives and by the private sector through price signals that reflect the risks involved.

- Higher quality planning standards required of local government, to ensure no further development is allowed in areas of unacceptable risk and that building standards reflect the need to protect property, as well as lives.

- An increased effort to co-ordinate and update existing data, natural resource mapping and assessments that may exist across government departments needs to be prioritised and integrated into land use planning. This will enable the government to provide a more informed and consolidated approach to planning decisions and land management.

The opportunity exists for Australia to design a more sustainable and comprehensive national approach to making communities safer and more resilient.
• Commitment to recurrent funding of education and awareness programs aimed at helping people to adapt to living with the threat of disaster to promote long-term behavioural change (e.g. along similar lines to road accident prevention campaigns).

The research presented highlights the opportunity to develop a national, long-term approach to managing natural disasters, through a co-ordinated and collaborative response. Importantly, the policy response to building our nation’s resilience to natural disasters must focus on prevention.

**RECOMMENDATIONS**
The paper offers three key recommendations:

1) Improve co-ordination of pre-disaster resilience by appointing a National Resilience Advisor and establishing a Business and Community Advisory Group.
   • Developing resilient communities should be elevated to the centre of government decision-making to deliver effective and efficient coordination of activities across all levels of government, business, communities and individuals. This should be directly supported by a Business and Community Advisory Group to help facilitate a more co-ordinated response and to ensure that business and the not-for-profit sector are represented at the highest levels of policy development and decision-making. This framework is illustrated in Figure 1.

2) Commit to long-term annual consolidated funding for pre-disaster resilience.
   • All levels of government – led by the National Resilience Advisor – should commit to consolidating current outlays on mitigation and to funding a long-term program which significantly boosts investment in mitigation infrastructure and activity. Critical to this success will be support for the consolidation of existing information and commissioning of additional data where needed. This will assist in the development and implementation of effective local responses by governments, businesses and the community.

3) Identify and prioritise pre-disaster investment activities that deliver a positive net impact on future budget outlays.
   • A program of mitigation activity should be developed based on cost-benefit analysis that demonstrates a clear positive outcome from investing in pre-disaster resilience measures.
   • Prioritisation of these activities should be informed by analysis of research, information and data sets allowing key investment decisions to be taken at all levels, including government incentives and price signals from the private sector.

**CONCLUSION**
The Australian Business Roundtable for Disaster Resilience and Safer Communities was formed to contribute to the national discussion on how Australia might reduce its vulnerability to natural disasters. The paper fills an important information gap, both here in Australia, and internationally, on the potential outcome of mitigation activities at an aggregate, or national, level.

The paper outlines a new approach for effective and prioritised pre-disaster investments across the country and highlights the importance of integrated information and activity across government, business and community.

By pursuing the paper’s key recommendations, economic costs can be materially reduced, as well as relieving long-term pressures on government budgets.

More importantly, a safer Australia can be created through building resilience against the trauma and loss of life that all too frequently confronts many of our communities when a natural disaster strikes.

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1 The Australian Government Budget 2013-2014, handed down on 14 May 2013, allocated $50 million per year over two years to reduce flood risk.
2 In each case, the estimated BCRs have been based on data and information drawn from existing studies as well as data provided by Roundtable members. As with all government investment decisions, detailed analysis utilising the latest engineering and technical data should be conducted along with comprehensive impact assessment to assess the full extent of possible environmental effects.
Andrew Matthews

Title... Chief Actuary
Organisation... Medibank Private

Summarise yourself in one sentence...
What is a life without adventure?

My interesting/quirky hobbies...
Taking our family dog to obedience school

My favourite energetic pursuit...
Swimming

The sport I most like to watch... I don't like watching. Rather be involved

The last book I read (and when)...
The Collaboration Economy

My favourite artist/album/film...
Roald Dahl – Never forget reading Fantastic Mr Fox

The person I’d most like to cook for...
My great, great, great grandchildren

I’m most passionate about...
Health

What gets my goat... Abuse of power

I’d like to be brave enough to...
Sing on stage

In my life I’m planning to change...
That I pause and celebrate more often

Not many people know this but I...
Seldom take the time to tell my wife, Cathy, that “I love her”

Four words that sum me up...
Live with no regrets

What I wanted to be when I grew up...
Coach of a sports team

Why and how I became an actuary...
My good friend John Salamito encouraged me to skip an honours year at University and join National Mutual

Where I studied to become an actuary and qualifications obtained...
While working at National Mutual, I studied by correspondence

My work history...
National Mutual (wonderful grounding), Trowbridge Consulting (‘love your clients’), Transport Accident Commission (‘Internal Advisory’), CGU/IAG (‘team-building’), Ernst & Young (‘commerciality’) and now Medibank

What I find most interesting about my current role...
Being part of the complex network of the health sector and the opportunity to contribute to the health of the nation

My role’s greatest challenges...
As an actuary live by behaviours that contribute to Medibank by (1) illuminating and surfacing facts, assumptions and remembering what is important, (2) creating new possibilities and alternatives, and (3) initiating collective actions

Who has been the biggest influence on my career (and why)...
My parents, Nora and Max. They encouraged our family to have a passion for learning

My proudest career achievement to date is...
My 12 year old daughter attending my graduation for a Masters Degree in Organisational Development at Pepperdine University, California

10 years from now, I will be...
57 years old. Our two children will be 24 and 22 years old

When I retire, my legacy will be...
To live up to the challenge of a mentor... “If you truly believe that humans are not a disease, then pursuing contributions that drive sustainable effectiveness cannot be what other people do. It must be what we do.”

Why I’m proud to be an actuary...
I have the opportunity to contribute to the tone of conversation and that brings about change

The most valuable skill an actuary can possess is...
Building connections and understanding to enable us to be grounded, aware and explore possibilities

If I was President of the Institute, one thing I would improve is...
Recognise globalisation may be inevitable, but actuaries can help shape the way it unfolds

At least once in their life, every actuary should...
Just live in the moment!

My best advice for younger actuaries...
Be willing to listen

If I could travel back in time I would...
Take my wife to see the pyramids being built

If I win the lottery, I would...
Invest in the share market
The Ancient Greeks have a word for everything and it is therefore not surprising that they have a word for the doom of ‘all people’. Pandemic, from the Greek word ‘Pan’ = all and ‘Demos’ = people, is an epidemic of infectious disease that can spread to all human populations across a large region, multiple continents, or even worldwide. In essence, it can affect and infect ‘all people’. Now let’s fast forward to the Modern Era. If anyone is a fan of the Hollywood interpretation, it normally involves an outbreak, courtesy of ourselves (to be fair, the intention was always to find a cure for something), a Hollywood heart-throb and the mass destruction of the entire human population. All-and-all, bad films with good underlying lessons: pandemic can happen anywhere, anytime, to all people, usually not so well prepared.

Famous Influenza Pandemics in Recent History and their Mortality Profiles

1957/1959 – Asian Flu – Influenza A (H2N2)
- One to four million deaths in the world.
- Pandemic occurred in two waves following virus mutation.

1968/1970 – Hong Kong Flu – Influenza A (H3N2)
- One to two million deaths in the world.

Both of the above pandemics exhibit the normal excess mortality profile where it is expected that this would relatively kill the more ‘weaker’ part of our population (i.e. the elderly and the very young) – ‘U-Shape Mortality Profile’.

1918/1919 – Spanish Flu – Influenza A (H1N1)
- Over 40 million deaths in the world.
- Australia suffered around 10,000 deaths (0.2% of the then population).
- More than 50% of deaths were from those aged between 20 to 50 years-old – ‘W-shape Mortality Profile’.
- This is the mortality profile that would likely financially cripple the insurance industry and cause maximum business disruptions (as the pillar of our workforce is in this age group).

Since 2003, we have had several scares: H5N1, SARs and the 2009-2010 Swine Flu (H1N1). In the most recent months, we have heard of the H7N9 in China and from a new Coronavirus originating in the Middle East. Not all have been declared a pandemic event by the World Health Organisation.

‘IS IT A BIRD, A PLANE, NO IT’S: INFLUENZA A’
A pandemic virus does not travel first class and actually, they have absolutely no class preferences when it comes to travelling by air. The type A viruses are the most virulent human pathogens among the three influenza types and cause the most severe diseases. Wild birds are the natural host for all known subtypes of influenza A viruses. From them in particular, viruses can be transmitted to and infect a wide range of animal groups, including humans.
An influenza pandemic may occur if three conditions are met:
1. a new influenza virus emerges;
2. the virus infects humans; and
3. the virus spreads efficiently and in a sustained manner from human to human.

"Scientists agree that the threat of a pandemic from H5N1 continues and that the question of a pandemic of influenza from this virus or another avian influenza virus is still a matter of when, not if." (WHO – The World Health Report 2007).

It is often difficult to properly define something so unpredictable and truly unknown in its next shape or form. Perhaps the best way to grasp what a pandemic is, would be to look at what a pandemic is not – a widespread epidemic disease that is stable in terms of infected population, is not a pandemic (e.g. the seasonal flu).

Throughout history, there have been a number of identified pandemic events, such as those triggered by smallpox, tuberculosis, or HIV. For many of these diseases, either a cure has been found or at the very least, its effects have been progressively contained by advancements in modern medicine, as well as detection.

A widespread epidemic disease that becomes stable in terms of infected population is not a pandemic anymore (e.g. smallpox, tuberculosis or HIV).

It is difficult to predict the shape or form of the next pandemic. Projecting the next pandemic event is no different from something actuaries often do day-to-day. Actuaries project future profits or expected claims, knowing that the only certainty is that the actual figure in five years will not be the figure projected today. Similarly, in projecting the next pandemic, one thing we know with relative certainty is that the next pandemic may well differ in its characteristics (virulence, lethality) from anything we have seen in the past.

"Named, must your fear be, before banish it, you can" ~ Yoda

As Actuaries, we must try. Normally, our first step is to try and derive the path of the future, based on the past (e.g. experience study). More than other types of diseases, influenza is widely recognised as the main pandemic threat in today’s world by WHO, international experts, countries’ respective medical bodies and governments. Based on the history, most sources conclude that an influenza pandemic occurs approximately every 15 to 30 years or an annual probability of occurrence at 3% to 7%. This is more deadly than the common flu.

There are many models and assumptions that exist with an aim at measuring the impact of the influenza pandemic. The most simple models will rely on a scenario based approach, deriving an estimated number of fatalities from a target population base, and then using one or several combinations of assumed infection rate (i.e. how many people get infected) and lethality rate (i.e. among those affected, how many die). These can be refined further using different assumptions across age band sensitivities (e.g. ‘U-Shape Mortality Profile’ vs. ‘V-Shape Mortality Profile’. More sophisticated models are also available (as those developed by RMS1 and AIR2) and would typically include a stochastic engine, allowance for geographical particularities, evolution in demographics, medical improvements compared to past pandemics, as well as the latest influenza research.

Irrespective of the fancy models and assumptions used, the following issues should be adequately addressed:
- How many credible data points in history have you used?
- Have these data sources consistently defined the events that have been classified as a ‘pandemic’?
- How have you allowed for medical advancements, heightened risk awareness by governments, tougher border controls, etc.?
- What about population density adjustments? (If you have lived or worked in Singapore, it’s quite clear that the...
residents are practically living on top of each other. In Singapore, for example, any pandemic would spread with maximum efficiency!

- Interaction between ‘deadliness’ (lethality) vs. ‘infectiousness’ (virulence)?
  - some pandemics might be very infectious but kill little to no people
  - some pandemics might be very deadly but may not be able to spread from human to human efficiently or may be easily contained.
  - independently taking averages of each feature may underestimate the tail scenarios (e.g. ‘Black Death, England 1349’, very infectious and very deadly).

“Always in motion, is the future”  ~ Yoda

Yoda reminds us that the future is always moving away from us (otherwise, it would be called the ‘present’ or the ‘past’).

Fortunately, our government has the foresight to look and plan for the future. The Department of Health and Ageing has devised an Australian Health Management Plan for Pandemic Influenza and the latest version update is dated September 2011. In this, it details that if Australia was to experience a pandemic as severe as the event in 1918 and is not prepared and unable to respond, potentially 40% of the population (around 8.5 million Australians) could show signs of infection during a pandemic and that 2.4% of those infected, would die (around 200,000 people). Furthermore, there’s a good chance that 50% of the population may not go to work at the peak of the pandemic and that there would be several waves, each lasting up to 12 weeks (similar to previous pandemics).

