SOCIETY OF ACTUARIES

INTERNATIONAL SECTION

International News

ISSUE 69 • SEPTEMBER 2016

3 Editor's Note
By Vincent Xuan

4 Chairperson's Corner
By Wendy Liang

6 Insurance Innovation and Implications for Actuarial
By Simon Phipps and Valerie du Preez

12 The Flipside of the European Immigration Crisis
By Ronald Klein

14 Pension Reform in Germany: Reform Discussions and Areas for Improvement
By Norman Dreger

18 Dare to Live on a Long White Cloud?
By Wansi (James) Xu

20 The Role of Swiss Actuaries
By Carlos Arocha

22 5th Actuarial Symposium in Colombia
By Armando Zarruk

24 Retirement Readiness: A Rocky Road in Canada
By Geoffrey Melbourne

28 Prevention is Better than Cure
By Joseph Lu

Retirement Readiness: A Rocky Road in Canada

Page 24

By Geoffrey Melbourne

International News

Issue Number 69 • September 2016

Published by the International Section Council of the Society of Actuaries.

This newsletter is free to section members. Current issues are available on the SOA website (www.soa.org).

To join the section, SOA members and non-members can locate a membership form on the International Section Web page at http://www.soa.org/International/

Editor's Note

By Vincent Xuan

For most of us, we live in a calm yet uncertain world. We luckily enjoy the longest period of peace in modern human history, while also facing new challenges. The Zika virus, European immigration crisis, Middle East unrest, world top GO player defeated by artificial intelligence … every piece of news passes on the same message—new risks are coming and someone needs to find ways to manage them. We, as actuaries, could right be the ones to turn the risks into opportunities, whether it is today or many years down the road.

I am excited to announce the "2016 Country Feature Article Call for Papers" winner, Geoffrey Melbourne with "Retirement Readiness: A Rocky Road in Canada," and the runner-up, Ronald Klein with "The Flipside of the European Immigration Crisis." Congratulations to both of them and many thanks to all authors who shed light on these topics with their unique observations. In this issue, we selected five excellent articles, and they show how these fellow actuaries observe, analyze and also try to solve the problem. It might be impossible to untangle a complicated matrix in a quick turnaround, but thinking about possible solutions is a big step forward.

With articles about the bumpy roads of pension plans in Canada and Germany, an interesting view on the social impact of the European immigration issue, professional development stories in Switzerland and New Zealand, and finally a rhapsody of insurance innovation and changing roles of actuaries, I want to make sure there is always one or two (or more) articles that will pique your curiosity for something new, fun and inspiring.

By the time you receive this newsletter, we will have a new slate of International Section Council members. Every year we have fresh talents flowing into the council and they bring in new ideas, initiatives and the power to make things happen. We always welcome volunteers who want to serve the community and also can gain new leadership skills from doing so. If you are interested in joining the editorial board, please contact any of the editorial board members listed on the front page.

Time flies! You have seen my name on the editorial roster for a long time—four years if I remember correctly. This will be my last issue as the editor of *International News*. Two editorial board members, Qi Sun and Arpita Das, were elected to be the new co-editors, effective immediately after the release of this September issue. I want to thank everybody on the editorial board who never let me down, Carl Hansen who I have worked side-by-side with since the beginning, our SOA Staff Editor Kathryn Baker, our incumbent Section Specialist Jane Lesch and retired Section Specialist Sue Martz. I appreciate your patience, professionalism and friendliness. It has made the editor job a truly enjoyable and memorable journey.

And last, thanks so much my dear readers! 再见! ■

Vincent Xuan, FSA, CFA, MAAA, is a vice president & actuary at Prudential Financial in New Jersey. He can be reached at *xu.xuan@prudential.com.*

Chairperson's Corner

By Wendy Liang

It's hard to believe that we are already in September and that the 2016 SOA Annual Meeting & Exhibit is only a month away from us! Time really does fly!

As this will be my last time writing as the chairperson of the International Section Council, I'd like to take this opportunity to thank all of our section members, volunteers and council members for the successful year working together. During 2015–2016, we launched the Pilot Mentorship Program which we have now decided to continue based on the positive feedback, we recruited many new Ambassadors in different countries, so keep your eyes out for international events hosted by our Ambassadors and we have strengthened our working relationship with the International Committee, especially in China and the Greater-Asia region.

Looking forward to the 2016 Annual Meeting (October 23–26 in Las Vegas, NV), the International Section has an exciting program for you. We will be hosting four sessions covering a wide range of international topics from U.S. to Europe to Asia. The sessions are:

- IAIS Capital Standards
- The Swiss Standard Model for Captive Reinsurers—Insights and Features
- The Emergence of Accountable Care in the U.S. & U.K. Health Markets
- Kaleidoscope: Life Products across Asia-Pacific

In addition, we will also be partnering with the Investment Section this year to jointly host a networking reception on Sunday evening with wine, nibbles and live music. If you missed the event last year, please look out for the Sunday evening reception as you register for the meeting. A hot breakfast for members is also planned for Wednesday morning as usual.

You will notice that this issue of the *International News* includes several articles from the 2016 International Section Country Feature Article Contest. Please join me in congratulating the winners of contest: Geoffrey Melbourne with "Retirement Readiness: A Rocky Road in Canada" and the runner-up, Ronald Klein with "The Flipside of the European Immigration Crisis."

I hope you will enjoy this edition of *International News*. It's been a great year for me leading the International Section. Thank you all and good-bye for now! ■

Wendy Liang, FSA, CERA, MAAA, is director & senior TA operations actuary at Swiss Re in Zurich, Switzerland. She can be reached at *wendy_liang@swissre.com.*

INDUSTRY INSIGHT | DIVERSE CONTENT | LATEST SOLUTIONS | EXPERT KNOWLEDGE

SOCIETY OF ACTUARIES

YOU'RE INVITED

THE MOST DYNAMIC ACTUARIAL EVENT OF THE YEAR

2016 SOA

Annual Meeting & Exhibit

Oct. 23–26, 2016
The Cosmopolitan of Las Vegas
Las Vegas, NV

Join us at The Cosmopolitan of Las Vegas.

Comprised of nearly 200 sessions and networking events, the 2016 SOA Annual Meeting & Exhibit is poised to be one of the largest in history. Packed full of expert speakers, leading actuaries and world-renowned keynotes, this year's meeting will showcase the best the industry has to offer.

For more information visit ***SOA.org/AnnualMeeting***.

Insurance Innovation and Implications for Actuarial

By Simon Phipps and Valerie du Preez

Note from the author: A few months ago I was presenting on disruptive forces in the insurance industry as part of a review of emerging risks across the sector, and was subsequently approached to write this article. It is clear that much of the innovation transforming our industry will, in one way or another, impact the work done by actuaries.

At this point I need to declare something upfront; I am not an actuary! Though, having spent much of my time working alongside actuaries around the world over the years, I have developed an immense respect for the work they do. I have asked one of my global colleagues at KPMG in the U.K., who IS an actuary, and a fellow at that, to co-author this piece. I am delighted that Valerie has kindly accepted. This should help ensure the article is relevant and interesting to readers, and perhaps more importantly, that I am kept on track!

-Simon Phipps

As consumers, we are constantly faced with the impacts of digital transformation and technological advancements in society, whether this be in relation to omnichannel connectivity (e.g., the Starbucks Rewards app), social media (e.g., WeChat), and online retailers (e.g., Amazon), or simple user experiences sitting on top of even more complicated products and services (e.g., Apple). We are increasingly touched and enthused by these experiences in our personal lives.

> 66 percent of insurance CEOs said they are concerned that new entrants are disrupting their business models ...

The reality is that this disruption is sparing no industry. Insurers must transform fast or risk falling behind new competitors. In fact, in our recent 2016 Global CEO Outlook survey, 66 percent of insurance CEOs said they are concerned that new entrants are disrupting their business models, and 83 percent are concerned about their competitors' ability to take business away from them.[1] It is predicted that four of the top 10 global financial services providers will be displaced from the top 10 in the next five years.[2]

Unlike the dot-com boom-and-bust period of the late 1990s, the current wave of technological innovation is here to stay, and if anything, will continue to build over the next few years. We are at the early stages of the fourth industrial revolution. We would go as far as to predict that the insurance industry will likely see more innovation in the next five years than it has seen in the last 50 years. According to our research, CEOs from some of the largest insurers worldwide agree, with 70 percent saying "the next three years will be more critical for the industry than the last 50."[3]

Rapid technological advances and unprecedented access to data are impacting all aspects of an insurer's business, and go straight to the heart of the actuarial department and what actuaries do. In this article we provide a nonexhaustive list of some of the many developments we are seeing across the sector, and some brief reflections on the potential implications of these for the actuarial profession.

Telematics: This technology has been running for some time now in the U.S. and U.K., mainly in the context of pricing car insurance more accurately based on the driver's specific driving style. It started to get real traction when it became easier and cheaper to record and analyse the vast amount of generated data and subsequently predict the level of risk involved. What is most interesting about telematics for many is not the ability to more accurately price risk, but the ability of the technology to change consumer behaviours and actually reduce risk.

