

The Actuary

SOCIETY OF ACTUARIES

AUGUST/SEPTEMBER 2015 VOLUME 12 ISSUE 4

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GOING GLOBAL

The growing international market for pension risk transfer, p. 22

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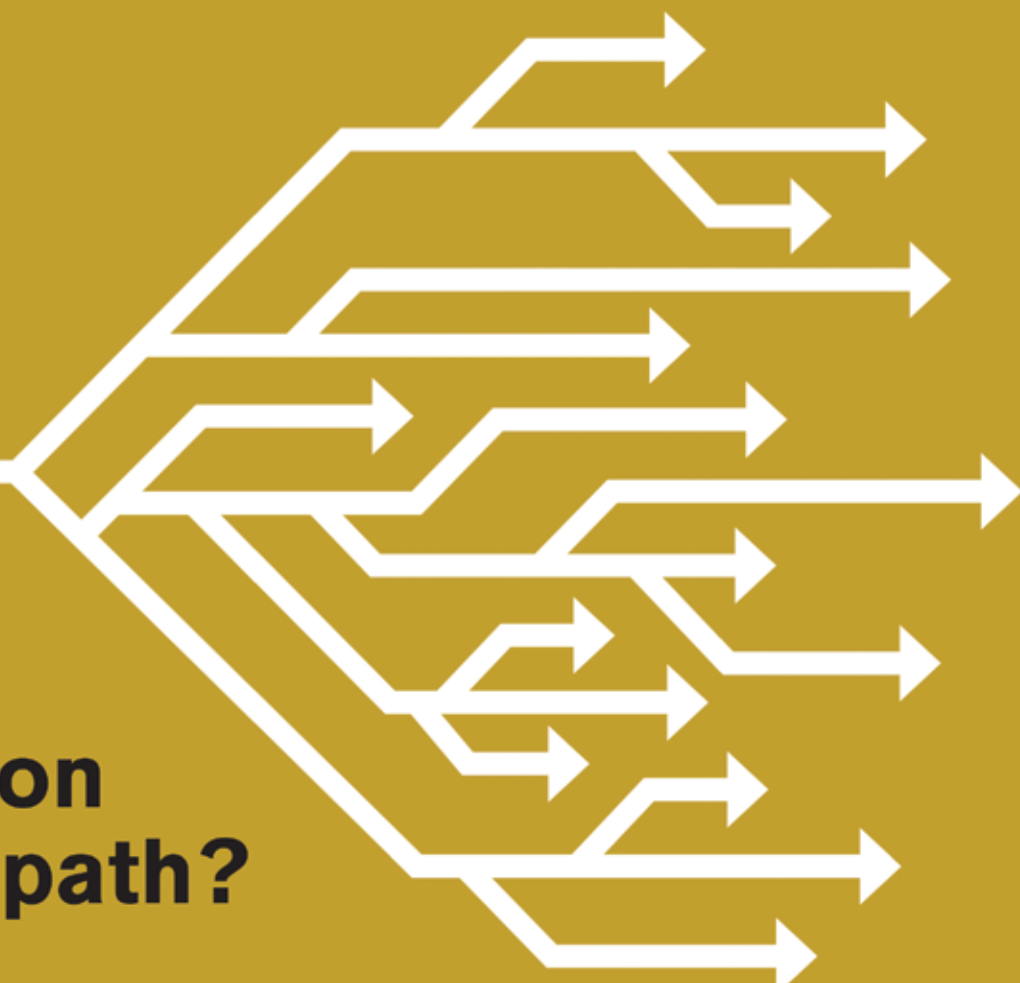
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RETIREMENT SOLUTIONS

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The SOCIETY OF ACTUARIES Actuary

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The Actuary is published bi-monthly (February, April, June, August, October, December) by the Society of Actuaries, 475 N. Martingale Rd., Suite 600, Schaumburg, IL 60173-2226. Periodicals postage paid at Schaumburg, IL, and additional mailing offices. USPS #022-627.

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The Actuary is free to members of the Society of Actuaries. Nonmember subscriptions: students, \$22; North American \$43; Int'l \$64.50. Please send subscription requests to: Society of Actuaries, P.O. Box 95600, Chicago, IL 60694-5600.

POSTMASTER: Send address changes to the SOA, c/o Communications Department, 475 N. Martingale Rd., Suite 600, Schaumburg, IL 60173-2226.

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The Actuary welcomes both solicited and unsolicited submissions. The editors reserve the right to accept, reject or request changes to solicited and unsolicited submissions, as well as edit articles for length, basic syntax, grammar, spelling and punctuation. *The Actuary* is copyedited according to Associated Press (AP) style.

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Alan Cooke

Editorial

THE CHANGING RETIREMENT BUSINESS

BY ALAN COOKE

POSSIBLY NO OTHER single area of actuarial activity has undergone as much change and offered as many opportunities for actuaries in the past 50 years as the retirement industry. The role that actuaries have played and continue to play in helping to provide retirement solutions is significant. In this special theme issue of *The Actuary*, we have included articles that discuss and illustrate retirement solutions to the current challenges of increased longevity, low interest rates, the shift away from defined-benefit pension plans and the changing nature of the employment relationship. We have attempted to bring an international perspective to these articles, and they have been written to appeal to a broad audience, rather than just to pension actuaries.

The first article by Anna Rappaport looks at the considerations for when and how people retire, programs that help people phase into retirement and related policy issues. We hope that the article will encourage actuaries to contemplate these issues, take an active role in thinking about what changes are needed to adjust to emerging demographics and advocate for important changes in retirement policy.

In his article, Rich Berger provides a historical view of the pension business by sharing his personal experiences as a pension actuary working in the defined-benefit pension field from the 1970s to the present day. Rich also provides his perspectives on future opportunities for actuaries in the pension business.

Our other two feature articles discuss the different ways that sponsors of defined-benefit pension plans are currently mitigating the risks of providing their plans. The article by John Turner, Conrad Ferguson, Rajish Sagoenie and Mark-Anthony Macharia focuses on innovative plan designs around the world that share risks between employers and employees; the article by Amy Kessler and William McCloskey illustrates the increasing use of insured solutions to address interest rate and longevity risks.





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In addition to the authors of the articles, I would like to add a special thanks to Carl Hansen, who was the co-editor of this issue. Carl contributed significant amounts of his time and provided valuable insights in the review of the articles submitted for publication.

While assembling the articles for this issue, I reflected upon the changes I personally

witnessed in the retirement business as a longtime pension actuary. My first job was at an insurance company helping employers transition the funding of their pension plans from the fully guaranteed group annuity arrangements that they had purchased during the low-interest-rate environment of the 1950s to more flexible managed fund arrangements. This change in funding vehicles was accompanied by the rise of the consulting firms to reduce the insurance companies' previous domination in the provision of actuarial, administration and investment services for pension plans. I personally experienced this latter change, initially as a client of a pension consulting firm and then as an international pension consultant.

After more than 40 years in the business, the insurance industry has strongly re-established itself as a provider of retirement solutions both for defined-benefit and defined-contribution plans. We have gone full circle in some respects.

We hope that you will enjoy this issue of *The Actuary*, and we welcome your feedback at theactuary@soa.org. **A**

Alan Cooke, FSA, FCIA, MAAA, is an actuary living in Vancouver, Canada. Retired from full-time work, Alan serves on the boards of the Workers' Compensation Board of British Columbia, the Healthcare Benefit Trust and the Canadian Institute of Actuaries. He may be reached at vancooke@telus.net.