Luckily we are a country with a very co-ordinated government. In the event of a pandemic outbreak, there are efficient vaccine distribution channels and the government has the ability to quickly tighten border control. Furthermore, our isolation from the rest of the world provides an additional time buffer in the event that there’s a pandemic outbreak from offshore. The Department of Health and Ageing suggests that with a proper response plan, the number of estimated infected may reduce from 40% to 10%. The number of deaths from the infected could potentially halve and that only around 25,000 people may die. Having said that, there is still a good chance 30-50% of the population may be absent from work and the duration of the pandemic in a single wave, is potentially seven to 10 months. Overall, the level of disruption across all sectors would be reduced, although persisting for a longer period.

**HOW DOES THIS IMPACT THE INSURANCE BUSINESS? Starts from...**

Insurance Risk (i.e. mortality, morbidity)

More deaths = more claim payments, and this could result in an increase in lump sum claims.

For ‘Death Claims’ only, we have estimated the following gross impact on the Direct Life Insurance market in Australia. Essentially, we looked at the percentage of the additional claims due to pandemic as a function of the latest earnings result, for both insurance entity, as well as the parent entity. While many would be protected via reinsurance, we understand the retention levels are relatively high for most major life insurers (particularly, in relation to mortality risk).
Basic Assumptions:

- Using APRA’s floor for the event stress charge, additional/excess mortality is one per mile (i.e. 0.5 per mile over two years).
- Average Sum Assured per Life = $150,000.
- Insurance Penetration of Population (between age 20 – 65) = 50%.

For the infected population that is lucky enough to survive death, the event could still trigger income protection or salary continuance losses (subject to standard waiting periods of around 90 days). The definitions of disability income in Australia are very wide these days, largely owing to market competition, particularly in the group space.

We have not dared to estimate the potential losses due to disability income in Australia. Lucky for us, APRA has a framework. The latest APRA Mortality and Morbidity Event Stress requirements (LPS 115) specifies the following:

“an annual incidence rate of total disablement at each age, as a result of the event, of 10 per cent of lives insured for the two years following the reporting date; of those lives becoming disabled as a result of the event, half remain disabled after 14 days, one quarter remain disabled after 30 days and none remain disabled after 60 days; and

if disability continues to the end of the policy waiting period, one month’s benefit will be paid. For waiting periods other than zero, 14, 30 or 60 days, interpolation must be used to find the proportion of policies for which a benefit will be paid”

Source: APRA, Mortality and Morbidity Event Stress – LPS 115

We have used these stresses to get a feel for the impact on insurance risk charge.

- 10% incidence rate:
  - this is in line with the scenario that the Australian government has a successful plan in place to contain the infection.
  - one quarter remain disabled after 30 days and none remain disabled after 60 days.
  - for a standard minimum 90-day waiting period offered under most group salary continuance plans, there would be negligible impact on the disability claims.
  - in the retail space, likely there’s more policyholders on 30 day waiting periods, the impact here may be higher.

- post waiting period:
  - this can be significant for open claims’ termination rates i.e. any infection and/or government plans to contain risk may reduce the likelihood of a policyholder on disability benefit returning to work (although, APRA did not explicitly prescribe any percentage here).
  - the termination rates for open claims have already deteriorated over recent years, and adding a pandemic (or even the hint of a looming pandemic) could exacerbate the situation further.

May lead to...
Regulatory Risk

If more deaths and/or disability claims occur than what has been expected or allowed for in the reserving and solvency basis, then additional regulatory capital would need to be replenished.

At the same time...
Market Risk

With death and gloom, the press and media coverage on pandemic risk will explode (it’ll have a 20 page spread in Actuaries magazine!). This is likely to lead to volatility in the share price for the insurance company, and potentially have wider impact on the broader share market.

The Tohuko earthquakes became a global market contagion. In the wake of the news, the German DAX lost 1.2% within minutes, Hong Kong’s Hang Seng index fell by 1.8%, South Korea’s KospIndex slumped by 1.3% and MSCI Asia Pacific Index dropped by 1.8%. The share prices of both Munich Re and Swiss Re fell following the earthquake on speculation that they may face losses in the billions.

The following graph is the Nikkei 225 adjusted to 100 on the day before the disaster, and day-to-day percent changes are used to adjust the index on the other days accordingly.

If a pandemic were to happen today in Australia, we can reasonably assume that there would be a similar market downturn during the duration of the pandemic.

In your own company...
Operational Risks (i.e. business continuity, etc.)

With as many as potentially 30-50% of the workforce potentially on sick leave due to the pandemic, the severe staff shortage could lead to high levels of operational risks and business continuity issues/disruptions.
WHAT YOUR MARKETING TEAM IS DOING...

New Business Strain

As fear grips the Australian population (post pandemic), there’s likely to be an increased demand for life insurance policies amongst the surviving population. The marketing teams of major life insurance companies and FA’s would look to take the opportunity to write more business. This will likely cause new business strain and may lead to the further need to raise capital, during volatile market conditions.

So, what starts as a direct impact on insurance risk, may lead to a capital or financing risk for life insurance companies, during very challenging and volatile market conditions. Therefore, if we start by having additional capacity in place in the event of a pandemic, the impact on the need to raise capital during a very difficult business environment may be minimised.

REINSURANCE CREATES CAPACITY

If a pandemic results in significantly higher deaths or disabilities than expected, reinsurance protection, specifically set-up for this purpose, could come in and pay the claims. This would reduce the need for Life Insurance companies to use surplus capital to pay the additional claims, and preserve precious capital to write new business.

A typical structure to cover extreme mortality due to pandemic is the Aggregate Excess of Loss, or Portfolio Stop Loss reinsurance:

- **Structure: ‘Aggregate Excess of Loss’ Reinsurance Contract**
- **Risks Covered:** Death and/or Disability
- **Coverage Basis:**
  - **Deductible:** normally corresponds to a best estimate of future claims, allowing for some provision for standard deviations for expected claims (i.e. reinsurers would not want to cover normal deviation in expected claims or they will charge you for it!)
  - **Limit:** normally corresponds to the capacity of a life company that would want to purchase.
  - **Indemnity / Parametric:** based on actual experience of the company or based on a market index!
  - **Period:** reinsurance covers losses occurring during a period, most preferred period would be greater than two years, given that a pandemic may span across multiple years due to the recurring nature of the disease (i.e. in waves).
  - **Triggers:** with a Pandemic Trigger (e.g. World Health Organisation declares a phase-6 pandemic), the risk for the reinsurers are only limited to a pandemic event, rather than all possible events that can lead to extremely higher claim levels than expected.
  - **Cost:** can be 2% to 8% p.a. of the limit purchased. Depending on your cost-of-capital, reinsurance might prove more cost effective than holding the additional capital or reserve internally.

Other solutions, such as Pandemic Per Event Excess of Loss or a Structured Quota-Share or Financial Stop Loss might also be considered, depending on the main motivation of the ceding company (covering certain types of pandemic only or smoothing the financial impact of the pandemic rather than ensuring a full risk-transfer).

1) **Pandemic Per Event Excess of Loss Reinsurance:**

Similar to the Stop Loss, a standard Catastrophe Excess of Loss protection can cover claims caused by a pandemic event, but this pandemic event would need to be pre-defined. However, what we may be able to define based on a pandemic event that we have seen in the past (e.g. 1918 Spanish Flu) may not fit the pandemic event that may occur in the future.

We need to be able to see into the future to pre-define the duration of a pandemic, when and how it would start and what distinguishes the pandemic symptoms from normal illnesses that can cause deaths. This would make the administration aspects of claim recoveries very cumbersome.

2) **Financial Reinsurance (e.g. ‘Structured Stop Loss’):**

The underlying idea is a multi-year reinsurance contract, which can have regulatory solvency or accounting benefits, by smoothing the impact of losses across several years.

- In the case where there is no pandemic, the price of the protection would be small.
- In the case where there is a pandemic, the reinsurer would provide compensation. Although risk-transfer may be limited with some features like additional premium, or an automatic renewal clause with losses being carried forward, or triggers to recapture the business with a hefty recapture fee for the reinsurer.

There could be many ways to structure a more cost effective Stop Loss by limiting the extent of the risk-transfer. However, by being ‘too clever’ with this, it may attract the unwanted attention from your friendly regulator.

Beyond (Re)insurance Solutions: abnormal Mortality Bond issued on the Capital Markets.

It is often criticised that transferring the risk from an insurer to a reinsurer essentially keeps the risk within the industry and adds more concentration risk to the reinsurance market. Often, this is one of the reasons why the cost of the reinsurance solution is so expensive.

Securitising the risk provides a wider risk transfer to the capital markets who would perceive this as a diversifier to investments risks such as interest rates.

However, this transaction needs to be on a larger scale as there is normally a minimum volume for the transaction to be economical or feasible. There are high fixed acquisition costs associated with setting up this risk-transfer solution.
Who has the largest scale, with the biggest alignment to ensuring the adequate controls and provision of pandemic risk? Our Government.

Our government appears to have the biggest stake in ensuring that our people are protected from pandemic risk. If its first line of defense (i.e. vaccines, border control, etc.) fails, then at the very least, it must ensure that the Australian people and its families are compensated. Our government has ‘Skin-in-the-game’ and naturally, it should be the ultimate counterparty that can pool and manage the risk (see graph above).

CONCLUSION
Most of us would have read the famous book The Black Swan by Nassim Nicholas Taleb and by now should be fairly convinced that not all swans are white. There are black swans for sure, but we can’t help wonder if any other colours exist out there? (blue perhaps?) Just like the historical pandemic events that we have already seen (in particular, the 1918 event), that’s already our ‘black swan’ event (rare, low frequency but extremely high severity). Just like the mythical blue swan, the next pandemic will shock and surprise us, just as much as seeing a blue swan waddling down the road.

So when you are preparing your next ICAAP statement, ask yourself, “are you prepared for the Blue Swan”? 

1. Risk Management Solutions (RMS) launched its Pandemic Flu Model in 2007. Similar to the AIR model, however it has only approx. 2000 unique scenarios.
2. AIR Worldwide launched its Pandemic Flu Model in June 2013. According to AIR, the pandemic flu model contains over 18,000 simulated events. These range in severity from mild to severe and can start and spread anywhere in the world and last from months to years.
3. Market Index could be based on:
   - No. of official deaths as published by WHO.
   - APRA or National Department of Health may have the ability to access/track actual mortality claims during the period (so hence why this solution may need government support and/or wider national participation).
4. In a Per Event XL, we need to pre-determine the number of months where deaths would need to occur for it to be covered under the reinsurance. Even if deaths occur during the pre-determined no. of months, many reinsurers may still argue whether it’s due to pandemic or other illness (e.g. asthma attack, old age etc.).
Weathering the Storms of Drought

The viability of weather index insurance in managing drought risk in Australia

INTRODUCTION
Given the intensity and frequency of extreme weather events due to climate change, the insurance industry is becoming overly stretched. Grain production is particularly vulnerable\(^3\). Although there are several efforts that the Australian government has put in place to facilitate responses to drought risk, these have been criticised on the basis of inequity, politicisation and slow response. Consequently there has been a paradigm shift in the perception of drought from that of a disaster to a risk that requires self-reliance\(^5\). The debate on the prospects of weather index insurance (WII) particularly rainfall insurance, in Australia can be traced to the work of Bardsley and Quiggin\(^3\)\(^,\)\(^4\)\(^,\)\(^11\)\(^,\)\(^12\). Quiggin\(^12\) was of the view that: 

“While the debate did not reach a settled conclusion, there was a consensus that a rainfall insurance scheme would not have a major impact in the absence of some subsidy at least on administrative costs. On the other hand, if subsidies were to be paid to farmers suffering from adverse climatic conditions, rainfall insurance would be one of the most cost-effective alternatives. (p.123).”

WII is a viable option in managing drought risk because it resolves the problem of asymmetric information that leads to moral hazards and adverse selection. It achieves this because payouts are based on weather indices that are exogenous to the system and therefore cannot be manipulated by either of the counterparties to the contract\(^7\)\(^,\)\(^13\)\(^,\)\(^14\). However, WII is also plagued by structural and geographic basis risks\(^14\). Although WII is in wide usage in the energy industry, the agricultural sector is yet to make the best use of the product because of the complex interaction between weather and crop yield and a methodological bottle necks. The legal distinction between weather insurance and weather derivatives, despite their functional similarities, has also added to the challenges\(^1\).

Nevertheless, some countries are already reaping the benefits of this member of the family of index based risk transfer products which is gradually making its way into Australia\(^6\)\(^,\)\(^7\). Kapphan\(^8\) has shown that when hedging with contracts adjusted for future climate scenarios, benefits almost triple for the insured while profits increase by 240% for the insurer in Schaffhausen Switzerland. Despite the potential benefits, scholars are issuing some caveats on its usage\(^1\).