Early results at Discovery Insure in South Africa have found, for example, that their customers drive more carefully and experience one-third of the level of fatalities of the South African average,[4] hence their marketing tagline "we save lives." Interestingly their customers are not incentivised by cheaper insurance, but rather the prospect of value-added services through their Vitalitydrive programme. Early-stage developments are now underway to adapt the technology to other areas, such as sensors in the home. **For actuaries,** *assessing changing behaviours and the effect on pooling of risk are our bread and butter. We expect to see the ongoing evolution of this technology requiring continual recalibration of actuarial models. Tailoring an actuarial model to more accurately reflect the expected cost of claims for individual policies will give an insurer a competitive advantage in claims and risk management. The implementation of such technologies will also likely require the users of the data (actuaries, IT departments, etc.) to be involved in the system, product and pricing design. For more information, listen to a recent webinar[5] on telematics hosted by The Digital Insurer.*

Self-drive and car-share: Much has been said about Google's self-driving car and the pros and cons of self-drive vs drive-assist business models. Whichever way you look at it, there is a growing trend to improve car safety. At the same time there is an increasing movement towards car-sharing and/or leasing directly from manufacturers as society becomes more conscious of the need for capital efficiency and to reduce our carbon footprints. Companies such as Uber and carshare.hk are cases in point. Less accidents mean lower risk pools; shift of ownership to manufacturers will mean less retail and more commercial insurance; and car-sharing will mean people will require less traditional annual motor insurance and more flexible, mobility-based insurance schemes, with fewer cars on the road. **For actuaries,** *these innovations will challenge traditional actuarial product teams to develop more flexible products, with more accurate pricing, across a different range of policyholders to the traditional retail customer base, including manufacturers and fleet managers. This will be a challenging area for actuaries to think about. These developments have the potential to converge with telematics, resulting in a very different car insurance landscape to the one we have today.*

Aggregators: In the U.K., first-generation aggregator models (largely price comparison sites) introduced in the early 2000s have grabbed an increasing share of the personal lines market, and now reflect an estimated 70 percent of new motor business.[6] Resultant commoditisation has proved good news for consumers but challenging for many insurers, faced with aggressive margin compression. This is just the beginning. While still early days in Asia, the next generation of Aggregator 2.0 models, such as *gobear.com*, are set to leapfrog into new markets, incorporating social analytics (think *tripadvisor.com*). This will provide an even broader view for consumers to help inform their buying behaviour.

Research shows that most of us trust recommendations from friends and family over anything else, so community-based feedback is extremely influential. Insurers may try to disengage from working directly with aggregators, but they cannot afford to fight the tide of consumerism. For example, they cannot stop aggregators running consumer ratings on their products and services, even if they do try to make direct price comparisons difficult. We are likely to see the extension of aggregator models to more complex products and services, including more of those found within the life and health markets over the next few years. **For actuaries,** *the development of next-generation aggregator models has the potential to make actuarial jobs very challenging. Imagine full transparency on reduction-in-yields for savings products, or our personal favourite, aggregator-enabled, dynamically-priced personal lines insurance which switches to the best insurer not just each year, but each day—or better still, by the hour! For more information, listen to a recent webinar[7] on aggregators hosted by The Digital Insurer.*

Tailoring an actuarial model to more accurately reflect the expected cost of claims for individual policies will give an insurer a competitive advantage in claims and risk management.

Big data and predictive analytics: Google's former CEO, Eric Schmidt, commented in 2010 that we now create as much information in two days as humans did from the beginning of time to 2003. Even though there is no widely accepted definition for "big data" (and in fact it is constantly evolving), it loosely describes large amounts of structured and unstructured data that has the potential to be used for information.

This, more than any other technological development, is the key that opens up all the other technological advances highlighted in this article and beyond. **For actuaries,** *what we are able to do with this "big data" is paramount. By nature, actuarial jobs involve analysing data for potential patterns in order to predict the future. This is what actuaries have been doing for years. The key is to utilise the power of technology in order to continually improve this process, both in speed and potential accuracy. High-level examples include modelling mortality, modelling trends in morbidity and evaluating longevity improvements. The key question is, to what extent can much of this be automated, and how quickly?*

Internet of Things (IOT): While the growth in demand for items such as computers, tablets and even smartphones is forecast to be fairly benign over the next five years, demand for internet-connected devices such as refrigerators, home automation and security sensors (resulting in smart homes), as well as health monitoring devices, is set to soar.

Enabling enhanced connectivity of consumers with their homes and lives, we should all be able to benefit from more personalised premiums and richer insights into our daily lives, and hence the creation of better quality products and services. A good example, *beam.com*, enables dentists to monitor the effectiveness of patients' teeth cleaning through smart toothbrushes—and friends and family can compare against each other if they so desire. Another great example of IOT is *heartisans.com*, a start-up initially incubated through AIA's Healthtech 1.0 accelerator, powered by Nest VC and mentored by KPMG in 2015. The team has developed algorithms to predict a heart attack and alert emergency services and next of kin, 10 minutes before the heart attack actually happens.[8] **For actuaries,** *particularly those working in general insurance, getting access to IOT real-time monitoring devices in commercial machinery and homes will be key. Insurers can then be alerted if a critical part requires servicing or may fail, causing larger losses. These developments may require actuaries (and their underwriters) to rethink how the cost of claims will look given these real-time risk management devices. Understanding the impacts on longevity will also be a big challenge. Scenario analysis and forward thinking will be key, most likely supported by the use of additional technological advances in the field of predictive modelling and big data.*

These developments may require actuaries (and their underwriters) to rethink how the cost of claims will look given these real-time risk management devices.

Pure digital direct: Someone once said "give me 100 million customers and I'll build you a profitable business." Next-generation companies understand the true value of having access to a customer base and their digital footprint, and the relative drag on value through carrying non-critical infrastructure. China is spearheading the development of next-generation models, with no better example than Zhong An (co-funded by Alibaba, Ping An and Tencent); a pure digital direct model selling, for example, low-premium return-delivery insurance for products bought online. The winner of KPMG's 2015 Fintech 100, Zhong An acquired 150 million new customers and 650 million new policies in its first 18 months.[9]

Traditionalists will ask "where's the value?"—but this misses the point. Like those at Apple, Facebook and Google, the management team is confident that such scale will lead to handsome returns in the long term—achieved through the application of advanced data analytics techniques, enabling targeted campaigns on their customer base, as well as significantly lower costs to serve than traditional models. Time will tell. **For actuaries,** *the increased access to data, the potential for more interactions with policyholders and the unique nature of the insurance arrangement will bring the need for more frequent; potentially real-time assessment of risk. You can learn more about Zhong An at* http://www.the-digital-insurer.com/dia/zhong-chinas-first-online-insurance-company.

Peer-to-Peer: It is somewhat ironic that hundreds of years after the first insurance policies were written by a mutual insurer, there is a resurgence of demand for mutual in the form of a new, technology-enabled version for the 21st century—peer2peer. Early signs are encouraging, with Friendsurance in Germany experiencing 20–40 percent lower claims ratios than traditional insurers,[10] and we all know how hard it is to shave 1 percent off traditional models! All eyes are currently on *lemonade.com* to see how disruptive it can be. Driven largely by the sharing economy and millennials, it is understandable that 87 percent of CEOs expressed concern about how millennials will change their business.[11] **For actuaries,** *this has the potential of going fullcircle back to actuarial roots, rebuilding policies but this time using 21st century technology and focusing on the true need of the end customer. Part of the*

attraction of peer2peer is lower claims (due to better risks) and higher retentions (community/referral dynamics), so actuaries will be called upon to validate and price these models.

Robotics, artificial intelligence (AI) & machine learning: This is really too big a subject to do justice in one paragraph. Suffice to say that the replacement of human activity with machines is on the cusp of reality. We are talking about a paradigm shift in technology which will enable cheaper, more repeatable and ultimately more informed products and services being delivered to customers. There are a few companies already doing this, and in fact, some organizations have developed software that uses machine learning and predictive analytics across the insurance life cycle.

However, what we found in KPMG's survey of insurance CEOs was somewhat disconcerting, with 91 percent saying they are concerned about the integration of basic automated business processes with AI and cognitive processes.[12] **For actuaries,** *and insurance professionals as a whole, our day-to-day jobs will be directly affected by this category of innovation. Automated underwriting is already being used widely. These are good tools to support the work actuaries do but they also require a lot of programming, and statistical and mathematical knowledge. Actuaries can further hone these skills given their mixed skill set and we expect to see greater collaboration between the actuarial/statistics/maths/programming disciplines to best extract value from these new technologies. What will set actuaries apart from their 'automated friends' will be their creative thinking and communication skills; expert judgement ; and ethical behaviour. All of which are much harder to automate—for now. TechCast Global predicts that "there is a 60 percent probability that in the next 10 years, AI will be good enough to replace routine intelligence work." Will computers be able to handle the routine work of actuaries, therefore displacing much of the current work, and freeing teams up to focus on more value-adding work?*

Social and behavioural analytics: Following the rapid adoption of social media in the last few years, there is a wealth of behavioural information being collated on almost everyone each day. For example, Social Intelligence Corp has developed underwriting and risk rating models which use social media and online presence data to underwrite insurance policies. We recently met a company already engaged and working with law enforcement agencies worldwide in light of their ability to access and interpret phenomenal amounts of data from multiple sources, effectively in real-time. They were able to show the precise propensity to buy from a particular insurer for the entire region's online population, including what types of product they are most likely to buy from which channels. Useful indeed! **For actuaries,** *the age-old job of calculating probabilities is set for a radical overhaul with the growth of behavioural science and analytics. Lack of experience in this area will likely be a big challenge for actuarial teams.*

Blockchain: Perhaps saving the best for last, if you have not yet heard about blockchain and its potential, it is time to get up to speed!