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Errol Cramer

Letter From The President

A SHARP NEW LOOK

BY ERROL CRAMER

THE DOUBLE COVER OF THIS EDITION OF THE ACTUARY is a technique used at times by many prestigious magazines to call out an issue of particular interest. For us, this is our way of announcing a brand new look to the face of the Society of Actuaries (SOA) in the public eye. Branding is very important to encapsulating the entire package of values and principles that constitutes the SOA as an organization. The SOA staff, together with branding consultants, put a lot of thought and research into the brand refresh, and the Marketing Executive Committee and Board gave their careful deliberation and input and approved the new brand. We are very excited about the end result and hope you share in our enthusiasm.

WHO ARE WE?

Now that the magazine announcing the new SOA brand has your attention, I would like to share with you the reasons why this isn't just about an updated logo. This brand refresh reflects the essence of the SOA—a leading provider of globally recognized credentials establishing actuaries as business leaders who measure and manage risk to support financial security for individuals, employers, organizations and the public. You'll see the new look throughout this magazine, on *SOA.org*, at the 2015 SOA Annual Meeting & Exhibit and in our communications to you.

With roots back to 1889, the modern SOA was formed in 1949 by the merger of the Actuarial Society of America and the American Institute of Actuaries. This new association had around 1,000 members and four employees. Today, the SOA has more than 26,000 members in 78 countries and 36,000 candidates in 89 countries. The SOA's heritage is a source of pride for all who are members.

This brand refresh is a symbol of that pride. The credentials we've earned are more than letters after our names. They are the reason we are trusted and respected around the world by those who use actuarial services.

WHY CHANGE THE BRAND?

While the SOA is well-known and highly-respected, we lacked a strong, highly recognizable appearance of our "brand;" that is, our logo, the colors we use in our materials and the overall appearance of our publications. Looking at a set of logos and brands of other organizations, including those of other actuarial organizations, the SOA's brand simply didn't stand out in ways reflecting the SOA's role in the profession. Modern technology applications were not kind to our logo whether rendered in mobile applications, Web-based communications or even presentations.

The clean aesthetics of the new logo, the infinity shield, will serve us well in the digital age where logos are reduced to the screen size of an Apple Watch. As we bring our professional designations, research and our continuing education programs to a global audience, we need a strong, recognizable logo representing our brand that reflects our principles, history and identity while keeping pace with technology.

Making necessary changes to our logo and our overall brand appearance is not, by the way, unique to the SOA. We've all seen many other organizations, including those for which we work, do the same. In recent years, a number of our sister actuarial organizations have updated their logos to reflect their unique histories and identities. In a world crowded with brands, it's vital that we create a visual identity that is immediately recognizable to those who seek out, or are stakeholders of, the SOA.

Of course, members are very familiar with the SOA's intricate seal (rosette with the shield, eagle and maple leaf), which we have often used as a logo in the past. We will continue to use the seal on official and formal documents, such as our certificates of membership, and we will feature the new logo and look on organizational materials and in media channels.

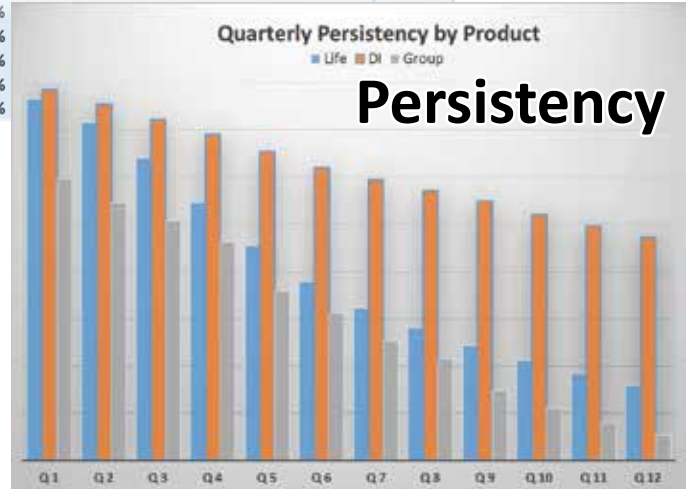
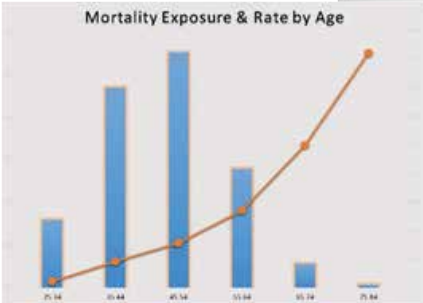
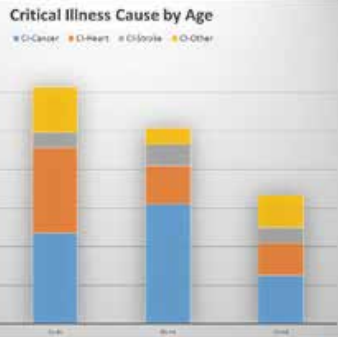
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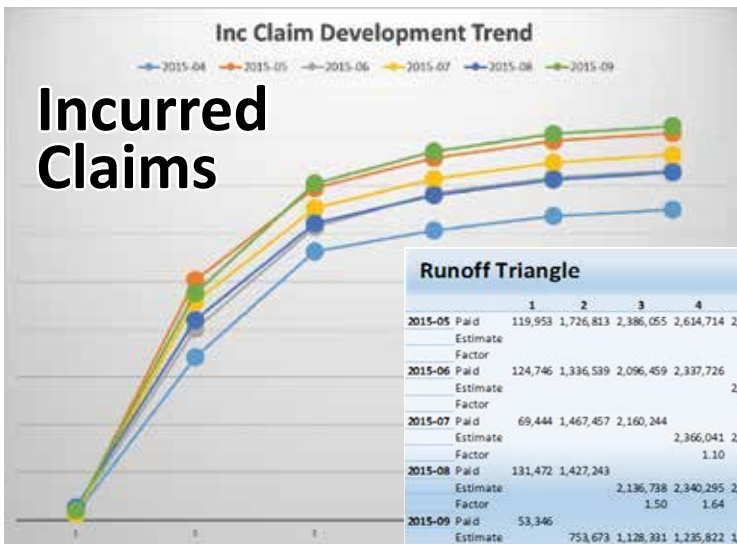
The Insight Enterprise suite includes dynamic, interactive studies as part of a flexible, modular analytical system built on data warehouse technologies. It can be implemented as an enterprise solution including operational reporting and financial management, or more locally as a stand-alone actuarial system. The system includes full set of audits; tracking data through the system, integrity, job execution and error reporting. Visit our website for more information, call us for a demo or email us at info@insightdecision.com

Mortality by Date	2013	2014	2015			Total
			2015-Q1	2015-Q2	2015-Q3	
Exposure	55,759	57,051	14,439	14,525	14,620	156,395
Actuals	281	332	57	78		
Expecteds	201	212	54	55		
A/E	140%	157%	105%	141%		

Persistency by Issue Date	2011	2012	2013	2014	2015			2015 Total
					2015-Q1	2015-Q2	2015-Q3	
Y 1	88.38%	88.19%	87.91%	88.14%	89.54%	91.61%	90.04%	90.28%
Q 1	96.96%	96.63%	96.16%	97.06%	96.68%	97.35%	97.41%	97.11%
Q 2	94.61%	94.47%	93.81%	94.96%	94.48%	95.97%		95.22%
Q 3	91.91%	91.44%	91.18%	91.77%	92.16%			92.89%
Q 4	88.35%							
Y 2	77.79%							
Y 3	70.90%							
Y 4	65.72%							
Y 5	60.67%							



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INFINITY: Communicates how we are continually evolving to provide forward-thinking research, education and opportunities for our community and the professionals within it.

SHIELD: Represents a fortified foundation, bound by a set of principles that advances the interests of our profession and cultivates outstanding, trusted professionals.