Given the future prospects of WII, we conducted analyses of its viability in some Queensland (QLD) and Western Australian (WA) shires. The index used was the Cumulative Standardised Precipitation Index (CSPI) aggregated over 10-day periods (dekads) within the growing seasons in both states spanning over 180 days from 1971 to 2010. The triggers were set at the 5th, 10th and 30th percentiles implying payments in two, four and 12 years in the 40-year period respectively. The first objective was to establish the yield-index relationship. Secondly, we were interested in the hedging efficiency of the contracts and finally the diversification benefits of a portfolio of the contracts. Data was collected from the Bureau of Meteorology and the Department of Primary Industries\(^1\).

FINDINGS
In the preliminary analyses, it was observed that yield and rainfall were more variable in QLD than in WA as noted in previous studies\(^12\). The actuarial burns analysis was used to price the contracts. The relationship between crop yield and CSPI was found to be stronger when the susceptibility of the crops to rainfall is captured across the dekads by optimisation. Furthermore, using the ordinary least square regression, we noted that there was a relationship between yield and the index. However, the extent of this relationship varied significantly, ranging from an Adjusted R-square value of 22.29% for Katanning Shire to 89.77% for Booringa. We noted that there was no uniform pattern in the weather-yield relationship across the quantiles based on the quantile regression results (details not reported here)\(^1\). The implication of this is that some shires are more prone to drought than others. It was noted from panel analysis that there was a statistically significant relationship between yield and CSPI across all the shires but there were differences in the characteristics influencing the relationship across the shires and therefore WII would have to be localised. Unfortunately, the localisation of the contract will erode the economy of scale in product design.

Two methods were adopted in the calculation of the hedging efficiency. First is the Mean Root Square Loss (MRSLS) which attempts to measure the downside risk. Based on this analysis, 12 of the 18 locations indicated that WII could have reduced the risk of a revenue shortfall over the period in consideration at the 5th percentile. 13 of these locations flagged efficiency at the 10th percentile while 12 were efficient at the 30th percentile.
Based on the Conditional Tail Expectations (CTE), the 5th percentile contract increased the revenue of the farmer in fourteen shires while the 10th and the 30th percentile contracts were efficient across 11 and seven shires respectively. Hedging efficiency depends on the risk measures used particularly at the higher strikes. Although, the MRSL reduced the semi-variance in revenue, it does not always lead to higher revenues in years when droughts were experienced. However, the risk measures were more congruent at the extreme tail. For instance, MRSL indicated efficiency for 12 shires, only one of them contradicted the results from the CTE at the 5th percentile strike. At the 10th percentile strike, there were 13 shires benefiting from the contract based on MRSL but the CTE missed two of them. In the case of the 12 shires MRSL flagged as deriving value from the 30th percentile contracts, six of them were not captured by CTE. The incongruence in the efficiency measures increased with the strike levels. Generally, it seems that the MRSL does not respond to strike levels like the CTE.

One would have expected that when the yield-index relationship is stronger there will be higher hedging efficiency. This expectation was however found to be inconsistent (Table 1). Complex multi-trigger indices may have to be designed to capture the relationship for significant improvements in hedging efficiency. Furthermore, the pricing of weather index insurance contracts does not capture the relative efficiency of the contracts. The most expensive contracts were not necessarily the most efficient and the cheapest contracts were not necessarily the least efficient. Furthermore, actuarial burning cost analysis does not capture the relative efficiency of the contracts.

<table>
<thead>
<tr>
<th>SHIRES</th>
<th>R-square adjusted (%)</th>
<th>5% strike</th>
<th>10% strike</th>
<th>30% strike</th>
</tr>
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<tr>
<td></td>
<td></td>
<td>↑MRSL (%)</td>
<td>↑CTE (%)</td>
<td>↑MRSL (%)</td>
</tr>
<tr>
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<td></td>
<td>*Price</td>
<td>³</td>
<td>*Price</td>
</tr>
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<td></td>
<td></td>
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<td>↑CTE (%)</td>
<td>↑MRSL (%)</td>
</tr>
<tr>
<td></td>
<td></td>
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*Prices are in percentages of insurable interest; ↑MRSL = Mean Root Square Loss, negative changes imply risk reduction; ↑ CTE = Conditional Tail Expectations, higher values imply higher utility to the farmer.

Table 1: Relationship and Hedging efficiency of optimised weather index insurance contracts

Figure 1: Risk reduction effect of an efficient weather index insurance contract – the case of Balonne
As shown in Table 2 below, the probability of a high profit was highest for a single year and two year pooling but this is also associated with high probability of loss. The decline from 73% for a single year pooling to only 19% for a ten-year pooling for the 5th percentile contracts is the cost of having no loss ratio greater than 300% for the ten-year risk pooling. This trend persisted across the other strike levels. In addition, an increase in strike levels further tempered the risk in that the probability of extreme values decreases towards higher strike levels across the various years of pooling. This climaxed in zero probabilities for loss ratios less than 50% and greater than 300% for the 30th percentile strikes for ten years of risk pooling. One could conclude that temporal risk pooling reduces systemic risk to the insurer. The analysis also confirms the systemic nature of drought risk at the extreme tail. Insurers will be more comfortable bearing modest risk over the long-term than the most extreme risks over the short-term. To bear the extreme tail risk, reinsurance cost may have to be factored into the pricing of the contract making it more expensive for farmers. It is however reasonable to expect that the Australian community may be better off insuring the risk of drought than following the current pattern of risk management as noted in12. It is also expected that experience, over time, will prove the worth of the insurance as insured farmers weather the storms of droughts unlike their uninsured counterparts. The effect of the insurance could also be tempered as farmers pass on part of the cost to consumers. This implies that the society at large bears the cost of the insurance and therefore the problem of equity or politicisation of drought response would not arise. This arrangement should be more equitable in that the 

<table>
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<th>Year</th>
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<tr>
<td>SD</td>
<td>3.35</td>
<td>3.72</td>
<td>2.62</td>
<td>2.51</td>
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Table 2: Loss ratio probability by strike level

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<th>Probability of Loss Ratio</th>
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<th>30%</th>
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<td>&lt;50%</td>
<td>0.73</td>
<td>0.58</td>
<td>0.39</td>
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<td>50% to ≤100%</td>
<td>0.05</td>
<td>0.10</td>
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<td>200% to ≤300%</td>
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<tr>
<td>&gt; 300%</td>
<td>0.10</td>
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<td>0.02</td>
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Table 3: Estimated Annual Loss Ratios at different strike levels
proportion of the insurance an individual pays indirectly by buying the product (in this case flour products) is the extent to which the individual has consumed the product whereas, spending taxpayers funds to bail out farmers translates into an assumption that everyone consumes the product equally.

From Table 3, it is obvious that the risk could be spatially pooled. Although there were some years when both QLD and WA shires had non-zero loss ratios, the loss ratios show that they did not experience droughts to the same extent. Year 2010 is the most extreme case because WA experienced drought with a loss ratio of 2276%, QLD experienced no drought payout because of the flood experienced in the state during the same period. Pooling the risk across the two states reduced the loss ratio to 1459%. The risk is further tempered at higher strikes. The standard deviations also revealed that the risk is higher for a single state than when risks are spatially pooled and higher strikes also indicated lower standard deviations. For instance, in QLD, at the 5th percentile, the standard deviation was 3.35 but this steadily reduced to 2.51 and 1.47 across the 10th and 30th percentile contracts. When risks were pooled, the standard deviation reduced to 2.62 which was lower than the 3.35 for QLD and 3.72 for WA. The trend in lower standard deviations as the strike level increases persists for each shire and for all shires combined. It could also be noted that loss ratios in WA shires were more volatile than those of QLD although QLD had more variable rainfall and yield. Another major finding of our study is that drought risk to the insurer is inversely proportional to strike levels, years of pooling and spatial pooling but the converse is the case in terms of benefits to the farmer based on CTE analysis. Consequently, the reduction in risk to the insurer’s portfolio arising from increases in strike levels comes at the cost of reduced benefits to the insured.

The findings in this study were similar to previous studies that cautioned against the one-size-fits-all approach to the design of WII and the pattern in loss ratio analysis was essentially the same as that of Chantarat7.

**RECOMMENDATIONS**

We recommend that researchers and practitioners investigate further into the methodological frameworks appropriate for the pricing of weather index insurance contracts and measurement of its efficiency. In addition, appropriate legal frameworks are required to enhance effective use of the product and it should be given appropriate considerations in the effort to marketise weather risk management in Australia. A

The full version of this paper by Adeyinka, A.A., Krishnamurti, C., Maraseni, T. and Chantarat, S. was presented at the 2013 Actuaries Summit and can be downloaded from http://www.actuaries.asn.au/ SUM2013/Program/Media.aspx

**BIBLIOGRAPHY**


7 Chantarat, S 2009, ‘Pro-poor risk management: essays on the economics of index-based risk transfer products’, Cornell University Faculty of the Graduate School.


Given the recent floods in Queensland and elsewhere the need for a better understanding of flood prone areas in Australia is essential. It is universally agreed that flood mitigation efforts are necessary. And although mitigation takes many forms, the social and economic arguments are clear.

Governments, insurers and individuals bear the cost of flood losses. The recent floods have seen insurers put a lot of effort into developing more granular flood models, and the extent of the problem and the complexity of the issues, plus the need for long-term planning, get in the way of constructing viable solutions. We are a long way from understanding the problem, and it is difficult to assess how often we can expect events to the degree of the recent floods to occur. Were they one in 100 year events? Are weather patterns changing, making predictability more difficult?

Despite the 2012 and this year’s flooding development in flood prone areas still continues, increasing exposure. To obtain some useful insights around potential losses from a repeat of a recent event, Deloitte Analytics together with its General Insurance Actuarial and Consulting division has researched future exposure by projecting population by location into the future.

By considering future Queensland flood exposure using demographic forecasting to estimate the increase in people, residences and businesses from 2011 to 2031, potential losses to the Brisbane area in 2031 are projected to be $1.14b in actual dollars.

THE FINE PRINT
The grid areas on the following maps (see next page) show the areas which were impacted by the recent Brisbane floods. The first map reflects the actual residential built environment in 2011, and the second map projected exposure in 2031. The third and fourth maps show actual 2011 exposure and projected 2031 exposure for business sites.

What the data tells us is that, in the absence of any changes to planning regulations, there will be continued growth in the recently flood affected areas. The projected increase equates to a 34% increase in population, a 36% increase in residences and a 56% increase in businesses.

“About $5.6 billion was spent on disaster recovery and rebuilding in 2011. In stark contrast, only $27 million was spent on disaster-mitigation works. Yet, for every $1 spent by government on mitigation, Australians save between $2 and $10 avoiding the physical and economic aftermath of events.”

– PATRICK SNOWBALL, SUNCORP CEO

Source: Deloitte Analytics/Actuaries and Consultants (2013)
The Insurance Council of Australia estimates that flooding in Queensland between December 2010 and January 2011 incurred a total loss of $2.388b. Whilst figures isolating the Brisbane area alone are not currently available, conservative assumptions can be made that the Brisbane area accounted for 50% of the loss, and the combined increase of residences and businesses to 2031 is 36%. Applying this rate would give an incremental increase in loss on a similar event in 2031 of $430m in 2011 dollar terms. This would equate to $1.14b in actual dollars in 2031.

THE IMPACT
There is a greater interest from reinsurers in both assessing the concentration of exposure to risk by geographical area, and the likely future economic loss. This may result in higher reinsurance costs linked to the extent of exposure individual insurers have. Insurers which are currently risk averaging across larger geographic areas may have reasonable portfolio profitability when no major events occur, but a significant impact on profitability when severe natural hazards occur.

THE ACTION
From a strategic perspective insurers need to determine an appropriate level of exposure to risk, likely reinsurance costs and the market share they are likely to achieve with a given premium structure in a competitive market.

A critical issue that needs to be addressed is the extent to which cross subsidies will be applied in order to set attractive premiums in higher risk areas that grow market share and profit in good years, but lead to higher losses (depending on reinsurance cover) in bad years.

INSURANCE IS A SOCIAL GOOD SOLD FOR PROFIT
Insurers cannot be expected to bear the burden of inappropriate development, and government action is needed to halt future development in flood prone areas, AND ameliorate current exposure through mitigation efforts.

The current option is to allow the cost of insurance to be a signalling mechanism which will encourage mitigation efforts through market forces. But this ignores the extent of reliance on the approval process for what turns out to be inappropriate development.

Clearly the insurance industry and local, state and federal governments have some serious thinking to do.
WHAT CAUSES ORGANISATIONAL FAILURE?