The simplest way of describing blockchain is to think of it as Internet 2.0. Internet 1.0 came to life through a desire to connect people through their computers by interlinking the variety of different networks that existed at that time. Over the years this environment has become the cornerstone of the digital evolution, and the adoption and deployment of the IOT and the Internet of Services continues to increase the amount of information which is available and accessible in the environment. The most recent development in Internet 1.0 has been the social network phenomenon, which has more and more people connecting across more and more platforms, enabling them to communicate seamlessly. However, Internet 1.0 has its deficiencies—one being its inherent lack of security and trust, which drove the adoption of encryption protocols such as SSL to provide security and third party platforms such as certificate authorities like Verisign to establish trust.

Now enters Internet 2.0 which is being driven not only from a desire to connect but from a desire to transact, an activity which has the need for security and trust at its core. Internet 2.0 includes encryption in its foundations to ensure security and authenticity. It does away with a need for third parties to establish trust by using a method of consensus to confirm identity and validity through all the individuals who are part of the ecosystem. It can utilise smart contracts to enable multi-step transactions that can be verified at any point to confirm the validity of each step performed. It continues to provide a mechanism for all parties to connect just like Internet 1.0, but its ability to support digital commerce and share trustable transaction information on an open platform without the need for relying on a third party will likely be a game changer for the insurance industry. With use cases, such as verifiable digital identities, validating your customer online and without paper through to claims processing, there is not one part of the operating model which would not be impacted.

Blockchain may be the underlying technology which enables Bitcoin to exist, but the cryptocurrency use case is only the tip of the iceberg for the technology and the real winners in this step-change for digital commerce will be those that do not necessarily know how the technology works, but do understand how it can impact their business. **For actuaries,** *could a truly global currency enabled by a cryptocurrency platform reduce or even eliminate exchange rate risks? Could blockchain enable the greater sharing of information across the industry, allowing actuaries access to data from any and every insurer and reinsurer? Is the platform the solution to calculating reserves and premiums instantaneously and customising propositions to a specific customer's needs?*

As previously said, this is not an exhaustive list. We have not even touched on many other trends such as augmented and virtual reality, internet of services, cybersecurity and regulation as unfortunately we had limited space available. By the time this article is published, new innovations may already have appeared too.

To stay relevant, both insurers and members of the actuarial community are going to need to anticipate and quickly adapt to the changes ahead. Learning from and working together with experts in the areas of these technologies will be key.

As someone once said, "The world is changing very fast. Big will not beat small anymore. It will be the fast beating the slow."

Note: All content within this article are the personal views of Simon and Valerie, based on their own experience as well as discussions with clients and colleagues across the international insurance community.

SOME POTENTIAL BLOCKCHAIN USE CASES IN INSURANCE:

- Know your customer
- Identity & verfication services
- Delayed flight claims
- Life maturities
- Health living rewards
- Hazard detection in homes
- Hassle free car repairs
- Dynamic pricing
- Fraud prevention

Simon Phipps, MSFA, ACII, BSc, is a partner at KPMG China, Hong Kong. He can be reached at *simon.phipps@kpmg.com*

Valerie du Preez, FIA, BSc, is a senior manager at KPMG UK, London. She can be reached at *valerie.dupreez@kpmg.co.uk.*

ENDNOTES

1 2016 Global CEO Outlook, KPMG International, 2016

https://home.kpmg.com/xx/en/home/campaigns/2016/06/ceo-outlook.html

2 Global Center for Digital Business

http://www.imd.org/dbt/digital-business-transformation/

3 *Supra* note 1.

4 *www.the-digital-insurer.com/dia/vitalitydrive-telematics-based-car-insurance-from-discovery*

5 *http://www.the-digital-insurer.com/event/the-digital-insurer-webinar-telematics-for-the-car/*

6 AM Best statutory data:

http://www3.ambest.com/ambv/bestnews/newscontent.aspx?AltSrc=23&RefNum=190791

7 *http://www.the-digital-insurer.com/event/aggregators-in-insurance/*

8 *http://www.heartisans.com/*

9 *http://www.chinamoneynetwork.com/2015/04/15/zhong-an-insurance-to-raise-1-45b-in-first-financing-round*

10 *http://www.the-digital-insurer.com/dia/friendsurance-germany-makes-insurance-social-again/*

11 *Supra* note 1.

12 *Supra* note 1.

SOCIETY OF ACTUARIES

LIVING to 100

SOCIETY OF ACTUARIES
INTERNATIONAL SYMPOSIUM

Jan. 4–6, 2017
Orlando, Florida

Save the Date

Registration for the 2017 Living to 100 Symposium will open soon. This prestigious event on longevity brings together a diverse range of professionals, scientists and academics to discuss:

- How and why we age;
- Methodologies for estimating future rates of survival;
- Implications for society, institutions and individuals;
- Changes needed to support an aging population increasing in size;
- Applications of existing longevity theories and methods for actuarial practice.

Learn more at ***LivingTo100.SOA.org.***

The Flipside of the European Immigration Crisis

By Ronald Klein

The European immigration crisis has been well publicized during the past year or so. Who can forget the images of young families fleeing the war-torn nations of the Middle East packed in rickety boats landing on the shores of Greece? German Chancellor Angela Merkel first openly accepted the immigrants saying: "There is no tolerance of those who are not ready to help, where, for legal and humanitarian reasons, help is due." And later adding: "If Europe fails on the question of refugees, then it won't be the Europe we wished for."

Chancellor Merkel continued to make a strong stand for these immigrants while other European Union leaders were protesting. That is, until an event occurred on New Year's Eve last year in Cologne outside of the Hauptbahnhof, the main train station. It was then that a pack of "drunken men of Arab or North African origin" began assaulting everyone in sight. In all, there were 838 complaints filed, of which 497 were by women alleging sexual assault.

This event turned the tides against Merkel and could potentially cost this once very popular politician, her Chancellorship. She is now changing her stance on immigration as she recently announced a deal with Turkey for it to retain immigrants. But was she wrong in this?

Europe is going through another crisis, one that will not subside any time soon—a pension crisis. As in most, if not all countries of people reading this article, governments and corporations are struggling with funding pensions. Governments are increasing the age of normal retirement. For example, Poland is incrementally shifting the age of normal retirement from 55 for females and 60 for males to age 67 by 2040. Some countries are also increasing contribution rates. Corporations have switched from defined benefit plans to defined contribution plans which places the onus of longevity and investment risk on the employee and, in some cases, they

are cutting benefits for those already retired or "buying them out" with a lump sum.

The reasons for this crisis fall into four main buckets:

- Increased longevity—life expectancy at age 65 continues to move up every year.
- Poor investment returns due to the financial crisis of 2008 and continuing low interest rates. Some governments also imposed stricter investment regulations after the financial crisis that require pensions to be invested in more conservative vehicles.
- Granting benefits that were too rich in good times without sufficiently funding the liability—a problem for both public and corporate pensions.
- Much lower than expected birth rates.

Lower than expected birth rates is something that very few economists foresaw. It could be the result of more women entering the workforce. It could be because of the financial crisis causing many families to be conservative with family sizes. It could also be because child-rearing aged women are children of baby boomers and wanted smaller families. Most probably it is a combination of these factors and many more.

Regardless of the reason, the ratio of workers to people over age 65 is plummeting in Europe and is projected to continue falling. In Germany for example, there are about 170 state pension contributors for every 100 retirees drawing benefits. This is projected to decrease to about 110 per 100 by 2050. For Spain the current number is about 190 per 100 going down to about 120 per 100 in 2050. Similar trends can be seen for Italy, Poland and France.

In fact, the birth rates are so low in Europe that if it was not for increased longevity, the population of Europe would be declining. This is quite alarming in itself. Maybe Europe can impose a mandated four-child policy. If China can impose a maximum, maybe Europe can impose a minimum!

Economists had also not factored in major immigration shifts into their calculations. Of course, there are always additional items not factored in, such as a cure for cancer (worsening the trend) or a major pandemic that affects the elderly (improving the trend), but let us focus on immigration here.

Let's assume that the 1.3 million immigrants that entered Europe from Syria, Afghanistan, Iraq and other countries in 2015 are relatively young. Let's also assume that they begin to assimilate in the country to which they emigrated to in all ways (this is probably the most difficult assumption currently). They will need accommodations, food, schools, cars, televisions, cell phones, etc. These drivers require immigrants to work which will help the economy and help increase the ratio of workers to retirees.