The color selected for the Society of Actuaries Signature reflects the vitality and positive outlook of the company. It also communicates the main brand pillar of trust.

The color blue is also perceived as dependable, fiscally responsible and secure. Strongly associated with the sky and sea, blue is serene and universally well-liked. Blue is an especially popular color with financial institutions, as its message of stability inspires trust.



The negative space within the center of the symbol was inspired by and is representative of the shield found within the revered Society of Actuaries seal. The symbol's infinitely undulating appearance was inspired by the Penrose Triangle, or an impossible triangle—a known and loved logic problem. The modern, multidimensional appearance represents the size, reach, strength, standards and authority of the organization.

WHAT DOES THE NEW BRAND COMMUNICATE?

The essence of the SOA's brand is "trusted." We are trusted to advance knowledge through actuarial research. We are trusted to nurture and educate our candidates, providing them with the highest quality actuarial credentials. We are trusted to connect, develop and advance the interests of our members around the globe. We are trusted to serve in key risk management roles in a growing number of organizations and industries. We're trusted to promote financial stability and well-being in an increasingly complex world.

The new infinity shield logo reflects the SOA's unbounded potential. The shield, taken from the SOA seal and a nod to the mathematical symbol ∞ infinity, represents our rich history, professional standards and principles, and our charge to manage risk to support the financial security for our stakeholders. The logo is blue, a color of trust. This may seem a bit poetic and it is not intended to be—according to our extensive market research, blue places us in the category of trusted financial services along with other actuarial organizations and actuarial employers.

The appearance of our brand is changing, and our principles endure as we serve the public, advance the profession, credential and educate actuaries, and build strong actuarial communities. I hope you will agree that this new brand does a good job symbolizing the SOA and what it means to me and to you as a member. If you're interested in learning more about the SOA's new look, visit SOA.org/Brand. **A**

Errol Cramer, FSA, MAAA, is president of the Society of Actuaries. He can be reached at errol.cramer@soa.org.



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Debt for retirement

**HOW AND WHEN WILL PEOPLE RETIRE
IN THE FUTURE? BY ANNA RAPPAPORT**



The last 150 years have seen dramatic changes in the demographic makeup of populations throughout the world and in the lives of older persons. The combination of people living longer and lower fertility rates (plus in some countries immigration) has meant a very different population age mix. Retirement has become an accepted part of the life cycle in many countries. This is the result of people living much longer than in earlier centuries and the development of public and private retirement systems in many countries. Retirement timing is usually described as a fixed age, and not based on the time until expected end of life. Since the start of retirement programs, retirement ages decreased a great deal and then increased a little; retirement periods have increased dramatically and continue to increase.

There are huge differences in when people retire and in the retirement expectations of different population subgroups. In the United States, police officers and firemen retire very, very early; teachers retire early; and employees of major companies tend to retire in their 60s—while judges, symphony conductors and members of Congress often work into their 80s. Work is increasingly seen as a part of retirement, and many people include some work as part of their retirement plan. Some businesses have programs to support older worker employment, but they are very much the exception. “Phased retirement” is the term commonly used for making a gradual exit from the labor force.

There has been a lot of discussion about retirement systems and many changes, with much of the change focused on the shift from defined benefit (DB) to defined contribution (DC). There has not been enough discussion of the question: How and when

findings

will people retire? There has been inadequate focus on the policy and program changes needed to drive retirement patterns that are sensible in light of the emerging demographic and societal patterns. This article focuses on this question, how people decide to retire, programs that help people phase into retirement and related policy issues. I hope that the article will encourage actuaries to contemplate these issues, take an active role in thinking about what changes are needed to adjust to emerging demographics and advocate for important changes in policy. It is important for actuaries to take leadership positions in these areas of public discussion, as many people prefer the politically popular route of not touching retirement ages.

RETIREMENT AGE TRENDS

The Organisation for Economic Co-operation and Development (OECD) publishes data on labor market exit, indicating retirement age trends in more than 30 countries. Retirement ages vary significantly by country. In almost all OECD countries, the effective retirement age has declined substantially since 1970, but this has been reversed more recently. Over the past decade, the average retirement age flattened out and was followed by a small increase. Nevertheless, the effective retirement age remains well below the levels of the 1960s and 1970s in most OECD countries (exceptions are Japan and South Korea).

For men, the average effective retirement age fell from **68.6** in the late 1960s to **63.5** in the five years prior to 2009. For women, the average age of labor market exit dropped from **66.7** to **62.3** over the same period.

Melbourne Mercer Study

THE MELBOURNE MERCER GLOBAL PENSION INDEX grades retirement benefit systems around the world focusing on three major types of factors: adequacy, sustainability and integrity. For each country, the total system, including social benefits and private pensions, is considered, along with legislative requirements.

This work builds on demographic realities and includes labor market participation at older ages as well as benefits. It also includes areas for improvement, both generally and by country. The 2014 report lists six common challenges. The first two are:

“The need to increase the state pension age and/or retirement age to reflect increasing life expectancy, both now and into the future, and thereby reduce the level of costs of the publicly financed pension benefits.”

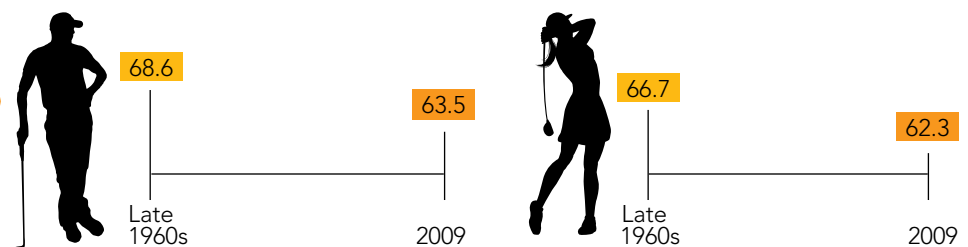
“The need to promote higher labour force participation at older ages, which will increase the savings available for retirement and also limit the continuing increase in the length of retirement.”

Several factors related to retirement ages are considered in the sustainability section of the analysis. The question is asked: “What is the current gap between life expectancy at birth and the state pension age?” The answers provide an indication of the average period of pension payment. Their analysis for 2014 shows a range from -2.9 in South Africa and -7.3 in India to 19.7 in France and 21.4 in South Korea.

The study also examines the question: “What is the labour force participation rate for those ages 55–64?” The percentages ranged from 40.1 percent in South Africa and 42.0 percent in Poland to 72.6 percent in Switzerland and 76.8 percent in Sweden. They point out the importance of increasing labor force participation.

Other questions deal with phased retirement and accruing and accessing benefits while working part time. More information can be found at globalpensionindex.com.

The falling average effective retirement age



EVALUATING INTERNATIONAL PRACTICE—A COMPARISON OF EIGHT COUNTRIES

The Department of Work and Pensions in the United Kingdom commissioned a variety of studies to look at population aging and retirement. One of the papers compared mandatory retirement practices in eight countries. Of the eight, four prohibited mandatory retirement generally, three permitted it after a minimum age, and one permitted it with no age requirement. The exhibit below offers some selected data from this report, which includes a much more complete

analysis. Some of my conclusions after looking at these reports are:

- The demographic issues across countries have many common threads, although some countries are aging much more rapidly.
- Older worker employment and longer retirement are important elements of addressing aging population issues. There are both similarities and differences in how they are addressed in different countries.
- Social insurance program provisions are generally important, as are

employee benefit plan provisions when employer-sponsored programs are a significant part of the retirement security package.

- Employment at older ages is also important, and there is no agreed-upon way to address facilitating older worker employment.
- Public policy has a big influence on the solution, and it is complex and interwoven.
- It is difficult to raise retirement ages.