Identifying, assessing, understanding and mitigating emerging risks are some of the most difficult tasks in risk management. Yet, they are essential in order to develop a resilient organisation that can adapt to an evolving environment. When we look at the causes of why organisations suffer large, unexpected losses and those that ultimately fail, it is typically not the result of the risks they are aware of and actively manage, but rather the ones that they either haven’t seen before or are novel in some way. History is littered with examples where combinations of multiple causal events interacted in unexpected ways to produce catastrophic losses. You only need to look at the history of rogue traders to evidence this.

When such risks manifest themselves, it becomes clear with 20:20 hindsight what characteristics the risks have and how they might be classified. However, before this point, these risks are essentially emerging risks, characterised by being things that you don’t fully understand, that may be material, and for which the likelihood, severity and timing are uncertain. Understanding them properly is, thus, really an exercise in understanding the uncertainty in how they may evolve dynamically over time.

Emerging risk assessment is an important part of the ICAAP process, which requires organisations to undertake stress testing and scenario analysis in order to understand and better manage the risks it is facing. However, to date most organisations tend to focus on a relatively small number of single risk factor stresses or simple scenarios that they already know and are easy to quantify. As a consequence, there is typically a disconnect between these and the risk scenarios that actually drive material losses and organisational failure. In order to bridge this gap, organisations are now starting to look at enhancing ways to systematically and meaningfully incorporate emerging risk assessment into this process.

AN EVOLUTIONARY APPROACH TO EMERGING RISKS

Are so called ‘black swan’ risks really unpredictable? From an evolutionary perspective, a black swan should not be a surprise – but an orange swan with purple dots would be. Risks bear considerable similarities to organisms: they exist in a particular environment; they change over time; and they have uncertain outcomes. The evolution of risk is partly determined by the uncertain nature of risks, partly by the environment and partly by human behaviours.

In order to identify emerging risks, a risk DNA methodology has been developed that uses phylogenetic approaches developed for biological and language evolution. It provides insight into the lineage, pace and characteristics of the evolution of risks. It cuts across organisation boundaries and disciplines; looks at risks for what they are, at an almost fundamental level; and then groups them accordingly. By adapting phylogenetic analysis, it is possible to determine an enterprise risk DNA map, which can unlock some surprising insights into risk behaviour.

Phylogenetics not only indicates the similarities and differences between species, but also illustrates their evolutionary relationships. There are three major methods and algorithms employed to construct phylogenetic trees: distance matrix, maximum likelihood and maximum parsimony. The parsimony principle favours the tree with the least evolutionary changes. Methods based on the principle of maximum parsimony are by far the most widely used because they are the most logical and intuitive to apply. A detailed methodology of the phylogenetic techniques is given in 2012 Clark Prize winning paper, available from the Institute and Faculty of Actuaries’ website1.

The outputs from phylogenetic analysis are tree-like shapes, often called ‘evolution trees’, ‘phylogenetic trees’ or ‘cladograms’. An evolutionary tree is essentially a connected graph that is composed of nodes, which represent species (risks) and branches. A risk tree is studied from left to right. As we move to the right, the tree branches to indicate points where the risk characteristics are evolving. Figure 1 (p29) shows a section of a tree with two legs representing risks A & B, ‘lost intellectual property rights’ and ‘claims infringement of intellectual property rights’, respectively. The risk characteristics are indicated by the numbers on the branches: 22 – ‘inadequate legal framework’, 7 – ‘crime’ and 25 – ‘human error or incompetence’. This tree shows there was an earlier risk with hazard 22 from which emerged the two new risks, A & B, with additional characteristics, 7 and 25 respectively.
Figure 1: (right) shows a section of a tree with two risks. The characteristics are indicated by the numbers on the branches: 22 – ‘inadequate legal framework’; 7 – ‘crime’ and 25 – ‘human error / incompetence’.

There are many patterns formed within the trees which indicate where evolution is most likely, thus helping with the monitoring and prioritisation of emerging risk management. Some of the more common patterns are shown in Table 1 below:

Table 1: Patterns in evolution trees

<table>
<thead>
<tr>
<th>CHARACTERISTIC / EXAMPLE EVOLUTION TREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW BIFURCATION:</td>
</tr>
<tr>
<td>Low numbers of bifurcations, shown by long straight branches, indicate areas of limited emergence. These areas are stable and independent from other risks. They possess few characteristics and can be more easily tracked.</td>
</tr>
<tr>
<td>HIGH BIFURCATION:</td>
</tr>
<tr>
<td>High numbers of bifurcations indicate areas of high complexity where risks are more likely to evolve from. This is shown by many branches on the evolutionary tree. Character patterns in these highly active regions can often be identified, creating an early warning system.</td>
</tr>
</tbody>
</table>

PATTERNS:
Pattern spotting between sets. As an example, pairs of common characteristics appearing in multiple locations can be used to identify potential locations for emerging risks. The emerging risks occur where one of the pair of characteristics exist. It is possible that these single characteristic locations may evolve into the common pair. Pair spotting (and other character pattern spotting) can be used to make predictions or construct scenarios about future risks.

SUDDEN CHARACTER EMERGENCE:
The same character in multiple risk locations indicates something is changing fast. If characteristic ‘14’ was ‘government’, for example, why is it suddenly affecting so many risks and what will the consequences of this be?
CASE STUDY
In order to demonstrate this technique, we have applied it to operational losses associated with derivatives. We have leveraged the work produced by Thomas Coleman who mapped a range of relevant characteristics to a number of major derivative loss events. The loss events are shown in Figure 2.

We have taken this mapping data at face value from *A Practical Guide to Risk Management*, with the exception of aggregating some of the finer levels of granularity on the security type. These characteristics are somewhat subjective, and clearly it would be possible to define additional characteristics, but they are sufficient for our purposes to demonstrate this technique. Figure 3-4 shows the evolutionary tree for this data and the 14 different characteristics used.

Each branch in the tree ends in a specific loss event. Each branching point is defined by a split in the characteristics as identified by the numbers that are common to all members of the sub-branches. The first thing that is noticeable in this tree is the division into three major clades or groups:

- normal activity gone wrong (characteristic No. 4);
- fraudulent activity (characteristic No. 1); and
- collection of “simple” events characterised by the use of a range of derivatives (characteristic No. 14).

These can be considered the fundamental, or most systemic, risk elements. So, for example, the presence or absence of the fraud characteristic defines the first major break in lineage and forms the largest fraud clade. At the bottom of the tree is the derivatives clade which shows very little evolutionary process. These events can be considered to be relatively stable and unchanging in nature. These are the crocodiles of the risk world—they have reached their evolutionary peak and show little sign of emergent behaviour.

In contrast, there are two areas in the fraud clade that show significant evolution through a large number of bifurcations in characteristics. They can be considered to be highly evolving risk events. These types of events should be studied in detail, as companies with similar characteristics to these events are more likely to be subject to emerging risk. Furthermore, we would generally expect to see increased complexity in the new risks that evolve in these highly active areas.
Characteristics that appear frequently are more likely to appear in the future. The sequence of characteristics can also be important, as some characteristics tend to occur towards the end of branches rather than at the beginning. For example, characteristic 9 (Long-term accumulated losses in excess of three years) always occurs at the end of a branch structure, indicating that it could readily jump across to another branch to define a new emerging risk characteristic.

We have highlighted bifurcations involving characteristic number 8 (Lax management/Control problem). This is a very common characteristic, as it is evident in almost all branches/events. In many cases, it is also evolving jointly along with a number of other characteristics such as:

• 10: Single person;
• 5: Trading in excess of limits;
• 12: Physicals; and
• 7: Failure to segregate functions.

Characteristics 8 and 5 (trading in excess of limits) in particular seem to be very closely related in evolutionary terms. Note that this seems somewhat logical in hindsight, but we arrived at this conclusion through an objective analysis based purely upon a rich classification dataset. This could be very important information, as it provides clues as to what characteristics emerging risk events might have in the future. From this, we can then ask more focused questions such as:

• What would the next West LB (very top) or NatWest Markets (near bottom) events look like, if they evolved to contain a 5 characteristic (trading in excess of limits) as they already have a 8 characteristic?
• What would this event possibly look like if it happened at my organisation?

IMPLICATIONS
Firstly, risk can be viewed as an evolutionary process that gives rise to emerging risks. This will be the case whenever the underlying system involves human behaviours or is a complex adaptive system. Investigating the evolving characteristics of risk events in the past can provide insight into our understanding of how emerging risks might occur in the future.

Secondly, it is important to capture multiple characteristics of risk events, both in terms of realised historic events, as well as forward looking events. Valuable information may be lost if risks are forced to be assigned to only single categories or characteristics, which may be the case if risk register software constraints exist, if a prescriptive risk classification framework is narrowly defined, or if the emerging risk identification approach is biased from the outset to focus on single processes or risk silos. The quality and completeness of loss data collection and classification processes become critical activities in the emerging risk process.

Thirdly, the risk taxonomy can be determined objectively from the data, rather than being defined prescriptively in an ex-ante sense. Risk taxonomies are almost always defined on the latter basis, resulting in linear structures, which is only appropriate in rare situations whenever system complexity is low. However, humans tend to overly simplify situations where there is complexity, losing valuable information in the process. By defining the risk taxonomy objectively through this framework, we are able to map the interrelationships and connectivity between different risk branches, to gain insight into how risk events are truly related.

This is closely related to the discussion on the boundary between risk classes. Whilst it is a natural human response to try to carve everything up neatly into independent risk silos, with risks such as operational risk, it is not quite as appropriate to do so because of the high degree of interaction with other risk types. The Société Générale rogue trading event is a good example here, as there are clearly elements of market risk, operational risk and liquidity risk involved in the generation of the final loss amount.

The final implication is that the above framework provides a structured way of addressing emerging risk. It is another lens through which we can possibly gain insight into future emerging risk events that we haven’t yet seen and when we are not sure exactly what we should be looking for.

CONCLUSION
Taking into account the unique evolutionary history of an enterprise’s risk system, it is possible to determine the likely future trajectories or emergence of new and evolving risks. The evolutionary tree shows what the parent risk is and when a risk characteristic combines or separates to form a new lineage or emerging risk. This allows focused scenarios to be developed for the ICAAP of how emerging risks could evolve both within and between risk classes, hence allowing for early intervention, and thus, the enhancement of organisational resilience. Lastly, the analysis provides a unique and powerful way of classifying risks that is independent of traditional organisational boundaries and structures. This can aid effectiveness and efficiencies in managing risks and allocating risk-related resources or capital.

The full version of this paper was presented at the 2013 Actuaries Summit and can be downloaded from http://www.actuaries.asn.au/SUM2013/Program/Media.aspx

2 Cladograms produced using Evolutionary Risk Analysis software available from www.systemicconsult.com
**INTRODUCTION**

Floods present a complex phenomenon for insurers and governments to manage. Despite the increased attention in recent years, formulating a position around management of the risk and development of insurance models remains a challenging process requiring different considerations across jurisdictions.

While much has been written on the Australian context as policy is developed around the appropriate level of government intervention in flood financing and mitigation, less focus has been placed on the various approaches taken internationally. The following article attempts to bridge this gap by providing a high-level summary of the key challenges and work being undertaken in flood management in the United States (US) and the United Kingdom (UK).

This piece is an updated version of the articles first published in the April 2013 GIPC Newsletter.

A full list of the resources used in researching this article can be found at the end of this article (page 34).

**US DEVELOPMENTS**

**INTRODUCTION**

Following the devastating effects of Hurricane Katrina and Rita in 2005, and more recently, Hurricane Sandy in October 2012, the US government has undertaken reforms to improve the sustainability of its flood insurance scheme, the National Flood Insurance Program (NFIP). The NFIP, established on 1 August 1968 as a response to the rising cost of taxpayer-funded disaster relief, aims to mitigate future flood losses by enabling property owners to purchase affordable insurance protection from the government while encouraging communities to adopt and enforce floodplain management ordinances.

On 6 July 2012, Congress passed and President Barack Obama signed into law the Biggert-Waters Flood Insurance Reform Act of 2012, aimed at addressing challenges to the long-term sustainability of the Federal flood protection program.

This article summarises the key provisions of the 2012 reforms and the challenges which provided the impetus for change as outlined in a report prepared by the Congressional Research Service, *The National Flood Insurance Program: Status and Remaining Issues for Congress.* (www.fas.org/sgp/crs/misc/R42850.pdf)
FLOOD MANAGEMENT CHALLENGES

Significant flood events over recent years have highlighted deficiencies in the underlying structure of the flood insurance scheme, which without remediation could place pressure on the NFIP’s financial solvency.