In short, once past the initial pain, immigrants could be the boon that the European economy needs. Can countries see past some early problems to enjoy future gains? This is unlikely. Politicians have an uncanny ability to focus on the next election in favor of preparing for the future. Indeed, if politicians thought about the future, Europe wouldn't have this pension crisis to begin with. In an ideal world all pension benefits, whether public or private, would be fully funded. A waning work force would not be such a serious problem. Of course, as the current cohort of baby boomers passes away, there will be more of a steady state condition, unless of course, there is another baby boom.

Europe should take a hard look at the long-term benefits of immigration. Not only would it help millions of people in need, it may also save the public and private pension systems of many countries, or at least prolong the solvency of the current funds. Is it possible that politicians could realize this? It is possible but I fear that a forward thinking politician would be quickly voted out of office before he or she completes the task.

Could this be an opportunity for the actuarial community to point out the benefits of immigration? Actuaries do not need to make the social arguments for or against immigration. We could simply point out the potential financial benefits to politicians. Running projections is what we do best.

While the focus of this article is on Europe, the same problems exist around the world, including in the U.S. The U.S. was built on the talents of immigrants, but European nations are not as open to the acquisition mentality—opting more for organic growth. We know from the business world that when organic growth does not happen, one of two things will occur: 1) the company will have to make an acquisition, or 2) the company will be acquired. While I do not foresee the acquisition of a European country in the near future, I have been wrong before. Immigration could be a solution to the problem and should be considered.

In conclusion, the European immigration crisis may not be a crisis at all. It could be just the opposite—a solution to a looming problem. ■

Ronald Klein, FSA, MAAA, is director, global aging at The Geneva Association in Zurich, Switzerland. He can be reached at *ronniefsa@aol.com.*

Pension Reform in Germany: Reform Discussions and Areas for Improvement

By Norman Dreger

It is widely acknowledged that structural reforms to the German pension systems are urgently required. Given demographic developments and the aging society, it is clear that current approaches will not be sustainable in the long term. Creative solutions must be found in order to increase coverage in the general population and to prevent old-age poverty from becoming a widespread phenomenon. Various stakeholders have joined the discussion; possible solutions including the German "social-partner model" and the "Germany Pension" *(Deutschlandrente)* are under review. Unfortunately, it appears that the insurance industry, employer representatives, employee representatives and the tax authorities all have different views on how pensions in Germany should be reformed. As a result, Germany risks facing an ineffective compromise as a solution. This article presents a number of approaches used in other countries to deal with the retirement challenges of tomorrow—in particular the use of defined contribution pension plans—and examines their applicability to the German market.

BACKGROUND/STATUS QUO

Germany is aging: a German woman today has on average only 1.4 children in her lifetime, roughly half as many as were born to each woman in the 1960s. The large wave of post-war baby-boomers is marching towards retirement and they are being replaced by too few children and immigrants to close the gap.

The German social security system, as it currently stands, cannot support the impending demographic shifts that will occur in Germany in the coming years. It is financed using a pay-as-you-go approach; contributions made by the working population are used to pay benefits for current pensioners. While a pay-as-you-go system can work well if the population is growing, in a society where the population in retirement is rapidly increasing, and the population that is still working is decreasing, the system is bound to come under strain. At the very least, such an approach could be considered a breach of the intergenerational contract as the younger working population will be required to pay for a benefit level that they are unlikely to receive themselves.

The current working population not only has to worry about their benefits under social security, benefits under the second retirement pillar, company pensions, are also under pressure. Many companies that have historically offered generous pension plans to their employees have since cut benefit levels dramatically or closed the plans altogether. This leads to a perfect storm for today's workers: they have to pay for social security benefits for current pensioners without the guarantee of receiving comparable benefits themselves and they also expect to receive significantly lower company pension benefits as compared to the previous generation.

PROPERTIES OF AN "IDEAL RETIREMENT SYSTEM" AND A COMPARISON OF THE GERMAN RETIREMENT SYSTEMS WITH THESE CHARACTERISTICS

All developed western nations are struggling with the same issues: low economic growth, low birth rates, societies that are growing older and pension systems that are in many cases not robust enough to deal with the upcoming economic and demographic challenges. So, how should modern retirement systems be structured to best deal with these challenges?

Mercer, together with the CFA-Institute, prepared the 2015 study, "Ideal Retirement Systems." The key purpose of this study was to analyse the characteristics of effective retirement systems and to identify best practices.

Characteristics of an ideal retirement system were identified and included the following:

1. High coverage within the private pension system
2. Mandatory contributions of at least 8 percent of earnings
3. 65 percent to 80 percent target net replacement rate for average earners
4. Funded assets for the future of >100 percent of the country's GDP
5. A basic pension of at least 25 percent of average earnings

Unfortunately, the retirement income systems in Germany demonstrate major deficiencies in all of these areas:

1. The social security program is not sufficient to maintain a pre-retirement standard of living on its own, and only roughly every second German has access to a company pension plan. Although the majority of employees working for Germany's largest companies still receive corporate pension benefits, many of the employees working for small and medium-sized companies do not have access to a company paid pension plan.

2. Retirement contributions paid on behalf of an individual are in most cases significantly lower than the recommended minimum level of 8 percent of earnings. The social security program itself does not collect "contributions" that are used to finance an individual's pension entitlements; under the pay-as-you-go system, these amounts are simply used to pay the

current pensions in payment. This is very different from contributions being made to a funded pension plan as the current "contributions" only secure pension entitlements for the individual by means of the intergenerational contract, which based on the structure of the social security program, the low birth rates and increased life expectancy will almost certainly break down if fundamental changes are not made. For the portion of the population that does have access to a company paid pension plan, individuals usually receive contributions that are significantly lower than 8 percent of earnings.

3. An average earner with a full career behind them can currently expect a gross pension from the German social security program of approximately 40 percent of their final salary. The net (after tax) pension received will be somewhat higher, but only people who have either generous company pension benefits or who have saved privately at a significant rate, will reach a net replacement rate between 65 percent and 80 percent of final salary.

4. Each year since 2009, Mercer and the Australian Centre for Financial Studies (ACFS) have jointly conducted a research project with name "Melbourne Mercer Global Pension Index (MMGPI)." The objective of this research is to compare, contrast and evaluate different pension systems in major countries around the world. One aspect that is examined is to what extent assets have been set aside in order to pre-fund future pension obligations. According to the 2015 Global Pension Index, there were pension assets in Germany of less than 20 percent of GDP. The lack of pre-funding in the German social security system, which is the main source of retirement income for the majority of pensioners in Germany, presents a major issue here.

5. Germany has no "minimum pension" for low earners. According to the OECD-Study "Pensions at a Glance 2015," Germany has the lowest net replacement rate for low earners in all of Western Europe.

Unfortunately, one must come to the conclusion that the German retirement systems do not come close to fulfilling the requirements of an ideal retirement system. However, it does at least seem to have been accepted that changes do need to occur.

LESSONS FROM ABROAD: DEFINED CONTRIBUTION (DC) PENSION ENTITLEMENTS

Defined contribution plans have a number of advantages to companies when compared with defined benefit pension plans. Costs associated with this arrangement are simply the contributions, the company does not need to build up liabilities in its accounts with respect to the benefits earned. If managed properly, there are essentially no material risks (or opportunities) that remain with the company. This stands in stark contrast to defined benefit plans, for which a company is required to show liabilities in its accounts, and for which the associated costs and liabilities can be extremely volatile. As a result, many multinational companies

pursue the strategy of exclusively granting their employees defined contribution pension benefits, where possible.

Whether one looks to Australia, Canada, the Netherlands, Scandinavia, the U.S., the U.K., Asia, Eastern-Europe or Latin America, in most cases, defined contribution plans have become the vehicles of choice for providing company pension benefits to employees. Under all of the world's developed economies, there is only one country that stands out where this is not the case: Germany.

Germany has a very complicated set of pension laws. For instance, there are five different pension financing vehicles that can be used to provide company pension benefits. They all offer various plan design options, constraints and have different tax treatments. There are also a number of additional vehicles in the area of private pensions, such as *"Riester"* and *"Rürup"* products. Given this diverse landscape, it seems all the more astounding that tax advantaged "pure" defined contribution plans do not exist in Germany.

> Given demographic developments and the aging society, it is clear that current approaches will not be sustainable in the long term.

Is Germany really so different than the rest of the developed world? And why has Germany, unlike all other developed countries, decided to reject defined contribution pension plans as a viable alternative to providing retirement income?

The reservations that many Germans feel with regards to the pre-funding of retirement systems in general, and with regards to defined contribution pension plans please replace by: in particular, may be in part due to a general mistrust in the capital markets. The collective memory of periods of massive inflation during the great depression, as well as two world wars and the expropriation, loss of territory and economic collapse that followed, has likely left greater scars in the German psyche than many people may expect. Investments in the stock markets are still considered by many Germans to be fundamentally "speculative." But now, more than 70 years since the end of the World War II, is it not time for the German population to start seeing the capital markets as an opportunity rather than just as a source of risk?

A number of attempts have already been made to implement defined contribution pension plans in Germany, unfortunately without a great deal of success. The implementation of the "Pensionsfonds" vehicle in 2002 was intended to allow pension plan designs that were similar to defined contribution plans. However, benefits provided by means of a "Pensionsfonds" must be defined and the investment returns are subject to minimum guarantees, resulting in risks that can only be eliminated by using relatively expensive insurance options. The private pension products that were implemented, in particular the *"Riester"* and *"Rürup"* products, were also not successful.