MANDATORY RETIREMENT	COUNTRY	STATE PENSION AGE	MINIMUM MANDATORY RETIREMENT AGE	AVERAGE AGE AT WHICH PEOPLE LEAVE LABOR FORCE (2002–2007)
Prohibited at any age	Canada	65 (from 60 to 70 with adjustments)	NA	63
	New Zealand	65, can't be taken earlier	NA	65
	United States	66 (from 62 to 70 with adjustments)	NA	64
	Australia	65 for men and 63 for women	NA	63
Permitted with a minimum required retirement age	Sweden	67 (from 61 to any age with adjustments)	67	64
	France	60 (benefit available at 56 under certain circumstances, increased for later retirement)	65	59
	United Kingdom	65 for men and 60 for women (deferral possible with increases)	65	63
Permitted, no minimum required age	Ireland	65 for basic and 66 for contributory	No limit	65

Source: *A Comparative Review of International Approaches to Mandatory Retirement*. Tables 2.1 and 2.3. Department of Work and Pensions Research Report Number 674, 2010. Underlying data from OECD and various other sources.

The countries in this analysis have average ages of labor force exit ranging from 59 to 65. It is 68 in Japan, which is not on the exhibit. Most of the countries have a range at which social benefits can start. Except for France, this age is always 60 or later.

key points

DEFINITION OF RETIREMENT, WORKING IN RETIREMENT AND RETIREMENT AGES

Underlying demographics

It should be remembered that increases in life span vary by economic status, education and other factors. One of the troublesome aspects of this issue is that the situation for middle class professionals is very different from that of laborers.

The demographic issues are a blend of mortality rates, life spans and fertility rates. As we think about the future of retirement and the economy, dependency ratios—the balance between those working and those not—are an important issue. The demographic balance has changed in most countries, and while European countries and Japan have some of the oldest populations, some developing countries have experienced more rapid change.

Definition of retirement

There is no uniform definition of retirement. It can be viewed as age of receipt of benefits, leaving a long-term job, leaving full-time employment or total exit from the labor force. The appropriate definition will seem different to different stakeholders and the definition is evolving. Retirement today often includes some work, usually on a reduced basis.

Retirement ages and expectations

There are vast differences in retirement age and expectations about retirement by country and by occupational group. Social security system provisions will be important factors in retirement ages in most countries, as well as any regulation about mandatory retirement. Many social insurance systems have increased retirement ages, but periods in retirement are still increasing. Retirement

age provisions in employer-sponsored DB plans can also be major contributors. DC plans are much less likely to include provisions that have driven retirement ages.

Research has repeatedly shown that people expect to retire later than they actually do. For example, the 2013 Society of Actuaries (SOA) Retirement Risk Survey showed that the median retiree age for those surveyed was 58, whereas the median expected retirement age of pre-retirees was 65.

In the United States, both involuntary and “pushed” retirement are important factors in retirement decisions. SOA focus groups (in conjunction with the survey mentioned above) indicated that much “voluntary” retirement is “pushed.” Reasons people are pushed into retirement include unpleasant job circumstances, family needs and health problems.

There are many policy issues connected to retirement timing and the options that employers offer. Factors influencing retirement decisions include social security systems, pension and other benefit plans, having enough money to retire (although this is not always an issue), family decisions (when a spouse retires), the need to provide care and help to other family members, health issues, problems at work and pursuing dreams.

The path to retirement, phased retirement and working in retirement

Bridge jobs are jobs between career long-term jobs and total exit from the labor force. Economists have studied bridge jobs and found them a part of the process of exiting the labor force since about 1990. Some people would view bridge jobs as a form of phased retirement.

Phased retirement and working in retirement are issues of growing importance. Most

phased retirement today is not the result of a formal program. Rather, most phased retirement is informal, and consists of people retiring from something and working on some other basis later. Individuals are inventing their own paths. The reasons often given for working in retirement are split between the need for money and benefits, and staying engaged. In the United States, access to health insurance has been a major factor.

Formal phased retirement programs need more attention. In the United States, a new program for federal workers has encouraged more focus on this topic. Phased retirement means very different things to different people, and there are many issues involved in designing such a program. In 2008, phased retirement was a topic for a major study by the U.S. Department of Labor’s ERISA Advisory Council. The report included some principles for phased retirement that should be helpful in seeking to develop sensible structures and policies.

It should be noted that some older persons are very employable and others are not. Factors contributing to the employability of older persons include flexibility, attitude, skills and keeping them up-to-date, familiarity with technology, ability to work with individuals of all generations, health, and physical capability versus job requirements. It has been pointed out that while some older persons are very flexible and great workers, others are inflexible, cranky and act entitled.

Building a life portfolio

It is important to have both a financial portfolio and a life portfolio. The life portfolio consists of the activities and interests that one has. Ideally, the life portfolio will be driven by passions. It may consist of activities that started before or after retirement, and may include volunteer work, board service, some

paid work, family time, artistic endeavors, hobbies, sports, travel, time with friends and/or learning something new. I often discuss with people what leads to “success” in retirement. Financial matters are vital, but once they are in order, the life portfolio is also very important. I believe that every individual has an internal set of values that defines what is important to him or her. My measure with regard to success and the life portfolio is that every year the retiree can say that he or she accomplished something of value based on that personal value system. The stronger an individual’s personal passions are, the more likely it is that he or she can accomplish something related to his or her passions.



The reasons often given for working in retirement are split between the need for money and benefits, and staying engaged.

LINK BETWEEN RETIREMENT AGES AND PLAN DESIGN

Indexing retirement ages to increased longevity is viewed as a logical step, but it is rarely done in public or private retirement systems. Also, thinking about retirement ages in terms of the expected period in retirement versus the age at retirement makes sense but is rarely done.

Traditional DB plans encourage retirement at a particular age or range of ages. Incentives for retirement are part of DB plan design, and many DB plan sponsors historically used early retirement windows.

DC does not encourage retirement at any particular time. With DC primary plans, many people are reluctant to retire, and some employers are finding that this is creating workforce management challenges. This may be partly due to inadequate funds.

POLICY AND SOCIETAL ISSUES AND RETIREMENT OF THE FUTURE

Public policy is an important contributor to retirement decisions. This is an area where actuaries can make major contributions to discussions and can offer leadership in encouraging desirable change. There are a number of areas of policy that are linked

to options for working longer, older worker employment and phased retirement. Policy can either enable or create barriers for innovation in older worker employment.

Social benefit retirement ages, benefit structures and benefit adjustments based on claiming age should be reviewed. These define when retirement and disability social benefits can be claimed and how benefits are adjusted based on claiming ages. This is a major factor in many retirement decisions and in the possibility of claiming disability benefits.



Over the last 50 years, periods of retirement have lengthened dramatically. Recent increases in retirement age have not offset the increases in life span.

Employment legislation should also be reviewed, including age discrimination and mandatory retirement provisions. Some of the provisions designed to protect workers may make creative options during retirement more difficult.

Of course, any policy review should include employee benefit regulation. This includes the types of entities that can sponsor plans, what provisions are required and possible support for phased retirement. Benefit plan law and regulations may include provisions with regard to normal retirement age, payment of benefits while still working, suspension of benefits if someone returns to work, etc.

In any country where there is work to expand options, a comprehensive review of all of these regulations and how they support or deter innovative options for older workers would be most helpful. A multidisciplinary group representing diverse stakeholders (including actuarial input) will be needed to effectively address a long list of practical and philosophical questions, and the group will need to understand that compromise will be necessary.

CONCLUSIONS AND OPINIONS

Societal aging is a global trend affecting many countries. Over the last 50 years, periods of retirement have lengthened dramatically. Recent increases in retirement age have not offset the increases in life span. If retirement systems are to be sustainable, further increases to retirement ages are vital.