The two largest flood events covered to date by the NFIP, Hurricane Katrina and Hurricane Sandy, have both occurred within the last decade, resulting in US$16.3 billion and an estimated US$12-15 billion in flood insurance claims respectively. However, as there is no financing mechanism to handle catastrophic losses under the existing structure, the NFIP has relied on Treasury borrowings and has accumulated an outstanding debt of $17.5 billion. Unlike private sector insurers, the NFIP is not required to purchase reinsurance cover, and so to finance flood claims following Hurricane Sandy, the NFIP was required to seek approval from Congress to increase its borrowing capacity by $9.7 billion (from $20.7 billion to $30.4 billion).

Given the intent to provide affordable flood insurance, even for high-risk properties, premium rates set by the NFIP do not reflect the true risk exposure. Beyond providing subsidies to high-risk properties, the NFIP does not set a rate which allows for the cost of capital, taxes or contingent reserves. In a 2011 report undertaken by the Property Casualty Insurers Association of America, the NFIP’s rates were estimated to be half the true market-risk cost, with the rates for high-risk properties being approximately one-third of the true market-risk cost. This rate setting approach impacts the NFIP’s ability to build up a surplus to fund unexpected flood events.

Despite flood insurance being mandatory for all residents in floodplains with federally-backed mortgages, participation in the NFIP has been historically low. The report refers to a 2012 New York Times article following Hurricane Sandy suggesting that only 18% of households in flood-prone areas have flood insurance. As a result of the low take-up, the government’s exposure to uninsured property losses due to flooding remains substantial.

RECENT DEVELOPMENTS IN FLOOD INSURANCE

To improve the financial solvency and efficiency of the NFIP, the Biggert-Waters Flood Insurance Reform Act of 2012 was enacted with key provisions relating to:

- Implementing rates that better reflect the true risk: Actuarial rates will be gradually phased in which may take into consideration historical loss data (including catastrophic losses) and other factors such as coastal storm surge and climate change. In addition, subsidies previously available on specified properties will be removed with the intent to discourage development in flood-prone areas. Premiums are expected to increase by an average of 10% for policies written or renewing from 1 October 2013.

- Investigating the feasibility of increasing private sector involvement: The reforms require studies to be undertaken into the capacity of the private reinsurance market to assume a portion of the NFIP risk in order to reduce its flood exposure and hence reliance on Treasury borrowings.

- Establishing a catastrophe reserve fund: A US$12 billion reserve fund will be created as a mechanism to spread the costs associated with catastrophic losses over time and to minimise the likelihood that the NFIP will need to draw on Treasury borrowings on occurrence of future flood events. The reserve fund will be funded from policy premiums where the contribution is expected to be 5% of the total premium.

- Increasing participation in the NFIP: Penalties against regulated lending institutions that fail to require flood insurance have been increased from US$350 to US$2,000 per violation in an effort to improve the enforceability of the mandatory purchasing requirement. In addition, a study is being undertaken to investigate methods to encourage and maintain participation, and to educate consumers about the NFIP.

While successful implementation of the reforms are expected to improve the sustainability of the NFIP, there remain a number of issues which are still being worked through, such as those relating to the affordability of flood insurance (particularly given the change in pricing provisions), repayment of the NFIP’s accumulated Treasury debt, and an increasing flood exposure due to continuing extreme weather events and population growth. When it comes to issues in flood management, it appears apt to say that when it rains it pours.

UK DEVELOPMENTS

INTRODUCTION

Since the devastating 2007 UK floods caused damages of £3.2 billion and the subsequent Pitt Review into flood risks, flood risk management and insurance have become areas of activity and change in the UK.

This article summarises some of the information available on the state of flood risk management in the UK and current developments in flood insurance. As this area is currently very active, readers should note that information contained in this article is up to date as of 1 July 2013 and may not capture developments beyond this date.

STATE OF FLOOD RISK MANAGEMENT

The national flood and coastal erosion risk management strategy sets out the UK government’s framework for managing flood risk. Aspects of the flood risk management have seen changes over recent years, including:

- Legislation – the Flood Risk Regulations 2009 and the Flood and Water Management Act 2010 (to be fully implemented by 2014) were introduced following the Pitt Review and the EU’s 2007 flood directive.

- The EU’s flood directive sets out milestones regarding the preparation of preliminary risk assessments (by 2011), maps of flood risks (by 2013) and plans for managing flood risk (by 2015). These legislative changes have translated into actions in areas of flood risk management;

- Flood mapping – the Environmental Agency has produced flood maps which show the potential areas subject to flood risk and areas protected by defence mechanisms. These maps assist with ensuring compliance with the EU flood directive; and

- Funding for flood risk management/mitigation – the UK government has committed £2 billion between 2011 and 2015 to improve flood risk management, covering aspects such as improving forecasting and early warning systems, ensuring current defence mechanisms are in working order and improving flood protection for householders.

Work is continuing on improving flood risk management. The links between mitigation activities and insurance continue to provide incentives to improve flood risk management.
RECENT DEVELOPMENTS IN FLOOD INSURANCE

In 2008, the Association of British Insurers (ABI) and the UK government updated the Statement of Principles (SoP), an agreement on the provision of flood insurance in the UK. Key elements of the SoP are:

- the ABI committed to provide flood coverage as standard on householders and small business policies where the property faces an insignificant risk of flood (i.e. less than a 1 in 75 chance of flood in a year) or where the property is at a significant risk of flood, the Environmental Agency has planned flood risk reduction measures to be implemented within five years to reduce the risk to an insignificant level;
- premiums and policy terms are set to “reflect the level of risk presented”; and
- new buildings built from 2009 are not covered by this agreement, with the ABI encouraging people to check if a property is insurable prior to purchase and development.

In the lead up to the SoP’s expiration on 30 June 2013, both parties engaged in negotiation to reach a new agreement amidst concerns over the ability to secure cover and affordability as insurers continue to improve their ability to reflect risk in pricing and reduce the level of cross subsidisation beyond this date.

The negotiations over an insurance model occurred under a set of overarching principles for flood insurance. These principles were agreed to by stakeholders, including insurers and the government, at the Flood Summit in 2010. They support the wide availability of insurance, equitable provision of flood insurance, and premiums and policy terms which reflect risk and do not distort competition.

Despite the above common principles being in place, the negotiation over a common insurance model was not straightforward and the debate between stakeholder groups received high profile media attention. The following captures some of the stakeholder positions/proposals as they emerged from the debate:

- the ABI released a proposal for a flood insurance fund to which policyholders pay a small levy from which flood claims for high-risk properties can be paid. It proposes the government provide an overdraft facility in case payments in early years exceed the fund balance as it builds up;
- the National Flood Forum, a British charity organisation dedicated to assisting flood impacted individuals, has proposed equal flood premiums regardless of the risk profile of the property; and
- the UK government is not supportive of public subsidisation of insurance premiums. There are also affordability concerns associated with the existing SoP. The Flood Working Group Party notes that as the level of cross-subsidy in the market decreases, those who are most in need may be left under-insured or even uninsured.

In May 2013, the ABI and UK government agreed to extend the SoP deadline to 31 July 2013. Interested readers can follow the developments on the SoP renewal online.

ACKNOWLEDGEMENTS

This article draws heavily from a number of sources and the authors wish to acknowledge their reliance on these resources in writing the article. Interested readers may follow the links to find additional information on the topic.

- The Department of Food, Environment and Rural Affairs website (accessed 11 April 2013).

Christopher Vo (US Developments) and Mary Poon (UK Developments) are both Members of the GIPC Editorial Board
Comment

A Topic of Interest

How to Extrapolate the Yield Curve

INTRODUCTION
One of the most fundamental concepts in actuarial practice is the time value of money. For any work where future cash flows are allowed for, such as reserving or pricing, it is natural to discount to present values so that an appropriate amount of money can be set aside today, allowing for future investment returns.

It is widely accepted that for claims reserving, liabilities should be discounted using the prices of the ‘risk-free’ assets available in the financial markets. This means that the present value of a liability cash flow should be set equal to the market price of a basket of risk-free assets that provides a matching cash flow.

Despite this general agreement, for some time there has been considerable debate on some practical aspects of the principle. This debate gained intensity following the global financial crisis of 2007/08 which saw large increases in the price of risk-free assets and correspondingly, large decreases in risk-free interest rates.

Issues of debate include:
- What are the best instruments to use to determine risk-free interest rates?
- Should the risk-free rate include an ‘illiquidity premium’?
- What should be done when the liabilities being valued extend beyond the term of available market instruments?

In the Australian context, where we have a deep and liquid market in AAA rated Commonwealth Government Bonds, the Australian Prudential Regulation Authority (APRA) has made it clear that it regards these bonds as the best instruments to use to determine the risk-free interest rate. Further, for general insurance liabilities at least, APRA do not allow the inclusion of an illiquidity premium. However, the issue of what should be done when the liabilities being valued extend beyond the term of available market instruments has, in our opinion, not been fully addressed in any current Australian regulations. Further, actuaries operating in the Australian market have adopted a wide range of approaches to this issue and this has led to inconsistent valuations of long-term liabilities across entities. This issue is particularly relevant for Australia where the term of the longest dated government bond is currently around 15 years – in many other countries government bonds are available for terms of up to 30 years or more.

The aim of this article is to review the issues relevant to yield curve extrapolation. Figure 1 shows the three key features required in an extrapolation:
1. Deciding on a starting point for the extrapolation of the known yield curve.
2. Finding an appropriate long-term rate, which we refer to as the ‘Unconditional Forward Rate’ (UFR).
3. The speed and path of moving from the fitted curve to the UFR.

PHILOSOPHICAL AND REGULATORY CONSIDERATIONS
There are two philosophical approaches to yield curve extrapolation. The first emphasises market consistency, by which we mean that the yield curve is a genuine attempt to predict the yields on long dated government bonds, were they to exist. The liability estimate therefore aims to accurately quantify the cost of transferring that liability in the current market conditions. The second approach emphasises liability stability. This will tend to estimate the extrapolated yield curve so that it is more stable over time. This reduces the business impacts of volatility in the liability estimate, particularly when offsetting financial investments do not exist.

Our reading of current regulatory and professional standards in Australia is that, while not being completely explicit, the market consistent approach is to be preferred. In our research we have attempted to extrapolate the yield curve using this market consistent approach.

WHAT IS THE LONGEST MARKET FORWARD INTEREST RATE WE CAN ESTIMATE RELIABLY?
A common starting point for extrapolation is the term of the last available market instrument. In this section we consider reasons why this may not always be appropriate.

The most common approach to yield curve fitting is to estimate the forward rate curve using a smooth parametric fit to the observed prices. These fits contain a small amount of error as the pricing ‘noise’ of individual bonds lead to small departures from a smooth shape.
Figure 2 shows the estimation of the yield curve at 31/12/2011, using an exponential spline method commonly used for fitting such curves. Bond yields were available going out to duration 15 years. We have estimated the error of this fit along the curve by looking at the errors associated with the fit. Up until a term of 10 years, the 90% confidence interval is around 10-15 basis points in width. But by year 13 it has spread to 25 basis points, and reaches about 40 basis points by year 15.

Figure 2: Estimation error in the forward rate curve, 31 December 2011

While there are a number of reasons for this widening, we have found the pattern in the confidence intervals to be similar whenever the yield curve is estimated. Thus our first recommendation is that we should not be overly reliant on forward rate estimates made at the long end of the fitted forward curve, in particular the last two years of the observable range. In the example above, we would start the extrapolation at duration 13 years.

** WHAT IS AN APPROPRIATE VERY LONG-TERM ‘UNCONDITIONAL’ FORWARD INTEREST RATE?**

The rational expectations hypothesis of the term structure of interest rates suggests, in its more general form, that long-term forward rates are the sum of the expected future short-term interest rate plus a constant ‘term premium’ that varies only by term but only slowly over time. Taking this to be true, the process of determining the ultimate very long-term ‘unconditional’ forward interest rate (’UFR’) would involve making estimates of what these two components are. Unfortunately, neither component is particularly easy to estimate.

The problem of setting the expected short-term interest rates is usually split into determining the:

- expected future inflation; and
- expected future real short-term interest rate.

In relation to expected future inflation, the Reserve Bank of Australia has been very successful in targeting inflation and entrenching low and stable inflation expectations for at least the last 15 years. It seems reasonable then to adopt the mid-range of the bank’s current CPI target of 2-3% as our future inflation expectation. For expected real short-term interest rates a typical approach has been to look at historical averages for real cash returns across several countries. We believe a real short term rate average of 2% is fairly consistent with the conclusions in recent research.