The pension reform discussion that is underway provides Germany with the opportunity to set things right. A system of individual DC retirement accounts, with assets invested in the capital markets may finally be implemented.

These individual retirement accounts could also improve the portability of pension benefits in Germany. Currently there are no practical solutions that allow an employee to consolidate various pension entitlements that they may have received from different employers. Many pensioners receive their retirement benefits from a number of different sources leading to additional administrative burden for both the pensioners and the former employers. In a model with individual pension accounts, a transfer value could be calculated on termination of employment which is then paid into the individual's retirement account on a tax-sheltered basis. In this case, the former employer would no longer have a deferred vested pension entitlement to administer and the pensioner would ultimately receive their pension benefits from one source.

CONCLUSIONS

Demographic developments and aging societies create massive challenges for the retirement income systems in many developed countries. Although retirement systems can vary substantially from country to country, robust retirement systems do share common traits, such as a high degree of coverage in the population and a significant element of pre-funding. A broad-based discussion about reengineering the existing retirement income systems is underway in Germany. As part of this discussion, Germany would be well advised to seriously examine possible solutions for its demographic challenges which have effectively been implemented in other countries—in particular, the use of defined contribution pension plans. ■

Norman Dreger, CFA, Dip. IEB, FCA, FCIA, FSA, is a partner at Mercer in Frankfurt, Germany. He can be reached at *norman.dreger@mercer.com.*

SOCIETY OF ACTUARIES

SOA Professionalism Ready-to-Go Kit

Host a Top-Notch Professionalism Workshop for Your Employees (Without Leaving the Office)

Check out the Professionalism Ready-to-Go Kit:

- Includes a facilitator guide, logistics guide, slide presentation and participant guide
- Participants may attain Continuing Professional Development credits
- Uses real-life scenarios and provides opportunities for group discussion
- Ideal for 20-30 employees of any level
- At $500, it is an excellent value

Learn more at *www.SOA.org/ReadyToGoKit.*

Dare to Live on a Long White Cloud?

By Wansi (James) Xu

When I was living in Australia, I never paid too much attention to this little island right across the Tasman Sea, not to mention imagine that I would go and work there for a part of my life.

But when I was looking for a new challenge right after the Global Financial Crisis, I realized that I really needed to expand my horizons, so I turned to New Zealand, which in its aboriginal Maori word "Aotearoa,"means "Land of the Long White Cloud."[1]

SO, WHAT DOES IT FEEL LIKE TO WORK ON THIS PIECE OF CLOUD?

First, I must say, I was quite lucky that I was one of the pioneers who went against the mainstream—most professionals would choose the other direction but I was fortunate enough to have seen the opportunity and been offered one.

It was a crucial year for the New Zealand life insurance market in 2010. New tax legislation targeting the industry was in place and faced increasing scrutiny and upward pricing pressure. My company brought me into the re-pricing work. They were regular pricing considerations, like various demographic decrements, expenses and reserve calculations. One interesting thing about the Australian and New Zealand actuarial work is (or was) the Margin on Services (MoS) type of calculation—now in hindsight is quite beneficial in understanding the new IFRS Contractual Services Margin calculation.

Almost a year later, my company merged with a local player. Being one of the few actuaries in the new company, I was promoted into a project-based type of role where I oversaw both pricing and valuation sides of work. This is very unusual for a newly qualified actuary in countries where actuarial resources are just abundant due to university accreditation programs or the exam system. Hence for young and ambitious actuaries who want to do more, I would recommend trying places where it is a lot harder to become a fully qualified actuary, but nonetheless still involves all essential actuarial type of work. This way, it is just a lot easier to get more responsibilities and exposure.

WHAT IS THE LIFE INSURANCE MARKET LIKE?

Up until 2010, the New Zealand insurance market was actually regulated by the Australian regulator, APRA, hence it should come as no surprise that the New Zealand product offering and reporting requirement is very much like its neighbor.

The market is primarily protection product driven, I would say at least 90 percent of individual products sold in the country are term life, total and permanent disability (TPD) and trauma (critical illness) products. While historically annuity products were popular in the 70s, there is virtually no new offering or consumer appetite for these at the moment.

In very recent years, a couple of companies started to focus on the retirement segment. Just like many developed economies, New Zealand is no different in terms of underfunded status of the Social Security system, with the defined contribution (DC) like retirement savings plan introduced only less than 10 years

ago. In my personal opinion, one great challenge of this type of product (such as the Seg Fund) is the lack of investment vehicles in the country., Fund managers have limited resources to pursue adequate returns that would be either explicitly or implicitly embedded in the product offering, it is going to be interesting to see how exactly they manage this long tail risk.

Compared to most other advanced economies, New Zealand life insurers enjoy a reasonably high risk free rate—the Official Cash Rate (OCR) published by the Reserve Bank of New Zealand is sitting at 2.25 percent even though it had come down by at least 125 bps since a year ago. The drop in rates posed some serious issues with participating products sold historically, having guaranteed a dividend around 3 percent. However, this issue is much less severe compared to some companies I have seen in other places where the overnight rate is close to zero, but the dividend scale is around 4 percent.

WHAT IS THE PROSPECTUS FOR OVERSEAS ACTUARIES, REALLY?

Even though I have already left the country, I would still say that I loved it and I believe it's a great country to live in and to work as an actuary. In my opinion, the top three reasons why I would recommend actuaries who dare, to take the risk of working in New Zealand are:

- As mentioned before, in New Zealand, a dedicated and smart actuary gets noticed fast, and will get assigned to more important responsibilities so early in their professional life. Take me for example, I was able to get involved in making asset allocation decisions, present campaign analysis and propose recommended action plans directly to the CEO on a regular basis at the age of 25.

- As a country that does not produce part-qualified actuaries straight out university, those of us who already have a few exams under our belt have a natural advantage when competing with local talent. Therefore, overseas actuaries generally spend less time on exams and hence can put in more effort to excel at work.

- For those practicing in big cities, commute to work is always a pain, and moving out of the city could mean losing some of the convenience in life. New Zealand—being a small island—inevitably has a relatively compact lifestyle, so you can actually have it both ways, if you want.

So, now you may wonder, if it was really that wonderful, why did you leave? Well, just like every coin has two sides, being an actuary on this land poses some problems as well:

- The market is a bit too small that everyone knows everyone which leads to less opportunity for job mobility.

- The product offering, as pointed earlier, is limited to protection-oriented ones. For actuaries who spent their entire career in the wealth management business, there is fairly limited use of that knowledge and experience here.

SOME FINAL REMARKS

Working in New Zealand as an actuary is not that much different from other places, you still need to become acquainted with products and regulations; you still need to stay late to finish that pricing report or meet the annual filing deadline; and you also need to find that optimal work/life balance you always wanted. However, it is unique at the same time that you will be (almost) the first one to see the first sunrise every year, you will be gaining lots of new experience and you don't need to shop hard for organic in the supermarket because almost everything is.

So if you ever dare to live on the Land of the Long White Cloud, say "Kia ora" to your new life journey! ■

Wansi (James) Xu, FSA, FCIA, is associate director, Investment Risk Management at Royal Bank of Canada. He can be reached at *james.xu@rbc.com.*

ENDNOTES

1 New Zealand's Maori meaning *(https://simple.wikipedia.org/wiki/New_Zealand)*

2 Reserve Bank of New Zealand: Official Cash Rate. *http://www.rbnz.govt.nz/monetary-policy/official-cash-rate-decisions*

The Role of Swiss Actuaries

By Carlos Arocha

"The first duty of a human being is to assume the right functional relationship to society—more briefly, to find your real job, and do it."— Charlotte Perkins Gilman

Switzerland is small country in Western Europe, known—among other things—for its neutrality. Many international organizations are based in Switzerland. The United Nations has a main office in Geneva. Its predecessor organization, the League of Nations, was also headquartered in Geneva. Besides its prominence in the international arena, Switzerland bases its economy on certain industries. It is a main player in financial services on a global scale. And it is the country where influential organizations are headquartered, like the Bank of International Settlements (and the Basel Commission on Banking Supervision), the International Association of Insurance Supervisors, and the Geneva Association.

As nonmember of the European Union (EU), Switzerland has its own regulatory insurance solvency standard, the Swiss Solvency Test (SST), which was adopted in full in 2011 well before the EU's Solvency II enactment of January 2016. SST is in itself a success story: it was probably the first regulatory economic capital paradigm to be put in place, in a joint effort of authorities, industry and academics. This was no small feat, considering the size and diversity of the insurance industry. Annual direct premiums are about USD 65 billion or 10 percent of GDP, in a country of 8.3 million. On a premium per capita basis, Switzerland ranks at the top of the European list.

What are the roles of Swiss actuaries in this seemingly large insurance universe?

First, let's have a look at the educational path of a Swiss actuary. Actuarial education in Switzerland is based on a curriculum established by the Swiss Association of Actuaries (SAA). A candidate may take courses at the Federal Swiss Institute of Technology (ETH) to validate any or all of the 14 required areas of knowledge that range from computer science to professionalism. After the candidate files an application with the SAA, a committee decides what subjects need to be tested in a "colloquium." The final requisite is to have at least three years of relevant actuarial practice. The title of "Actuary SAA" is then awarded and a diploma is presented at the annual meeting of the SAA, held in the first week of September.