However, this can only happen in a way that works well for individuals if there are reasonable opportunities to make longer work feasible. Flexible work options and phased retirement support longer work, but there are few formal programs available today. I believe it is important to actively address these issues.

Raising retirement ages and social benefit eligibility has both pros and cons. Critics of proposals to raise retirement eligibility point to the big differences in life spans by socioeconomic groups, with lower-paid groups having considerably shorter life spans. It is much more difficult for people in occupations requiring heavy physical labor to work longer. Some critics view such increases as discriminatory against such groups. Raising retirement ages also will lead to some increases in disability, and will require that disability benefits also be adjusted so that the disability and retirement programs work well together.

Another criticism of potential increases in retirement ages is that older people have a great deal of difficulty securing employment, and often there are not suitable employment options. Flexible employment can help where it is available. Age discrimination is a subject of government regulation in many places, but that does not necessarily eliminate the problems. The private sector has largely avoided dealing with this issue directly, in part by shifting from DB to DC plans. DB plans make very explicit what they expect about retirement age, but DC

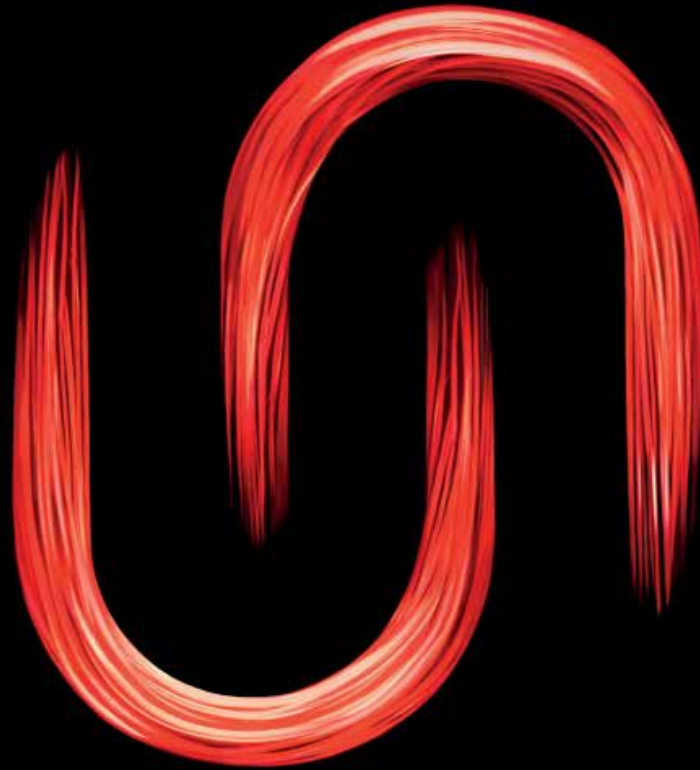
plans do not. Some organizations have dealt directly with creating employment options, but many have not.

I believe that we should reframe the way we think about retirement eligibility in terms of periods in retirement, with a fundamental goal to keep periods in retirement fairly stable. If we are to do this, we need to be much more aggressive in enabling employer options for older workers. I also believe that we need to consider disability benefits in the design of programs going forward.

Public policy affects retirement ages and work opportunities for older persons in many ways. The policy may be part of multiple laws that are not necessarily well coordinated. It is important for policymakers and the private sector to work to address these issues holistically. In so doing, disability policy also should not be forgotten.

My experience is that many professionals who have studied these issues understand the importance of addressing them. However, many in policy communities prefer not to address them, or take a position of supporting no change. This is an opportunity for actuaries to get more involved with policy. **A**

Anna Rappaport, FSA, MAAA, of Anna Rappaport Consulting, is passionate about creating a better future for older persons and improving retirement systems. She is a past president of the Society of Actuaries and chairs its Committee on Post-Retirement Needs and Risks. She can be reached at anna.rappaport@gmail.com.



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GLOBAL PENSION RISK TRANSFER



THE GROWING INTERNATIONAL MARKET FOR PENSION RISK TRANSFER **BY AMY KESSLER AND WILLIAM MCCLOSKEY**

The global pension risk transfer marketplace is growing dramatically, with more than \$240 billion in transactions completed since 2007. In the United Kingdom, the United States and Canada, hundreds of companies have transferred pension risk to insurers and reinsurers, with at least 35 pension funds executing transactions over \$1 billion. Each of these transactions honors and protects the lifetime benefit promise to plan participants while achieving significant corporate finance benefits for the plan sponsor.

Recent noteworthy transactions demonstrate the power of the de-risking trend. General Motors, Rolls-Royce, Verizon, British Telecom, Bell Canada, Motorola Solutions, Bristol-Myers Squibb, GlaxoSmithKline, Kimberly-Clark and AkzoNobel are among the leading companies that have completed pension risk transfer transactions. Each company differs in resources, constraints, strategic objectives and definitions of success. Accordingly, each deal was tailored with unique features to meet the company's needs and reflect a broad range of transaction sizes with agreement amounts up to \$27.7 billion. They all have in common the goals of securing the benefits promised to members and achieving a lower-risk future for the sponsor.

TODAY, PENSION RISK TRANSFER IS:

INCREASINGLY GLOBAL

EMPLOYED BY CORPORATIONS OF ALL SIZES AND INDUSTRIES

FLEXIBLE AND CUSTOMIZABLE

AIMED AT ACHIEVING A LOWER-RISK FUTURE

More than \$240 billion in pension liabilities have been transferred since 2007:



\$167.4 billion in the United Kingdom



\$62.2 billion in the United States



\$11.1 billion in Canada.

Sources: LIMRA, Hymans Robertson and Prudential analysis as of year-end 2014.

The need for a lower-risk future is acute. Despite a sustained equity market rally in recent years, more than a decade of financial market instability combined with sustained low interest rates and rapid life expectancy increases have taken their toll. The risk position most pension funds maintain is challenging due to underfunding and high allocations to risky assets that don't match the liability. Pension assets rise and fall in a manner bearing no relationship to the changes in liability value. With this risk profile and a prolonged period of low rates, even large cash contributions haven't brought funded status to sustained higher ground.

By implementing appropriate de-risking strategies, plan sponsors and fiduciaries can:

- Achieve plan contribution certainty;
- Improve consistency of financial results and realize corporate finance benefits;
- Allow greater focus on the firm's core business; and
- Enhance retirement security for employees and retirees.

Plan sponsors and fiduciaries who take action to manage or transfer pension risk can confidently fund their pension obligations and gain a significant advantage relative to those who don't.