Term premia are the differences between the forward rates and the expectation of the future short-term interest rates. They arise from:

- the premium demanded for locking in a long-term rate;
- duration preference, leading to different relative demand; and
- convexity effects, where gains from small interest rate changes on long-dated bonds tend to be larger than losses.

These premiums can also change markedly over time. Some recent work has estimated term premia are somewhere in the range of 1-2%.

We present our estimates of each of these components at the present time in the table below. Based on this, we believe that a UFR of about 5.8% seems reasonable for Australia.

**Table 1: Components of the Unconditional Forward Rate for Australia in 2012**

<table>
<thead>
<tr>
<th>Component</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected future short-term interest rate</td>
<td>2.5%</td>
</tr>
<tr>
<td>Expected future inflation</td>
<td>2.0%</td>
</tr>
<tr>
<td>Expected future real interest rate</td>
<td>4.5%</td>
</tr>
<tr>
<td>Term Premium</td>
<td></td>
</tr>
<tr>
<td>Risk Premium</td>
<td>1.5%</td>
</tr>
<tr>
<td>Convexity adjustment</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Unconditional forward rate</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

**WHAT PATH FROM THE KNOWN CURVE TO THE UFR?**

We now move on to the final and arguably most important aspect of yield curve extrapolation: what path should be set between the longest duration market rate and the unconditional forward rate and how long should we take to reach it? The speed of ‘reversion’ to the UFR is of practical importance; in the Australian context, if it returns quickly (by duration 20 years say), then long-tailed liabilities will be considerably more stable over time than if it returns slowly (e.g. by duration 100).

We have attempted to answer this question by looking at the relationship between medium and long duration bonds in some countries that do have longer dated bonds – USA, UK and Canada. Letting $f_s$ be the instantaneous forward rate at term $s$, consider the simple linear regression equation:

$$f(s+t) = \alpha_{s:t} + \beta_{s:t} f_s$$

This gives the relationship between the forward rate at term $s+t$ and the forward rate at term $s$. The intercept $\alpha_{s:t}$ allows for the UFR as well as any (fixed) term premiums across the yield curve, and $\beta_{s:t}$ is the linear dependence of the forward rate at term $s+t$ on the forward rate at term $s$. The estimate of $\beta_{s:t}$ should be a good indicator of progress towards the UFR; if the slope parameter is close to 1, this implies the forward rate at $s+t$ is still moving in sync with the rate at $s$, so no reversion to the UFR has taken place. Note too that if the slope was consistently close to 1 as $t$ increases, this would
be strong evidence against any reversion to the UFR. Conversely, if the slope is close to zero then the forward rate at \( s+t \) is largely independent of the rate at \( s \), suggesting that it has reverted to a constant level.

Figure 3 shows the estimated slope parameter on US data since 1998, where \( s = 10 \) and duration = \( s+t \) is varied. The results here are surprisingly clear, with a slow near linear reversion from 1 towards 0 starting at duration 10. This suggests to us that a linear shape of reversion is plausible, and that this reversion is very slow; when the 30 year forward rate is regressed against duration 10, the slope parameter is still around 0.7, suggesting a very slow reversion to the UFR.

Figure 3: Slope (\( \beta \)) coefficients for USA forward rates regressed against \( f_{10} \).

We can extrapolate the fit to estimate the duration at which the UFR is reached. Our results for each country are shown in Table 2. All estimates correspond to slow reversion, although there is significant uncertainty in estimation and variation between countries.

Table 2: Regression results for the linear extrapolation model

<table>
<thead>
<tr>
<th>Country</th>
<th>Duration decay starts (yrs)</th>
<th>Duration when reach UFR (yrs)</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>10</td>
<td>82</td>
<td>(55, 168)</td>
</tr>
<tr>
<td>UK</td>
<td>15</td>
<td>34</td>
<td>(31, 40)</td>
</tr>
<tr>
<td>Canada</td>
<td>10</td>
<td>41</td>
<td>(35, 47)</td>
</tr>
</tbody>
</table>

We also performed a principal components analysis of these yield curves as an alternative way of measuring how quickly long duration rates tend towards a value independent of the short to medium rates. This gave slightly longer estimates for reverting to the UFR than the regression approach. Our conclusions were that a linear shape of extrapolation to the UFR was plausible and that the speed of reversion was relatively slow.

IMPLICATIONS FOR HEDGING BALANCE SHEET RISK

It is possible to use a duration matching strategy to hedge risks that are beyond the longest term assets available, if you are allowed to take short positions in assets and have an estimate for the risk-free rate beyond the longest term asset. Given that this hedging approach requires an extrapolated yield curve, a natural question is whether hedging performance is better or worse if the extrapolated yield curve is assumed to revert slowly or quickly to the UFR? We have tested the success of slow and fast reversion assumptions using historical data from the Australian Government Bond market.

Without going into too much detail, we attempted to hedge a 20 year liability with four and 10 year government bonds over a period of 10 years. A hedge was considered good if the ratio of assets and liabilities remained close over time. The assumed speed of reversion to the UFR in the yield curve extrapolation made a significant difference to the hedging performance, with the slow assumption consistently performing better – see Figure 4 for example.

Figure 4: Comparison of hedging performance, starting June 1995

This approach to long-term liability hedging appears fairly legitimate from both a theoretical and historical data perspective. It gave a hedging error of less than 1% in all experiments. The performance of the fast reversion assumption is inferior, giving further evidence that a slower reversion to UFR is closer to ‘truth’.

CONCLUSIONS AND RECOMMENDATIONS

We can summarise our findings relatively succinctly:

- The yield curve up to two years before the longest dated bond can be estimated reliably. For the last year or so, the noise and method of fit can cause significant (relative) error.
- There is reasonable international market evidence for reversion to a flat long-term forward rate. This rate is reached via extrapolation from the end of the observable yield curve.
- The rate of reversion is slow. We believe term 40 is about the minimum point to reversion based on the bond markets examined, with a central estimate closer to term 60.
- A linear shape of reversion is plausible, with other approaches possible.
- Long-term risk-free hedging is possible, at least for moderate term extrapolations of the yield curve.

We believe that these results make significant contributions to actuarial assumption setting.

Finally, we note that Joe Hockey has suggested introducing 50-year Australian Government bonds in the future. Perhaps there will be a day where such yield curve extrapolations are not necessary!

The full version of this paper was presented at the 2013 Actuaries Summit and can be downloaded from http://www.actuaries.asn.au/SUM2013/Program/Media.aspx
Leadership Transitions: 
Managing Self to Managing People

For those people who manage staff or have managed people, I invite you to reflect back on those very early days when you took on this role for the first time. How did you feel? How did you cope? What did you learn in those first few days or months?

An early experience for me was boldly delegating a large chunk of work to an inexperienced actuarial student. I gave few guidelines, believing that this would provide them autonomy and a great learning experience. When there were major issues with the actuarial analysis produced, I discussed this with the analyst who shared with me they hadn’t known what to do and didn’t know who to turn to. I will never forget that feeling of shame that I had left this person feeling abandoned, and I hope never to repeat that again.

While some people seem to transition seamlessly to management, like a new born fawn finding its feet within minutes of being born, the vast majority of people seem to have a much more human experience. We arrive in the new world of management without the skills or capabilities to ‘walk’. Our first few experiences are spent prone on our backs, gradually learning to roll, then to crawl and finally, hopefully, to walk and run as managers and people leaders.

I explore why this transition can be so challenging for people coming from technical roles, the phases of maturity a people leader goes through, and some thoughts on the most effective way of leading people who are undertaking technical roles.

**CHALLENGES OF PEOPLE LEADERSHIP**

Paradoxically, when I ask people leaders on why they were promoted to a management role, a vast majority of people respond that it was because of their technical skills and capabilities. Not surprisingly, the challenges and demands in their new role are typically not technical. There are four key areas that people often struggle with initially:

1. **Shifting identity:** Letting go of the technical work, the very thing that they identify themselves by and that got them promoted in the first place. Each delegation can feel like a near death experience, “I am being asked to give away the stuff that I know so that I can do the stuff that I don’t know…”

2. **Shifting from an individual mindset to a group mindset:** Their role is no longer to deliver a specific task or project. It is to align the work of each individual in their team to the team goals and strategy, and ensure that is aligned to the organisation’s intent. Success of the manager is measured by the success of the team.

3. **Understanding multiple perspectives:** Being aware of each team member’s drives and ways of working.

4. **Building confidence:** “Who am I to be telling other people how to do their work? Am I credible enough in my own technical capability to be guiding other people’s work?”

Each of these requires a number of new capabilities, and a much deeper understanding of self and others. To develop these capabilities requires a journey of development. The table (on page 39) is a maturity framework that considers the stages of development of a people leader.

To be able to apply the maturity model to your own development, you first need to assess whereabouts on this spectrum you lie. Spend a couple of minutes to circle whereabouts you see yourself on each capability. You may find that with some capabilities you spread across a couple of maturity phases. As people’s capabilities develop and mature, they tend to develop greater flexibility and fluidity styles, depending on the context.

The next step is to consider what are the highest priorities to develop further and what is the maturity phase that you are moving towards? Developing maturity is quite different to developing skills – it’s not just skills, it’s also the mindsets and beliefs.
and uncovering of assumptions that develop. This requires practice, reflection and re-application. Examples of mindsets and beliefs that are essential for managers in the manager as coach maturity phase are as follows.

**TRUST**

Trust means trusting others as well as trusting yourself. For people to feel trusted, you must demonstrate this through being a role model – both actions and words being absolutely aligned. Any incongruence will send a hugely destructive message. One way to demonstrate trust is to seek to learn from your people! This is good for you, and great for them. And ultimately, you must demonstrate concern for the welfare of those you manage, if you expect them to trust you. As the saying goes, “People don’t care how much you know, until they know how much you care”.

**RESPECTING AND MANAGING DIVERSITY**

Letting go of the one-way/right-way... different people will do things differently (but not necessarily worse ᵃ). Drop the need to be right, even when you are. Develop a sense of each person’s skill, capacity and drive. These are three different things! Appreciate that different people need to be managed in different ways depending on their current skills, capacity and drive (situational leadership).

**PROVIDING FEEDBACK**

Feedback is the breakfast of champions. As set out in the maturity model, different people will respond to feedback in different ways depending on the meaning they attach to it; some will see it as disapproval or criticism, some will see it as essential to growth. Cater the feedback according to the person’s readiness to accept, and ensure it is constructive and point-in-time.

Don’t shy away from the hard conversations – that’s often where the most growth opportunities lie. Paradoxically, when difficult conversations take place with honesty and respect, people often appreciate in hindsight the significant learnings.

Finally, as a people leader it is important to have the humility to accept that you cannot change others; they can only do that for themselves. What you can do is to provide a space for them to choose to change, through how you lead, the conversations you have and sharpness or roundness of the boundaries you provide. Set the boundaries progressively wider as the person develops. People leadership is a lifelong journey – enjoy the ride! ᵃ
I have always been a sports and fitness person, playing in team sports since I could remember. After many years in rugby league, cricket, swimming, lifesaving, Thai kickboxing, mixed martial arts and gymnastics I took up the sport of Olympic weightlifting in late 2012 and I think I have found my true calling (apart from choosing actuarial studies).

WHAT IS OLYMPIC WEIGHTLIFTING?

Weightlifting is not just about the stereotypical bodybuilders at the gym grunting and pumping out endless bicep curls and flexing in front of the mirror. Olympic weightlifting, also called Olympic-style weightlifting or just weightlifting, is a modern Olympic sport in which athletes attempt a maximum weight single lift of a barbell loaded with weight plates.

The two competition lifts are the ‘snatch’ and the ‘clean and jerk’. Each athlete is given three attempts at each and the combined total of the highest two successful lifts determines the overall result within a bodyweight category.

The ‘snatch’ is essentially a single smooth continuous movement where the barbell is lifted from the platform to a locked arms overhead position. The ‘clean and jerk’ is a composite of two movements; the bar is first lifted to the shoulders and then lifted above the head. Properly executed, the lifts are dynamic and explosive while appearing graceful especially when viewed at half the speed.

HOW AND WHY I GOT INTO IT?

Whilst training in mixed martial arts, I would often perform simplified weightlifting movements with my coach for strength development. Over time, I started enjoying the strength and conditioning training more than the actual combative aspect of the sport (the loss of brain cells was also starting to take its toll). From a physical perspective, there is no better way to develop strength, speed, flexibility, balance and co-ordination all on a single platform with only a few pieces of equipment.