RiskLab, a research center on quantitative risk management, was founded, some 20 years ago, at the ETH. RiskLab has served as an interface between academia, industry, and regulators. The excellent academic ETH environment coupled with the intellectual and physical nearness of the financial and insurance industry in Zurich—in-

cluding regulators—provide the ideal scene for fruitful discussions. This "alliance" is probably unique in the world. Therefore, it is not surprising that the SST was implemented in a relatively short timeframe.

The majority of the 769 fully-qualified actuaries of the SAA work in Zurich. It is common to bump into many friends and colleagues at industry conferences. A good half of the membership attend the SAA annual meeting, and partake in the legendary banquet that takes place at the end of the first conference day.

As continuing education is concerned, the SAA has its own rules, and many events and courses are available to fulfill the requirements. In particular, every summer a one-week Swiss Summer School is organized by the SAA and the University of Lausanne, where a faculty of two to three invited academicians and practitioners focus on a single topic. This year's theme is "Quantitative Risk Management," featuring the authors of a book by the same title. In the last few editions, Prof. Bühlmann, a pioneer of credibility theory and honorary president of the SAA, has presented certificates of completion at a farewell ceremony.

Insurance companies are the main employers of actuaries. But it is common to find statisticians, physicists, mathematicians and quants performing actuarial functions. With the recent growth in popularity of predictive analytics and big data, there is a widening of areas of practice. It is my impression, however, that actuaries do not necessarily form an elite group in the same sense as in the Anglo-Saxon insurance world. For instance, the role of appointed actuary defined by FINMA, the Swiss regulator, can be fulfilled by either SAA actuaries or individuals with equivalent credentials (but not necessarily actuaries).

Interestingly the actuarial function gained popularity with the passing of the Solvency II Directive that in some sense has had an influence on the Swiss insurance legislation. Article 48 of the Directive states that:

"The actuarial function shall be carried out by persons who have knowledge of actuarial and financial mathematics, commensurate with the nature, scale and complexity of the risks inherent in the business of the insurance or reinsurance undertaking, and who are able to demonstrate their relevant experience with applicable professional and other standards."

For example, one of the tasks of the actuarial function is to ensure the appropriateness of the methodologies and underlying models used as well as the assumptions made in the calculation of reserves. It is assumed that other analytical professions, with the appropriate training, are equally able to carry out the task.

Although the above scope is somewhat limited to the determination of solvency capital requirements and best-estimates of technical provisions or reserves, it is also applicable to other functions that are typically of the actuary's domain, such as ratemaking, cash flow testing and experience studies.

The SAA is a member of the Actuarial Association of Europe, an organization of 36 member associations in 35 European countries. The Actuarial Association of Europe represents over 21,000 actuaries, and provides advice and opinions to the various organizations of the European Union on actuarial issues in European legislation. Actuaries who belong to any of these 36 associations benefit from mutual recognition agreements, facilitating work mobility within Europe.

Zurich is a world class financial center and attracts many actuaries from abroad, including non-Europeans from the Society of Actuaries (49 members), the Casualty Actuarial Society (26 members), the Institute of Actuaries of Australia (11 members), the Actuarial Society of South Africa, and the Institute of Actuaries of Japan. I even know a member of the Actuarial Society of Benin currently employed by a large reinsurer.

Traditional actuarial roles have expanded greatly, while other professionals play roles in risk management in the banking and insurance industries, as well as in product design and development, financial reporting, reinsurance, and other areas of practice, including academia. It is interesting to see an explosion in the growth of membership in other credentials in Switzerland, like CFA and PRM, who find their way in the ranks of banks and insurance companies.

The Swiss Association of Actuaries, founded in 1905, has produced scores of contributors to the actuarial body of knowledge, following perhaps the steps of Euler, the Bernoulli brothers and other forefathers. Its members form a strong community that has been enhanced by the participation of actuaries from other actuarial associations worldwide.

The growth of Zurich as a world class financial center and the close collaboration of academics, regulators and the industry, has contributed to the development of new and innovative areas of financial practice and research.

I have attested a few differences in actuarial curricula among members of the International Actuarial Association. But perhaps the salient feature of the actuarial practice in Switzerland is the diversity of roles played by actuaries and other professionals that fulfill the actuarial function. ■

Carlos Arocha, FSA, is managing director of Arocha & Associates GmbH in Zurich, Switzerland. He can be reached at *ca@arochaandassociates.ch.*

5th Actuarial Symposium in Colombia

By Armando Zarruk

On November 13–14, 2015, the Colombian Association of Actuaries (Asociacion Colombiana de Actuarios or ACA), held the fifth International Actuarial Symposium in Bogotá, Colombia. This is the main actuarial event of the country and it attracted approximately 140 participants including actuaries, statisticians, risk professionals, and actuarial students. The conference was the perfect place for them to join together, network and discuss different actuarial issues—including solvency regulation issues, International Financial Reporting Standards (IFRS), and predictive analytics.

The event, which is usually sponsored by local universities, insurance companies, and consulting firms, enjoyed great support from the International Actuarial Association (IAA) and The Society of Actuaries (SOA). The agenda featured, among others, the following speakers and panelists:

- Ed Robbins, past president of the SOA and consultant to the SOA Latin America Working Group.
- Carlos Arocha, past chairperson of the International Section Council of the SOA.
- Karel Goossens, past chairman of the Actuarial Association of Europe (AAE) (formerly Groupe Consultatif).
- Stuart Rose, global insurance marketing manager for SAS.

The two-day event included panels on predictive analytics, longevity and regulation, with the participation of local and international experts. In addition, the Actuaries Without Borders Section of the IAA helped organize two seminars on pricing of general insurance, given by Nasser Hadidi and Peter Murdza, both Ph.D.s and fellows of the Casualty Actuarial Society. These seminars rounded out a successful event and, given the credentials and expertise of the instructors, full attendance of 50 participants was reached.

Pictured (left to right) at the International Actuarial Symposium: ACA President Andrés Vesga; ACA Vice-president Francisco Baquero; Carlos Arocha, FSA; Edward Robbins, FSA; Josh Bank, ASA; ACA Secretary Armando Zarruk, ASA; Luis Gabriel Caro, ASA; and ACA Treasurer Camilo González.

The conference was also a good opportunity to keep up with news and recent developments of interest for the local actuarial community: the first master's degree in actuarial science in Colombia began enrollment in 2014 at the Universidad Nacional de Colombia, and the role of the responsible actuary in the insurance industry was defined by regulation. Additionally, a short-term objective of the ACA was established to formalize the actuarial profession in Colombia.

The International Actuarial Symposium is a biennial event, the next symposium will take place by mid-year 2017. More information is available at *www.actuarios.org.co*. ■

Armando Zarruk, ASA, is the life insurance product manager for Personal Lines at Liberty in Bogota, Colombia. He is also an actuarial instructor at the Universidad Nacional de Colombia. He can be reached at *azarrukr@unal.edu.co.*

SOA Explorer Tool

Find Fellow Actuaries Around the Block or Around the Globe

The SOA Explorer Tool is a global map showing locations of fellow SOA members and their employers, as well as actuarial universities and clubs.

Explorer.SOA.org

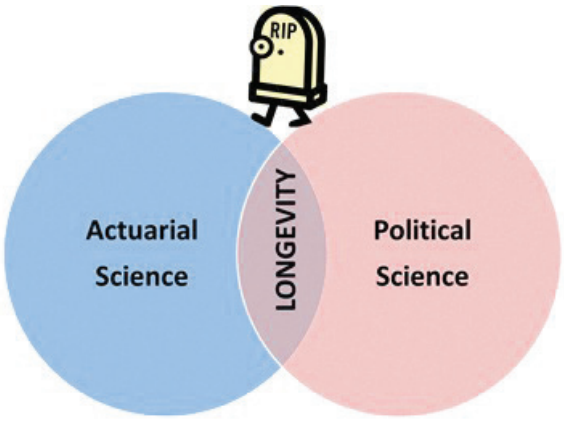
SOCIETY OF ACTUARIES

Retirement Readiness: A Rocky Road in Canada

By Geoffrey Melbourne

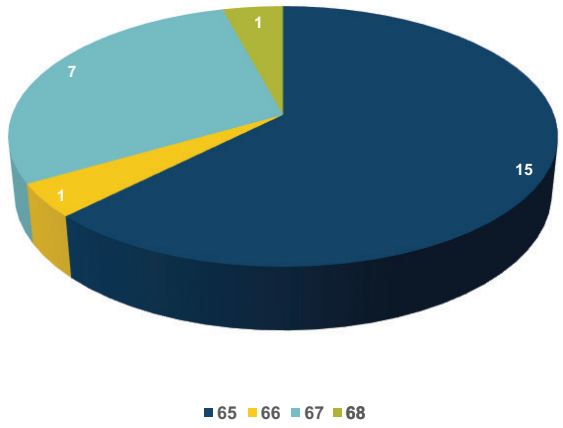
Politics and pensions make strange bedfellows. I was reminded of this recently as I read of a call[1] by U.S. President Obama for Social Security to be expanded. I was fascinated, not because of any merits or otherwise of the position, rather the position—which seems to represent a change in outlook—comes in the twilight of his presidency.