TELLING THE FUTURE—TODAY'S TREND IN THE UNITED KINGDOM

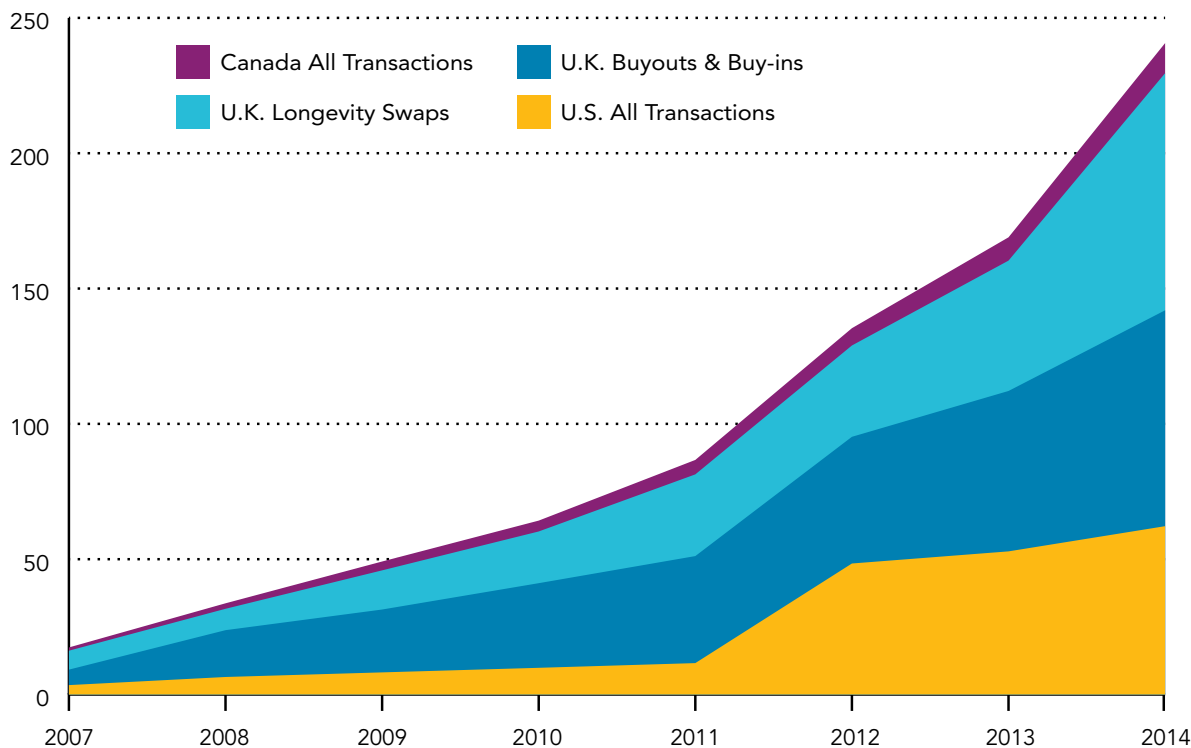
The United Kingdom is widely recognized as the global leader in pension de-risking,

with over \$167 billion in liabilities transferred between 2007 and 2014. The United Kingdom also leads the world in innovation, with groundbreaking products and approaches that enable pension funds to customize their de-risking strategies.

Over the past five years, North American plan sponsors have watched U.K. developments with growing interest. In 2012, the landmark General Motors and Verizon transactions transformed the U.S. market, modest since the 1990s. Despite these and many other agreements, the United States still trails the United Kingdom with only \$62 billion in transaction volume between 2007 and 2014. Canada comes in a distant third with just \$11 billion over the same period.

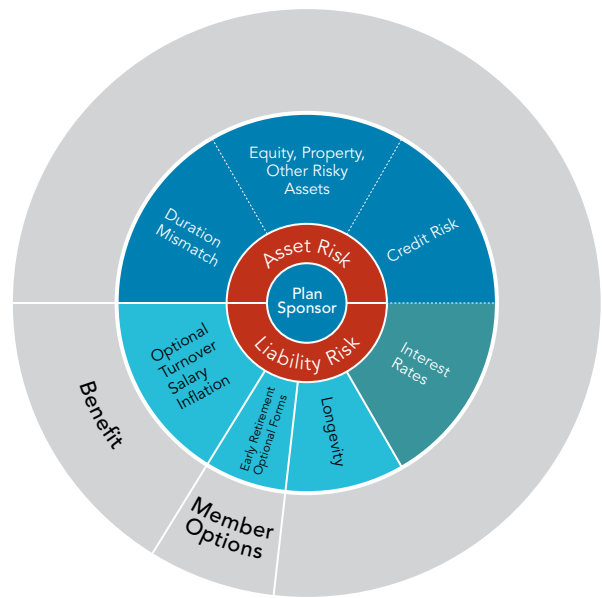
EXHIBIT 1: THE UNITED KINGDOM LEADS THE WORLD IN TRANSACTION VOLUME AND INNOVATION

Cumulative Annual Transaction Totals by Country/Product



Data in USD billions
Sources: LIMRA, Hyman Robertson and Prudential analysis, YE 2014

**EXHIBIT 2: ASSET
AND LIABILITY RISKS
FOR DEFINED-BENEFIT
PENSION PLANS**



Source: Prudential

Exhibit 1 shows the collective transaction activity in the United States, United Kingdom and Canada between 2007 and 2014. In the United States (shown in yellow at the bottom of the graph), all the transactions have been pension buyouts or buy-ins, holistic solutions in which insurers assume all of the asset and liability risks. The buyout completely removes the liability from the sponsor's balance sheet.

In Canada (shown in purple at the top of the graph), the total transaction volume has been modest and, through the end of 2014, was comprised solely of pension buyouts or buy-ins.

Turning to the United Kingdom, the market momentum is apparent. The volume of buy-in and buyout transactions completed in the United Kingdom (shown in dark blue) exceeds all U.S. and Canadian transaction volume combined. The U.K. activity is impressive considering the country's relative size, and, today, U.K. market momentum is accelerating because of competitive pressure in every industry peer group. The same competitive pressure to de-risk may exist in the United States and Canada in five years.

While U.K. buy-ins and buyouts are impressive, the United Kingdom boasts an additional market segment for longevity risk transfer (shown in light blue). This market segment is considerable and reflects transactions covering longevity risk alone—the risk of annuitants and beneficiaries living longer than predicted. Longevity risk transfer is thriving in the United Kingdom because it's the capstone to any pension hibernation strategy. For a company seeking to manage pension risk on the balance sheet, liability-driven investing (LDI) can be effective in building an asset strategy that matches the expected liability. However, it cannot address the fact that the expected liability is uncertain and that

the pension scheme may have underestimated the life span of its members. In response to these concerns, some leading U.K. plan sponsors have proactively transferred their longevity risk to the insurance and reinsurance community.

Today, some of the largest and most sophisticated U.K. pension funds choose to combine LDI and longevity risk transfer for an effective hibernation strategy on some or all of their liabilities. Industry leaders like BMW, Rolls-Royce, Aviva, British Airways and British Telecom have all chosen this approach. In early 2015, Bell Canada became the first North American pension fund to complete a longevity risk transfer transaction on \$5 billion of pension liabilities. This watershed transaction was the first longevity risk transfer outside of the United Kingdom.

When we look at the United Kingdom today, we see the global future of pension de-risking and the shape of the risk transfer market to come to other countries. We see a lineup of flexible solutions designed to meet the needs of any company on a path to a lower-risk future. In the United Kingdom, plan sponsors are making personal decisions specific to their resources, constraints, objectives and definitions of success. These decisions lead to exceptionally tailored de-risking strategies that are rapidly going global.

**UNDERSTANDING PENSION
PLAN RISK**

Managing a defined-benefit pension plan is a complex and challenging undertaking. A pension is a promise to pay monthly benefits for as long as the plan participants live, regardless of what happens to the assets.

Exhibit 2 provides a framework to describe the pension risk surrounding plan sponsors, with asset risks on the top and liability risks on the bottom.

Key sources of liability risk include costs of running the plan and member options (when to retire and what form of benefit to take), which can have a substantial impact. Salary increases and inflation can also increase the liability, along with longevity risk. Taken together, these sources of liability risk mean that future plan obligations aren't known with certainty and managing an asset portfolio against an unknown liability is difficult. Interest rate risk is also among the liability risks because a decline in interest rates increases the present value of the liability reported on the balance sheet.

From an asset perspective, plan sponsors face many risks. The conventional wisdom focused on investing to maximize long-term returns, which led to a typical asset allocation of 40 to 50 percent fixed income

and cash with 50 to 60 percent in riskier asset classes such as equities, private equity, hedge funds, commodities and real estate. Equity risk and credit risk dominate the risk profile, together with duration risk, which arises because the assets and liabilities aren't matched and do not move in concert. Instead, the risky assets fluctuate in ways that bear no relationship to the underlying liabilities, which lead to significant funding volatility.