I also have immense respect for the mental component of the sport. It takes supreme focus, determination and courage to lift a heavy barbell as high as you can, pull yourself underneath the flying mass, catch it and then proceed to stand back up holding the weight above your head. In a competition, there is nothing but you and the bar in an intense battle for glory. It is this intensity and excitement that drew me towards weightlifting and I am definitely hooked.
WHAT IS THE TRAINING LIKE?
I am currently training with Burwood PCYC Weightlifting Club and I plan to enter my first weightlifting competition towards the end of this year. My program consists of four two-hour weight training sessions a week using only weighted barbells. Every lift must be treated as though it is in a competition; intensity is the key.

The main exercises that are performed include the full competition lifts, squats, shoulder presses and deadlifts. The repetition scheme for each exercise varies but generally stays between one to five repetitions for up to five sets per exercise. The aim is to perform every repetition with perfect technique and the weight is gradually increased. Every session is finished off by a different assortment of abdominal, arms and back exercises.

Stretching and mobility drills are performed daily to increase flexibility and to promote efficient movement patterns in order to prevent injuries. Weightlifters rely on supple joints and ligaments to maintain rock solid body positions throughout a lift. Stretching bands, foam rollers and massage balls are used to release tension in tight muscles.

WHAT IS YOUR DIET LIKE?
When faced with comments such as “Wow... how much do you eat?” I often respond with – my weightlifting habit supports my eating habit. In truth, it’s actually the other way around; weightlifters tend to eat more than the average person in order to supply their bodies with energy for training. I try to minimise processed and junk foods whilst eating more meat for increased protein, which is important for recovery.

WHAT SORT OF PEOPLE DO WEIGHTLIFTING?
In my experience, weightlifters enjoy challenging themselves, motivating others, don’t mind becoming strong (and ridiculously good-looking) from the intense training and usually enjoy their food, a lot.

Weightlifting is as popular with women as it is with men; contrary to mainstream beliefs, weightlifting does not make you bulky and is a very effective way of strengthening and toning the body.

WHAT OTHER CLUBS ARE YOU A PART OF?
I am also a proud member of the UNSW Barbell Club, a close-knit community that welcomes all students who share an interest in strength training. The group is a hive of information with experienced lifters imparting their experiences and knowledge to new members on a daily basis. It is great to see the likes and encouraging comments pouring in when someone posts up their latest personal record or new fitness goals on the Club’s Facebook page.

WEIGHTLIFTING SOUNDS AWESOME, HOW CAN I GET INVOLVED?
In my opinion, weightlifting is best learnt under the watchful eyes of an experienced coach. Learning the right technique will save you time and money and maybe even prevent an injury. I suggest finding a weightlifting club or an experienced personal trainer that has access to weightlifting equipment such as a lifting platform, rubberised weight plates and barbells.

If you are happy to experiment on your own, make sure your gym has proper weightlifting equipment. There are ample resources on the Internet, especially YouTube that teach the Olympic lifts. I highly recommend watching instructional videos from the ‘California Strength’ channel. Also, searching ‘Olympic lifting’ on YouTube will lead you to some fantastic and inspirational videos from the world’s top lifters.

I recommend you get an OK from your health care professional before attempting weightlifting. It is of utmost importance to start out with light weights (I used a wooden stick) to learn the correct technique. Don’t attempt to lift more weight than you can handle and remember, always have fun!

ABOUT THE AUTHOR
Danny Ma is a final year actuarial student in the Co-operative Program at UNSW and will be joining the graduate program at Quantum in February 2014. Outside of weightlifting, Danny is passionate about student leadership, enjoys long walks on the beach, laughing, recording music, and has an obsession with ramen, sushi and pearl milk tea. © BENNY LEE – TWITTER@ITSBENNYLEE

© BENNY LEE – TWITTER@ITSBENNYLEE
It’s a well-known fact that, as well as writing children’s books and poetry, Lewis Carroll (aka Charles Lutwidge Dodgson) was also a mathematics lecturer at Oxford. So, it’s not surprising that his work is overflowing with mathematical references.

Take, for example, the fifth ‘fit’ (section) of The Hunting of the Snark. In this section, one of the characters, the Butcher, attempts to demonstrate to another character, the Beaver, who has trouble counting on his fingers, that $2 + 1 = 3$. The Butcher uses the following explanation that starts with the number 3 and ends with 3 (but curiously never mentions the numbers 2 or 1):

“Taking Three as the subject to reason about –
A convenient number to state –
We add Seven, and Ten, and then multiply out
By One Thousand diminished by Eight.
“The result we proceed to divide, as you see,
By Nine Hundred and Ninety Two:
Then subtract Seventeen, and the answer
must be
Exactly and perfectly true?

Not only is the Butcher’s reasoning circular, but by writing an algebraic expression for this procedure, substituting $x$ for 3, it can easily be shown that, regardless of what number the
Butcher started with, the result could never be anything other than the initial number:

\[(x + 7 + 10)(1000 – 8) ÷ 992 – 17 = x\]

Thus, the Butcher’s demonstration is complete nonsense and proves absolutely nothing. Not that this is really surprising, given that it does come from a nonsense poem.

Lewis Carroll liked to give puzzles to his friends to solve, and on one occasion purportedly managed to cause a little girl to burst into tears after posing such a problem at the dinner table. No doubt he would, therefore, appreciate the (admittedly far more sensible) algebraic problem posed by this month’s puzzle.

Into the empty squares of the grid (right), insert the numbers from 1 to 9 so that each number appears exactly once and all of the vertical and horizontal equations are correct.

For your chance to win a $50 book voucher, email your solution to: inthemargin@actuaries.asn.au.

A ROSE BY ANY OTHER NAME... ACTUARIES 180 SOLUTION

In Actuaries 180, readers were presented with a wordsearch and asked to find the names of 23 superheroes or supervillains and match them to their secret identities.

Solution: Opposite are the locations of the 23 names in the wordsearch grid:


Seven correct answers were submitted. The winner of this month’s prize, selected randomly from among the correct entries, was Jessica Fleming, who will receive a $50 book voucher.
Like many students, throughout my degree I constantly wondered about life after university: “What does it feel like being an actuary in a corporate environment?” “What should I expect in my first job upon graduation?” and “How will I apply what I have learnt at work?” During the summer of 2012/13, I had the opportunity to be a summer intern at Munich Re, Sydney. Here, I reflect and share my personal experiences and development throughout the whole process.

My summer internship was my first actuarial-related work placement, in addition to being my first corporate job. I recall being equally excited and nervous when I received my offer. On my first day at Munich Re, my initial impression of the firm was that everyone was very friendly and welcoming. Such positive energy reassured me that I had made the right decision as to where to intern. Munich Re is a very vibrant and open company, where everyone enjoys being there and doing what they do every day. My colleagues were from diverse backgrounds and specialties which allowed me to gain a much richer exposure to the life insurance industry and the different facets of the company. In my core team of 12, there were experts from areas of claims, underwriting, product development as well as actuaries.

The earlier period of my internship was particularly difficult as I struggled with transitioning from university to corporate practice. The learning curve was steep: I often found myself lost in conversations where I couldn’t grasp the lingo and jargon used as the information was overwhelming at times. I was placed into the Research and Development Team where I was involved in a range of projects covering many areas of life insurance. Often, I was challenged to move away from my comfort zone, given assignments where I had significant amounts of autonomy in approaching the problem, and thus providing me with an opening to apply some creativity and personal flair to my work.

Most importantly, the assistance and support provided was extremely helpful. I learnt tremendously from industry experts on areas I had no prior understanding of from university. The fact that I, someone who had minimal technical knowledge, could make a positive contribution to the company gave me a sense of accomplishment and confidence in my work. Embarking upon an actuarial career has been a challenging but highly enlightening path.

Joining the company during the summer period had its perks. I attended various social events like the division’s Christmas celebration, team lunches, and morning teas. This highlighted the ‘fun’ balance of work and eroded my assumption that working life was routine. Munich Re valued people, and there was always an element of fun and camaraderie during my time there.

Upon the completion of my 10-week internship, I returned to university with much more than I had expected to gain. My Excel skills had improved greatly, I developed extensive knowledge of various life insurance products offered, and gained insight into non-traditional roles that an actuary can play. I also acquired some medical knowledge on the side, which proved to be useful in daily life application. These skills and experiences are highly valuable to me as I better understand what opportunities the future holds for me.

Becoming an actuary is a career decision where you have the chance to apply the skills you learnt in university while being surrounded by passionate and talented colleagues. I find the process of becoming an actuary not only allows me to develop professionally, but also personally as you have to overcome various hurdles along the way to achieve your ambitions.

Personally, I think taking up a work placement has been immensely important and something every student should consider doing. I hope this article serves as an encouragement to others.
In the busy world, it can be hard to fit in time to learn anything that isn't essential. The only things learnt are often those that need to be. Everything beyond that is considered frivolous. Even those who do appreciate the practice of lifelong learning, can find it difficult to make the effort.

**Tips to Make Lifelong Learning a Habit**

1. **Always Have a Book**
   It doesn’t matter if it takes you a year or a week to read a book. Always strive to have a book that you are reading through and take it with you so you can read it when you have time.

2. **Keep a ‘To Learn’ List**
   We all have to-do lists. These are the tasks we need to accomplish. Try to also have a “to-learn” list. On it you can write ideas for new areas of study. Whatever motivates you, write it down.

3. **Get More Intellectual Friends**
   Start spending more time with people who think, not just people who are smart. Their habits will rub off on you and they will probably share some of their knowledge with you.

4. **Guided Thinking**
   Simply studying the wisdom of others isn’t enough. You have to think through ideas yourself. Spend time journaling, meditating or contemplating over ideas you have learned.

5. **Put it Into Practice**
   Skill based learning is useless if it isn’t applied. Studying painting isn’t the same as picking up a brush. If your knowledge can be applied, put it into practice.

6. **Teach Others**
   You learn what you teach. If you have an outlet of communicating ideas to others, you are more likely to solidify that learning. Start a blog, mentor someone or even discuss ideas with a friend.

7. **Clean Your Input**
   Some forms of learning are easy to digest, but often lack substance. Make a habit of regularly cleaning out your RSS feed reader for blogs you subscribe to. This will purify your input to save time and focus on what counts.

8. **Learn in Groups**
   Lifelong learning does not mean concentrating on a stack of dusty textbooks. Join organisations that teach skills. Workshops and group learning events can make educating yourself a fun, social experience.

9. **Unlearn Assumptions**
   You can’t add water to a full cup. Always try to maintain a distance from any idea. Too many convictions mean too few paths for new ideas. Actively seek out information that contradicts your world view.

10. **Find Jobs that Encourage Learning**
    Pick a role that encourages continual learning. Don’t spend 40 hours of your week in a job that doesn’t challenge you.

11. **Start a Project**
    Set out to do something that you don’t know how to do. This kind of forced learning can be fun and challenging.

12. **Follow Your Intuition**
    Lifelong learning is like wandering through a wilderness. You can’t be sure what to expect and there isn’t always an end goal in mind. Letting your intuition guide you can make self-education more enjoyable.

13. **Make it a Priority**
    Few external forces are going to persuade you to learn. The desire has to come from within. Once you decide you want to make lifelong learning a habit, it is up to you to make it a priority in your life.

**Professional Lifelong Learning**

Professional learning is often seen as something that takes place outside the workplace. When an employee is a lifelong learner, they will readily take responsibility for their own professional learning and constantly update their knowledge and skills to remain marketable.

If professional learning is supported and encouraged by an organisation, it can benefit immensely from the continuous, lifelong learning of its employees.
Professionals can take charge of their own professional learning in two main ways:

**Formal approaches**
- Taking part in CPD in the form of formal professional accredited development programs through professional bodies.
- Self-selecting other relevant and useful courses, workshops or Massive Open Online Courses (MOOCs).

**Informal approaches**
- Reading blogs and other news feeds.
- Participating in the fast moving flow of ideas and new resources being exchanged in their own personal learning network.
- Extracting the ‘learning’ from their daily dealings with colleagues, customers, clients or friends.

(From *The Workplace Learning Revolution*, Jane Hart, Centre for Learning and Performance Technologies, May 2013)

Lifelong Learners easily complete their CPD requirements. Are you a Lifelong Learner? Why not? Contact me to discuss how.

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**Letter**

**Dear Editor,**

**A NEW CHALLENGE FOR ACTUARIES**

I refer to the June 2013 article *Resources and Environment, a new challenge for actuaries*. I suggest that the ‘challenge’ is to avoid being taken in by the:

- unproven science of dangerous man-made global warming;
- superficial limits to growth resulting from possible exhaustion of the planet’s resources, which repeat Thomas Malthus’ failure to ignore human ingenuity to adapt to changing conditions and future technological advancement;
- expectations that actuaries will be able to develop robust long-term risk management techniques based on the flawed IPCC climate projections, and the uncertain impacts of changes in resource utilisation, none of which have a sound basis for modelling.