However, this article is not about U.S. politics or pension challenges, but those north of our (still friendly) border in Canada. In my entry to the 2012 Country Feature Competition (which I observe was published in the first digital edition of *International News*!), I wrote about planned changes to Canada's Old Age Security (OAS) program. The main changes would see the eligibility age for the residence-based OAS and its companion means-tested Guaranteed Income Supplement (GIS) gradually increasing from age 65 to age 67 over six years starting in 2023.



Whatever misgivings one may have, I would suspect that an audience of actuaries would find an increase in the eligibility age to be logical in light of longevity trends. According to World Bank Pensions Data,[2] 15 of 24 high-income OECD countries (including Canada) had a statutory retirement age for males of 65 as of Q2 2013, meaning 37.5 percent of these countries had a higher retirement age as shown in Chart 1.

Chart 1: Statutory Retirement Age for Males in OECD Countries (Q2 2013)

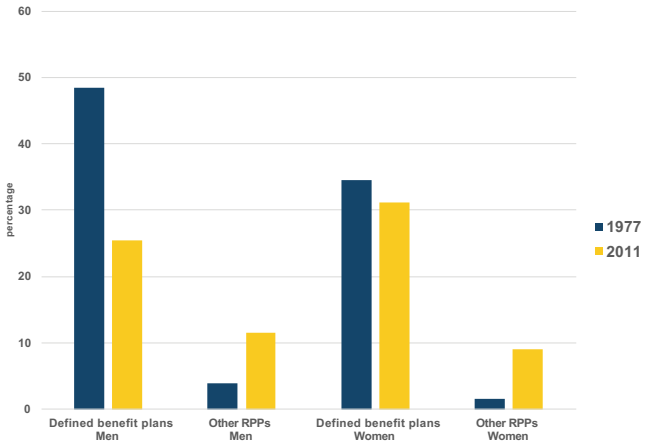


Fast forward to 2016 in Canada and we have a new Prime Minister, Justin Trudeau, representing the Liberal Party of Canada. You may read of his "bromance" with President Obama elsewhere, but one of his pre-election promises was to cancel the scheduled increases in the OAS eligibility age, and this was made manifest in his government's first federal budget:[3]

Well love it or hate it, that's one plus for future seniors. What else is in store for future generations of retirees? After all, the OAS has a target replacement ratio of only 15 percent of national average income, leaving most Canadians reliant on other sources of income for their financial security in retirement. The Canada Pension Plan (CPP), the other main social security pil-

lar, is based on employment earnings and has a 25 percent target replacement ratio. Even the combined social security program is considered to leave significant room for workplace retirement programs and personal savings to bridge the gap to retirement readiness for many Canadians. As in much of the industrialized world, workplace retirement programs have been in decline in Canada and, particularly outside of the public sector, there has been a trend[4] towards defined contribution rather than defined benefit coverage as seen in Chart 2.

Chart 2: Percentage of employees with a registered pension plan (RPP) through their job, by gender and pension type. 1977 and 2011



RPP: registered pension plan

Sources: Statistics Canada, Pension Plans in Canada and Labour Force Survey, 1977 and 2011.

The government of Ontario (Canada's most populous province) has long advocated a CPP expansion to address the retirement readiness issue. It faced resistance from the previous federal government that was generally opposed to such an expansion, but has found more favor with the Trudeau regime. Changes to the CPP require the support of at least seven provinces holding two-thirds of the population of the country—given the different state of provincial economies and other local considerations, achieving consensus on this front is non-trivial.

Ontario had therefore forged ahead with the Ontario Retirement Pension Plan ("ORPP").[5]

"A pension plan designed to help Ontario workers retire with greater financial security."

"Restoring the eligibility age for Old Age Security and Guaranteed Income Supplement benefits to 65 will put thousands of dollars back in the pockets of Canadians as they become seniors. These benefits are an important part of the retirement income of Canadians, particularly for lower-income seniors. Vulnerable seniors depend on this support, and without it, face a much higher risk of living in poverty."

Key features of the ORPP included:

- Mandatory for employees without a "comparable workplace pension plan"
- Employees would contribute up to 1.9 percent of their annual earnings up to $90,000—matched by employers
- Normal retirement eligibility age of 65, with options to receive adjusted retirement income as early as age 60 or as late as age 71
- Designed to provide a 15 percent income replacement rate after contributing to the plan over 40 years
- Pensions would be indexed to inflation
- Phased implementation depending on the number of employees and whether a non-comparable registered workplace pension plan is in place

The comparability test had been one of the more controversial features of the ORPP:

- For earnings-based Defined Benefit (DB) pension plans, the annual benefit accrual rate must be at least 0.5 percent to be considered comparable
- For Defined Contribution (DC) pension plans, the minimum total contribution must be at least 8 percent of earnings, with employers contributing at least 50 percent of the total minimum contribution, or at least 4 percent

One actuarial conundrum had been how a 0.5 percent DB accrual rate and an 8 percent DC contribution rate could be considered to be equivalent. Suffice it to say that there are arguments that a DC contribution rate would need to be higher to cover risks and features such as longevity, indexation, survivor benefits and institutional investment returns and fees that are better addressed under a DB arrangement.

Another concern, especially among DC providers such as insurance companies, was that DC plans, which are not structured as registered pension plans (and therefore allow easier access to the funds saved before retirement), would not be comparable. In addition, some DC plans have contribution designs that would not meet the comparability test, in some cases because contributions may be optional for employees with a match from employers rather than being mandatory. In contrast, most DB plans would be expected to satisfy the comparability test.

There were also viewpoints that:

- The ORPP would be solving a problem that doesn't exist
- ORPP contributions would represent an unjustified payroll tax
- Employers (especially small employers) and/or employees couldn't afford the additional contributions
- The disruption to existing workplace retirement programs because of the comparability test would be unwarranted

The Canadian Institute of Actuaries (CIA) recently released a public position paper on the "Expansion of Public Pension

Plans."[6] While not advocating for any particular position on the merit or lack thereof of any program, the CIA suggested the following key design elements for consideration if governments agree that the key problem to be addressed is middle income workers without a pension plan and that the best solution is for public pension plans to be expanded:

- 15 percent pension target after a full career, based on earnings between 50 percent and 150 percent of CPP covered earnings
- Set equal employee and employer contributions and consider staggered contribution rates based on age to minimize generational transfers
- Fully fund new benefits by providing gradual pension accruals, and adjust indexing if necessary so that the new plan remains self-sufficient
- Use the existing structures (CPP and Quebec counterpart) for collecting contributions, administering benefits and investment functions
- Take more time to evaluate whether the retirement age under public plans should be adjusted

The 2016 Global Benefits Attitudes Survey[7] from Willis Towers Watson highlighted that Canadian employees generally desire retirement security and are willing to pay for it (with 65 percent of Canadian employees surveyed in 2015 being willing to have a higher pay deduction each month to ensure a guaranteed retirement benefit):

So we have employees concerned about retirement readiness, governments taking actions at different paces and employers needing to manage the different issues and influences in a way that makes sense in the contexts of their business operations. On the government side, Canada's finance ministers met in June 2016 to discuss ways to reform the CPP, following the federal budget indications[8] that the government would launch consultations to give Canadians an opportunity to share their views on enhancing the CPP. At the time of writing, it had just been announced[9] that the finance ministers have agreed in principle to work on a CPP enhancement starting January 1, 2019, with the following key features:

- Target replacement ratio increased from 25 percent to 33.3 percent
- Maximum amount of income subject to CPP ($54,900 in 2016) increased by 14 percent upon full implementation in 2025, when the new projected limit would be $82,700
- Gradual phase-in of contribution impacts over seven years starting on January 1, 2019 to allow more time for businesses and employees to adjust
- Offsetting the impact on low-income workers by enhancing federal tax benefits, and providing a tax deduction rather than a tax credit for employee contributions associated with the enhanced portion of CPP to mitigate the tax consequences in general

Eight provinces and the federal government have signed the agreement, with Quebec and Manitoba agreeing to remain part of the discussions moving forward. Ontario has confirmed that the ORPP will not be implemented, pending ratification of the CPP deal by mid-July 2016. Despite all the preparation work done on the ORPP, using a national platform is that much more efficient and averts further "checker-boarding" of pension provision in Canada. Those who viewed the ORPP as solving a non-existent problem and/or the ORPP contributions as an unjustified payroll tax may hold similar sentiments towards the CPP expansion. The proposed CPP changes don't go as far as the ORPP would have, and I expect that the road to retirement readiness in Canada will remain a long and rocky one. ■

The views expressed in this article are not necessarily the views of Willis Towers Watson

Geoffrey Melbourne is senior consulting actuary at Willis Towers Watson in Tononto, ON. He can be reached at *geoffrey.melbourne@towerswatson.com.*

ENDNOTES

1 *http://www.latimes.com/business/hiltzik/la-fi-hiltzik-obama-social-security-20160603-snap-story.html*

2 *http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTPENSIONS/0,,contentMDK:23231994~pagePK:148956~piPK:216618~theSitePK:396253,00.html*

3 *http://www.budget.gc.ca/2016/docs/plan/ch5-en.html*

4 *http://www.statcan.gc.ca/pub/75-006-x/2014001/article/14120-eng.htm#n10*

5 *https://www.ontario.ca/page/orpp-ontario-retirement-pension-plan*

6 *http://www.cia-ica.ca/docs/default-source/2016/216056e.pdf?sfvrsn=0&utm_source=May_19_Announcements&utm_medium=Email&utm_content=PP_Link_PUB_EN&utm_campaign=May_2016_ORPP_PP*

7 *https://www.willistowerswatson.com/en/insights/2016/02/global-benefit-attitudes-survey-2015-16*

8 *http://www.benefitscanada.com/pensions/governance-law/finance-ministers-schedule-meeting-for-cpp-reform-discussions-82105*

9 *http://www.fin.gc.ca/n16/16-081-eng.asp*

Prevention is Better than Cure

By Joseph Lu

A pandemic, or global disease outbreak, is one of the top catastrophic risks faced by the insurance industry. So can we cope with a major pandemic? Last year, Bill Gates in his blog (bit.ly/1JX4s7B), and a World Bank poll, concluded that we can't.