FUNDING VOLATILITY

Volatility abounds for a pension fund that has not yet begun to de-risk. The average U.S. pension fund twice lost over 30 percent in funded status during market disruptions since 2000. Between 2000 and 2007, nearly \$270 billion in cash contributions have been required along with substantial market gains

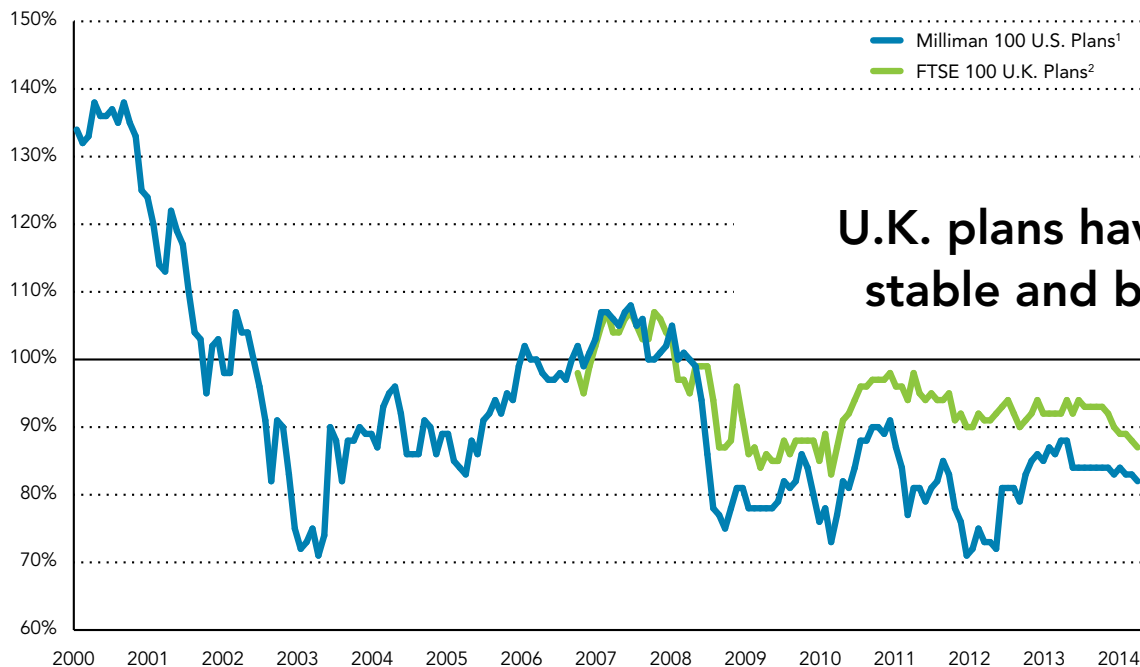
to return U.S. pension funds to good health. The extreme volatility is at its worst in recessions and falling rate environments and is rooted in two key challenges.

1. Pension assets and liabilities are usually not matched. As rates fall, liabilities rise sharply, but only the portion of the asset portfolio invested in duration-matched bonds will gain in value to keep pace. If the majority of the asset portfolio is invested in risky assets, those assets fluctuate in ways bearing no relationship to the underlying liabilities. This mismatch is particularly damaging when rates and equities are falling at the same time, which often occurs during recessions. Falling rates will increase the liabilities and falling equities will decrease the assets, creating a powerful downdraft on funded status.

2. Pension funds are usually underfunded, which introduces leverage. At the end of 2014, the average U.S. pension plan was only 81.7 percent funded (Milliman 2015 Corporate Pension Funding Study). The unfunded liability is leverage and, as in any levered investing strategy, gains and losses will be magnified when measured relative to the full amount of the liability.

The combined effect of these challenges is evident in Exhibit 3, which shows the funded status volatility of Milliman 100 U.S. corporate pension plans in blue, with their FTSE 100 U.K. counterparts in green. As the graph indicates, the U.K. plans—with their higher-funded status, higher fixed-income allocations and better match of assets and liabilities—have been significantly more stable during and after the financial crisis.

EXHIBIT 3: FUNDED STATUS VOLATILITY



¹Source: Milliman 100 Pension Funding Index; the 100 largest U.S. corporate pension plans, YE 2014

²Source: Aon Hewitt, "Aon Hewitt Global Pension Risk Tracker," as of Sept. 7, 2014. <https://rfmtools.hewitt.com/PensionRiskTracker>. Funding ratio (cumulative assets/liabilities) of all pension schemes in the FTSE 100 index on the accounting basis.

EXHIBIT 4: RETIRED LIFETIMES FOR U.S. AND U.K. MALES HAVE INCREASED SIGNIFICANTLY

U.K. companies reduce leverage in their pension funds pursuant to the strict funding requirements enforced by The Pensions Regulator. Many U.K. companies have also taken bold steps to manage asset risks and reduce their asset and liability mismatch. The leading strategy involves:

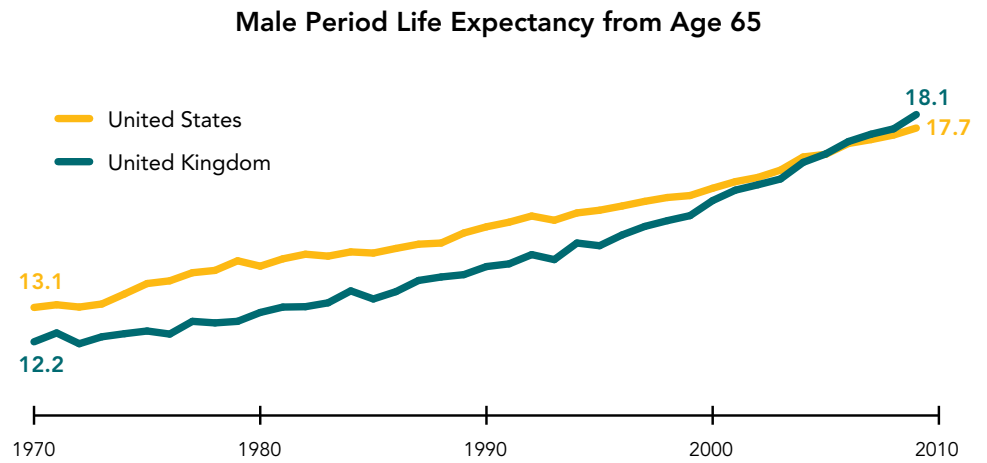
- Holding 70 to 80 percent of assets in custom LDI solutions, including liquid and illiquid fixed income selected for duration, yield and inflation protection; and
- Retaining 20 to 30 percent of assets in riskier asset classes like equity, private equity, hedge funds, commodities and real estate.

This approach allows a pension fund to keep the diversification benefit between fixed income and risk assets. At a ratio of 70 to 80 percent fixed income, funded status volatility coming from asset/liability mismatch is well managed. Downside risk is small; however, the upside earnings potential is also modest. There is not enough upside in this asset strategy to outrun a life expectancy increase, should one arise. To gain control over their liabilities, many leading U.K. plan sponsors hedge their longevity risk. Forward-thinking companies in North America are beginning to follow suit.

SPENDING MORE TIME IN RETIREMENT

Exhibit 4 shows the retired lifetimes—or life expectancy at age 65—of men in both the United Kingdom and United States and shows how these expectations have changed since 1970.