Actuaries have gained their reputation for assessing long-term financial risks through the use of projections based on sound analysis of well understood data, their statistical distribution, appropriate assumptions and logical models. These give them confidence when providing advice which will include reasonable recognition of the degree of uncertainty in the result.

All of the IPCC projections since 1998 have claimed temperatures would rise (in line with rising CO2 concentrations) and have been shown to have failed to date. (According to satellite readings, global average temperature has fallen by 0.2 degrees since 1998, despite CO2 continuing to increase as had been anticipated). Consequently, it is difficult to accept the ‘temperature change’ forecast (without qualification) to 2100 of up to five degrees increase on the first page of the article, without a considerable degree of scepticism.

Perhaps more importantly, with increasing numbers of scientists drawing attention to the uncertainties involved in climate science, the theory of dangerous man-made global warming cannot be considered as reasonable to be the main basis of forecasting climate change. This, together with the narrow science involved with the ‘limits to growth’ paper does not augur well for pursuit of the development of a sound environmental input to actuarial advice.

Geoff Dunsford  
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Repositioning the Brand

Over the last few months there have been a number of opportunities for you to express your views on repositioning ‘brand actuary’. OgilvyOne have made presentations on the work they have done for us; we have had focus groups and consultation sessions; the concept was available for your review at the Summit; and an online discussion forum has also been held.

There has been an enormous amount of very positive feedback from members. There is almost universal agreement on the need to get professional help to promote what actuaries have to offer. Those who heard OgilvyOne explain their thinking behind the proposed campaign found the rationale quite compelling, and there was widespread support for the thrust of the proposed advertising. Members also appreciated and applauded the visual impact of the black and white material.

The essence of the idea proposed is that actuaries are the leading experts in dealing with uncertainty. Actuaries are the people you need to talk to when you have to make decisions in what would colloquially be thought of as grey areas. The slogan ‘no grey areas’ has been proposed as a tagline that will get the attention of our target audience, stimulate them to think about what actuaries can offer, and give us the opportunity to engage with them.

A number of members expressed significant reservations about this tagline, both in the face-to-face sessions and in the online forum. In the face-to-face sessions those concerns were actively discussed and largely dealt with. I had also had real doubts about the tagline when I first heard it, but was won over by the argument that a marketing slogan or tagline will not be construed by the target audience as a promise — everyone understands that its purpose is simply to stimulate engagement. However, there were a number of negative views expressed in the online forum which were not changed as the discussion unfolded.

At its June meeting, Council considered all the feedback from the consultation process. The decision was made to revert to OgilvyOne with this feedback from members, and ask them to propose amendments without changing the thrust of the message or the key visual aspects. Council will then convene a special meeting to consider the matter further and make a decision on how to proceed.

JUNE COUNCIL MEETING
In addition the following important decisions were made at the June Council meeting:
• Martin Stevenson was appointed Convenor of the International Council Committee;
• Bozenna Hinton was appointed Convenor of the Life Insurance and Wealth Management Practice Committee; and
• Joshua Corrigan was appointed Convenor of the Risk Management Practice Committee.

All these volunteer roles had been advertised to members and there were a number of applicants for each.

In addition, a Banking Practice Committee was formally established. This Committee will initially focus on building the actuarial community and network in banking, and on building relationships between the profession and key stakeholders including the regulator. It will also support members through helping them address technical and practical issues such as risk measurement techniques. Members who may be interested in joining this new committee will be invited to express their interest through the weekly Institute Bulletin.

OVERSEAS MEMBERS
I have also made a number of overseas trips on behalf of the Institute over the last few months.

I was part of the Asia CPD Tour to Singapore, Hong Kong, Beijing and Shanghai which gave me the opportunity to meet members in those cities and learn face-to-face from key employers how our members are perceived in their employment markets. This was very encouraging — our members are very highly regarded, many are in senior and influential positions and there are clearly excellent opportunities throughout the Asian region for Australian trained Actuaries who are in high demand.

I then attended a series of meetings arranged by the International Actuarial Association in the Netherlands, where I had a number of very useful bilateral meetings with Presidents and representatives of other actuarial bodies. These various meetings certainly helped shape my thinking about our international strategy.

I also visited New Zealand last month and spoke at sessional meetings in both Auckland and Wellington. Although the actuarial profession there is small, it’s vibrant and I had the great pleasure of presenting certificates to two newly qualified Actuaries in Wellington (see photos below).
I’ve recently subscribed to a great blog I found through Twitter. The Farnam Street blog describes itself as being “about the pursuit of worldly wisdom by trying to master the best of what other people have already figured out.” Sensible idea – why reinvent the wheel?

I was struck by a recent article by Shane Parrish called Ten Techniques for Building Quick Rapport With Anyone. He was reviewing a book by Robin Dreeke called It’s Not All About Me. As a person who struggles with listening skills and has a natural tendency to think that I have the best ideas (I am working hard on overcoming these flaws, as discussed in previous columns!), the title immediately resonated with me.

Robin Drake is the lead instructor at the FBI’s ‘Counterintelligence Training Center’ in behavioural and interpersonal skills training. His book is about how to master the skills of communication, and draws on research into social and evolutionary psychology, overlaid with wisdom gained from his years of field work.

The book outlines 10 techniques for building rapport with another person:

1. Establishing Artificial Time Constraints
2. Accommodating Non-verbals
3. Slower Rate of Speech
4. Sympathy or Assistance Theme
5. Ego Suspension
6. Validate Others
8. Connect with Quid Pro Quo
9. Gift Giving
10. Manage Expectations

Whilst all of the tips are valuable, I want to focus on just two of these that really ring true for me.

**EGO SUSPENSION**

The blog says:

“This may be the most rewarding and most difficult of all of Robin’s techniques.

SUSpending your ego is nothing more complex than putting other individuals’ wants, needs, and perceptions of reality ahead of your own. Most times, when two individuals engage in a conversation, each patiently waits for the other person to be done with whatever story he or she is telling. Then, the other person tells his or her own story, usually on a related topic and often times in an attempt to have a better and more interesting story. Individuals practising good ego suspension would continue to encourage the other individual to talk about his or her story, neglecting their own need to share what they think is a great story.”

I don’t know about you, but I have definitely been guilty of this one. My natural comfort zone is talking about myself. (And we all know how boring those people are who only talk about themselves!)

Behaving that way (thinking only about what I want to say or chomping at the bit to put across my point of view) meant that I was having shallow and unsatisfying conversations. I have to remind myself to actively listen and concentrate on what the other person is saying, and ensure I ask lots of open questions. I thought that this was something I was doing for the other person. I didn’t expect that it would also mean that I enjoy the interaction more. But guess what happens when I remember to do this? I have much better, more rewarding, deeper level conversations.

**VALIDATE OTHERS**

The blog says:

There are many types of validation. Robin identifies three of them.

• **Listening**
  This is the simplest and one of the most effective. Just listening to someone can produce amazing results. Where we run into problems is keeping our own thoughts, ideas, and stories out of the conversation. True validation coupled with ego suspension means that you have no story to offer, that you are there simply to hear theirs. And there is another benefit. When the focus is on the other person and we’re not anxious to tell our own story, we also tend to remember the details. We’re mindful.

• **Thoughtfulness**
  … few people naturally use this to its fullest potential, and, most of the time, we don’t realise when it is being used; all we know is we really like the person who gives it. Demonstrating thoughtfulness in words and actions with everyone in our lives is a simple and effective way to improve our relationships.

• **Validate Thoughts and Opinions**
  This technique is quite difficult because of “our innate need to correct others and the difficulty we have suppressing our own egos.” But if you remember that we like people who are like us, you’ll immediately grasp the power of validating thoughts and opinions of others. The best way to get someone to do what you want them to do is to have them come up with the idea. The best way to have them come up with your idea is, no surprise, to honestly understand the other person’s point of view and then build upon that base with your ideas.

The best sales people and customer service people I have worked with have these skills. They listen, provide thoughtful input and respect their client’s opinions. Then they design a solution that is tailored to the client and meets their needs – and guess what? The client loves it and picks them out of the ‘beauty parade’. or they...
CEO’s Column continued

retain that disgruntled customer that had been getting really poor service and was about to leave.

I’ve seen many business professionals who have difficulty in suppressing their own egos. In my observation, the smarter the person, the harder it is for them to do this as they KNOW that they are the smartest and have the best ideas. However we need to suspend our egos and listen. Then we need to act on what we’ve heard.

In my opinion, mastering this technique is a necessary prerequisite to the actuary being seen as a valued business adviser, rather than a compliance person who puts roadblocks in the way of the business.

You can read about all 10 tips on the blog, or better still, buy the book if you want a detailed explanation. If these tips are good enough for the US secret service, they’re good enough for actuaries I reckon!

As always I’d love to hear your views on this or any of the other columns I’ve written. What has your experience been with ego suspension and active listening? Does it work?

Thanks to those who have taken the time to email me – we do appreciate your feedback.

2 You can buy Robin Dreeke’s It’s Not All About Me for $5-8 here: http://www.amazon.com/exec/obidos/ASIN/057809665X/farnamstreet-20

Student Column

Developing the Next Generation of Actuaries

To be honest, I came to study actuarial science with very little idea of what this profession actually entails.

Well, apart from those stereotypical descriptions of an actuary that were often passed around in high school.

After one and a half years of studies, my image of what an actuary will do on a day-to-day basis is still very sketchy and I daresay that many of my peers are none the wiser. To me, this lack of information is a barrier restricting the young talents that could potentially flow into our industry. I believe that the development of the next generation of actuaries should start not in their first year of university, but even before that – during their high school years.

Firstly, I want to give you a bit of background on how I chose to be an actuary. Nearing my university application deadlines, I still had no idea what exactly I wanted to pursue, career-wise. Up until then, my interaction with actuarial science was almost non-existent. The first time I even heard the word ‘actuary’ was three years ago, when my high school mathematics teacher mentioned it as her daughter’s job at PricewaterhouseCoopers.

All of her actuarial assignments eventually ended up as my teacher’s scrap paper, which were used by kids like me. I still remember us trying to decipher all the symbols and equations for fun, but we never considered it as a career path seriously. Truth is, very few high school students, or even university students for that matter, realise the story behind the math.

In the end it was pretty much a leap of faith on my behalf, but it was one that I do not regret (yet!). I would say I am lucky that, given how little I knew about my own course, I came to enjoy what I have learnt under the guidance of incredibly dedicated lecturers.

In a recent course on financial mathematics, I gained a newfound respect for Excel, seeing as all I thought it could do before was making shopping lists. Not to sound too childish to the experienced actuaries out there, who have long learnt the power of Excel, but it was very fun for me to discover all the cool commands that went into modelling a mortgage plan. I’m sure I’m just scratching the surface. With Excel. And all modelling.

However, I have also met many people who wanted to be an actuary but didn’t know much about it and hated it. I believe that the stereotypical image of an actuary that permeates the playgrounds these days deters many potential newcomers that have the right talent. I think we have all heard these, whether they are jokes or not, that actuaries “sit at a desk and do boring math all day” or that it is “so hard that you’ll have no social life”.

Actuarial courses themselves have long had a reputation for a high dropout rate; it is easy to attribute this to its difficulty, but in reality many people simply leave because they came in not knowing much, found out a bit and realised it’s just not for them.

Don’t get me wrong, the course itself is indeed very challenging, but that can be said about many other professions, such as law. Yet, unlike law, the general population’s understanding of what a lawyer does is far better than their understanding of what an actuary does. I once had a conversation with my local bank manager who was confident that actuaries are a type of accountant. This goes to show how little people understand our profession as a whole.

I believe that if we, as an industry, can be more vocal and educate people – from boardroom to bassinet – on what an actuary actually is and does, we can attract more of the right talent. I think we have all heard these, whether they are jokes or not, that actuaries “sit at a desk and do boring math all day” or that it is “so hard that you’ll have no social life”.

I have recently attended a development program in the workplace and it really opened my eyes on what an actuary does (luckily it wasn’t number crunching all day)! Many of my friends never considered becoming an actuary purely due to some of the negative connotations surrounding it, all of which I have realised could not have been more wrong. Actuaries are far, far from the people who stare at your feet when talking to you.

The world needs to know that.

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You can buy Robin Dreeke’s It’s Not All About Me for $5-8 here: http://www.amazon.com/exec/obidos/ASIN/057809665X/farnamstreet-20
## Welcome to New Members – July 2013

### New Members – Australia

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### New Members – Overseas

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