The Ebola virus, with a fatality rate of 50%, has killed more than 11,000 victims since the West African epidemic began in December 2013.

Imagine an Ebola-influenza bug; an airborne germ that spreads as fast as influenza and with a similar fatality rate to Ebola. This could be expected to cause great global damage, including large insurance losses.

An independent panel of experts from Harvard and the London School of Hygiene & Tropical Medicine recently called in The Lancet for global reforms, based on lessons learned from the West African Ebola crisis, in preparation for the next pandemic.

The panel highlighted grave deficiencies in the global system in responding to outbreaks, and provided a series of recommendations. The work also exposes opportunities for actuarial techniques and modelling to play a part in managing pandemic risk.

Knowledge is power

The world needs to understand the risks of disease outbreaks, and any failure in preventing them, in various countries to inform resource allocation. The UK government has outbreak detection infrastructure, a developed healthcare system and specific policies to deal with future pandemics. However, this is not the case in poorer countries with a higher risk of outbreaks.

From December 2013 to March 2014, the first Ebola infections occurred in a remote area in Guinea and went unreported for several months, allowing it to spread to neighbouring Liberia and Sierra Leone. This was largely the result of a failure to detect and respond to the disease outbreak. This highlights the need for international aid or a move to prioritise national resources for public health in less developed nations.

In addition, there is a need to understand the likelihood of the emergence of new germs over time. From 1940 to 2004, 335 new infectious diseases appeared in humans. About 60% of these were caused by microbes transmitted from animals to humans. Of these, about 70% were from animals that typically live in the wild. So, it would be useful to monitor infectious agents in wildlife in order to improve our awareness of emerging pandemic risks.

It has been estimated there are 320,000 different viruses that currently infect mammals, and a project to identify and characterise them would require an investment of approximately £4bn.

Additionally, an independent expert panel has recommended an investment of about

£3.2bn per year to markedly improve global pandemic preparedness. To put these costs into context, recent calculations have estimated that pandemics could cost the world $4.2trn in the next 100 years, averaging £42bn per year.

Consider the 1918 Spanish flu, which experts suggest may have originated from birds. This has been the most severe flu pandemic over the past 100 years; the outbreak killed more than 50 million people and cost the insurance sector about £13bn worldwide in today's money.

If an animal disease database were created, factors that influence disease transmission from animals to people, as well as the potential spread of disease in human populations, could then be considered in order to understand and actively manage global pandemic risks more effectively.

This can be assisted by developing a mathematical model to estimate the risk of emergence of outbreaks. It should take account of drivers of epidemics such as:

- Likelihood of emergence of new infectious agents from the wild
- Animal-human interactions
- Population density
- Investment in healthcare
- Healthcare capability
- Government's ability to mobilise prevention measures.

International intervention will be needed when national preventive measures fail. The Ebola epidemic saw failures in reporting the outbreaks, technical capacity to contain them and mobilisation of global action.

Consequently, international help was delayed. Non-profit organisation Médecins Sans Frontières responded to the Ebola epidemic in March 2014, but it wasn't until July that the global community engaged with the issue and provided tangible help.

Modelling could potentially help answer some key questions forming part of the risk management process, such as:

- What are the benefits of an early call for help? This would help national leaders of affected countries prioritise communication with the global community

> The world needs to understand the risks of disease outbreaks, and failure in preventing them, in various countries to inform resource allocation.

- What is the best containment strategy? Policies to shut down travel and trade has harmed the economies of Ebola-affected regions and hindered epidemic control. Experts and equipment need to be transported in and out of affected countries as part of an effective strategy
- Can insurers do more to help their customers plan their travel or prevent infection?

Shared research and resources

The sixth issue of the IFoA's Longevity Bulletin on Pandemics suggested that recent advances in big data capability and social media data, when combined with genomics and spatial information, can potentially provide notably quicker information flows. Co-ordinated use of various data sources can theoretically help minimise the spread of infection and facilitate faster treatments. This wasn't particularly evident during the Ebola epidemic.

Direct exchange of data on the spread of Ebola was ineffective between the three most affected countries because of a lack of robust channels and coordination. Consequently, data sharing on infection and death in each country had to go through the World Health Organization (WHO), rather than directly between the countries, hampering speedy decision-making.

Global scientific collaboration was also problematic. For example, some scientists shared genomic sequencing data through an open-access database but others kept the data to themselves. Although thousands of virus samples have been collected from patients, there isn't any established arrangement for scientists to analyse them.

Clearly, more needs to be done to materialise the possible benefits of big data on pandemic prevention. Data, statistical and modelling experts in the actuarial community are well placed to contribute to this worthy task.

An effective system to prevent and respond to a pandemic requires complex co-ordination and resource sharing among many stakeholders.

This would include national governments, international agencies such as the WHO, non-governmental experts, a UN-related humanitarian system and research institutions. They play a wide range of important roles, including maintenance of national health, information sharing, fund raising, mobilising international actions and scientific research.

The insurance sector is a key stakeholder in all this as it could suffer large losses directly through insurance claims, and indirectly through business disruption. The Solvency II regime ensures that European insurers have the capital to sustain a severe pandemic.

In the US, the Society of Actuaries modelled the impact of recurrence of the Spanish Flu on the direct life insurance industry, showing that it would reduce the industry's capital by 25%. It reported: "It is clear that the industry as a whole can weather even a severe pandemic on the scale of 1918."

It is comforting that the insurance sectors of the main global economies are likely to be able to sustain the aftermath of a severe pandemic. However, in this instance, insurers' capital would be useful only after a global tragedy.

Could the industry use its financial capability, in a commercially viable way, to prevent or respond to epidemics before they get out of control in the first place? Financial modelling is required to examine whether there are more capital-effcient approaches.

A major pandemic could cause significant damage globally, including insurance losses, yet the world seems poorly equipped to cope with a fast-spreading and fatal disease. Actuaries have the skills to develop advanced models, not only to calculate capital requirements for the insurance sector but also to inform decisions needed to prevent and deal with pandemics.

As a key stakeholder of pandemic loss, the insurance sector could consider wider roles beyond setting reserves. These might include financing, technical sharing and dissemination of crucial information to fight pandemics. ■

Originally published by The Actuary, Jan/Feb 2016. ©The Institute and Faculty of Actuaries

Institute and Faculty of Actuaries

Joseph Lu is the chair of the IFoA Mortality Research Steering Committee and longevity science director at Legal & General. He can be reached at *Joseph.Lu@landg.com.*

Caribbean Actuarial Association 26th Annual Conference & 25th Anniversary Celebration

November 30th - December 2nd 2016

Torarica Hotel – Paramaribo, Suriname

The CAA's Annual Conference is the main event on the region's actuarial calendar and brings together leading professionals in the financial services industry. The agenda will feature leading regional and international specialists in the fields of pensions, life insurance, investment and property and casualty insurance. There will be several sessions designed for our Dutch attendees which will also be of interest to everyone.

A special programme is planned in celebration of the CAA's Twenty-Fifth Anniversary.

Suriname is located on the South American continent and offers a cultural experience like no other. The 2016 Conference will take place exactly ten years since our first and only time there.

The Conference will take place at the Torarica Hotel and Casino but attendees will have the choice of staying at any of the group's three hotels: Torarica Hotel and Casino, Royal Torarica or Eco Resort, all located within five minutes of each other and all within walking distance of several local attractions.

Visa Requirements:
Nationals of the United States, Canada and some other countries require visas to enter Suriname, nationals of most Caribbean countries do not. The local committee will provide assistance in the processing of visa applications at the Ministry of Foreign Affairs in Suriname.

We hope to see everyone in Paramaribo this December!

To register, book your hotel, see specifics of visa requirements and other details, please visit our website:

www.caa.com.bb

CARIBBEAN ACTUARIAL ASSOCIATION

SOCIETY OF ACTUARIES

475 N. Martingale Road, Suite 600
Schaumburg, Illinois 60173
p: 847.706.3500 f: 847.706.3599
w: www.soa.org