The typical U.S. male’s retired lifetime increased by 35 percent over the past 40 years, and men in both the United States and United Kingdom can expect to spend roughly 18 years in retirement. Over the same 40-year historical period, U.S. pension



Sources: CDC, OECD, Aon Hewitt Global Longevity Tracker. <https://rfmtools.hewitt.com/GlobalLongevityTracker/>

plan sponsors’ liabilities have increased by 5 to 8 percent in each decade to keep pace with these life expectancy increases. The most recent update in U.S. pensioner mortality tables was released in 2014.

With the current focus on longevity tables, an opportunity exists to include longevity risk in the greater pension risk discussion. If people live longer than expected, pension liabilities will grow, and the larger liabilities will have longer durations. Consequently, pension funds will be challenged by more interest rate and duration risk. Leaving longevity risk out of the analysis will underestimate total risk, especially in regard to inflation-linked and deferred liabilities because their longer durations make them significantly more sensitive to adverse outcomes.

Pension decisions made without longevity risk in the equation will consistently undervalue the benefits of risk management or risk transfer. To date, only insurance solutions have been used to address longevity risk in large pension funds. There are several insurance solutions from which to choose.

SELECTING THE RIGHT SOLUTION

Many plan sponsors have chosen de-risking solutions tailored to meet their specific needs. Exhibit 5 on page 30 shows the solutions currently available; some of the firms that have implemented them; and transaction activity in the United States, United Kingdom and Canada since 2007.

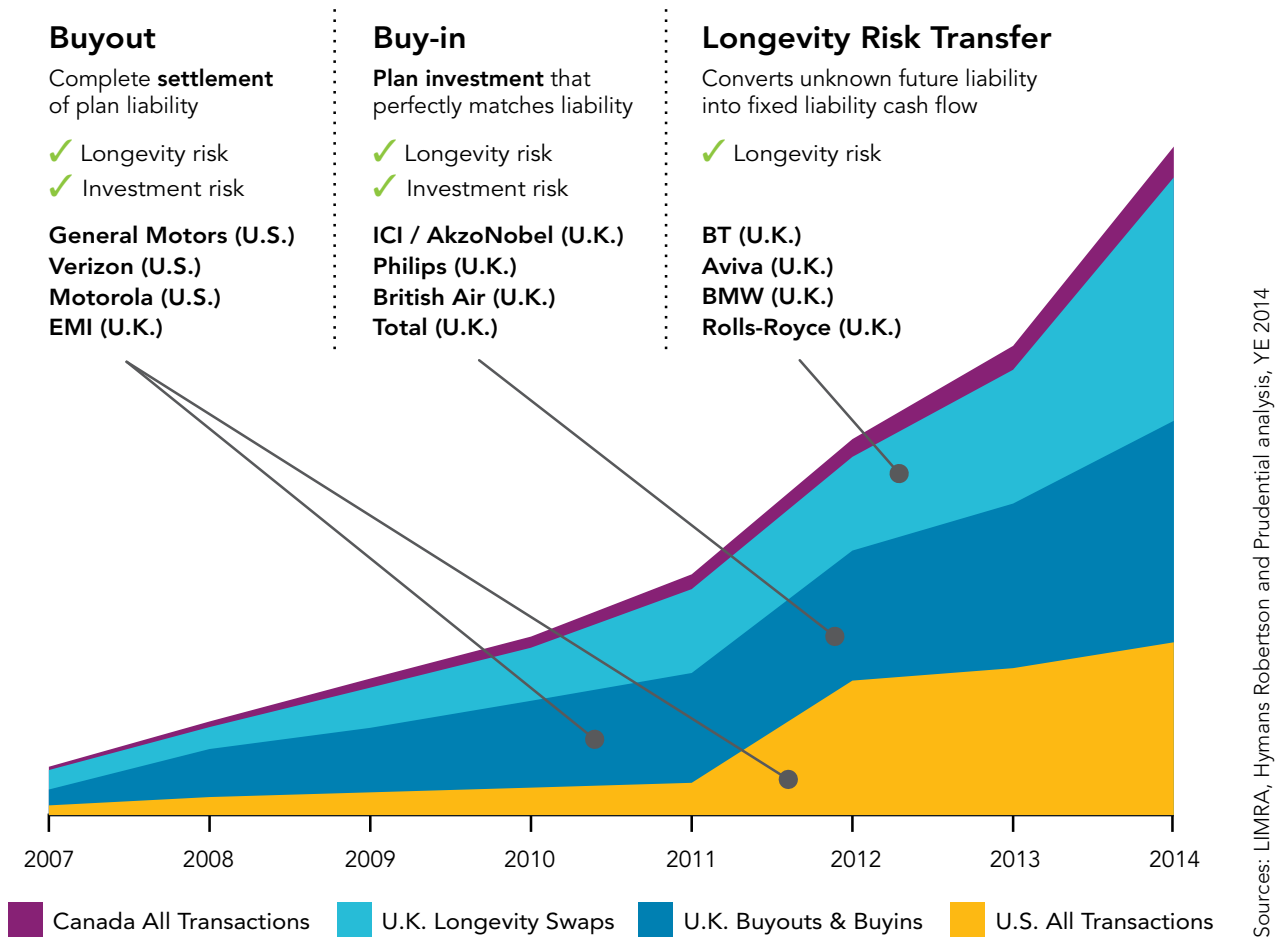
In a buyout, the plan pays a premium to the insurer to settle the liability, and the insurer then covers all investment and longevity risk for the annuitants.

A buyout allows plan sponsors to:

- Transfer risk, including investment, longevity and benefit-option risk, to an insurer who guarantees the payments to participants for life;
- Eliminate administrative, actuarial and investment management expenses, including guaranty corporation premiums; and
- Remove pension liabilities from their balance sheets.

This solution is ideal for plan sponsors seeking to reduce the size of their pension

EXHIBIT 5: PENSION RISK TRANSFER SOLUTIONS



liability, and can be particularly helpful in a corporate restructuring. Buyouts are common in the United States, United Kingdom and Canada.

A pension buy-in enables the sponsor to purchase a bulk annuity and hold it as a liability matching asset of the plan. This solution enables pension plans to transfer risk today without the plan liability settlement charges, and offers several additional advantages for underfunded plan sponsors, including:

- Maintaining funded status;
- Holding contributions steady; and
- Minimizing accounting and funding volatility.

A buy-in provides the plan with the exact amount of income needed to make benefit payments for as long as participants live. But because the liability is not settled, this option is rarely used in the United States. It is more commonly employed in the United Kingdom for pension funds beginning the plan termination process or taking steps in a phased de-risking program.

The fastest-growing solution in the United Kingdom is longevity risk transfer. The products available today convert an unknown future liability into a fixed liability cash flow by locking in the life expectancy of the

plan participants. With a fixed and known future obligation, large pension funds find it easier to manage an asset portfolio against the liability. In fact, for many plan sponsors, longevity risk transfer is the last step in a “do-it-yourself” pension de-risking program. Once funded status and asset risk concerns are addressed, longevity risk transfer is the capstone to a pension “hibernation” strategy, whereby the sponsor continues managing the plan on balance sheet with risks and expenses managed within a tight tolerance.

As illustrated in Exhibit 6, longevity risk transfer solutions are most appropriate for large pension plan sponsors who:

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It's time for defined-benefit plan sponsors to re-think pension risk—and to consider risk transfer solutions.



- Have high allocations to fixed income;
- Possess healthy funded status;
- Seek to retain some risk; and
- Prefer to pay for de-risking over time.

A pension fund that doesn't meet any of those criteria may prefer a buy-in or buyout solution.

RE-THINKING PENSION RISK

If recent transaction activity is any indicator, it's time for defined-benefit plan sponsors to re-think pension risk—and to consider risk transfer solutions. A pension risk transfer transaction helps plan sponsors:

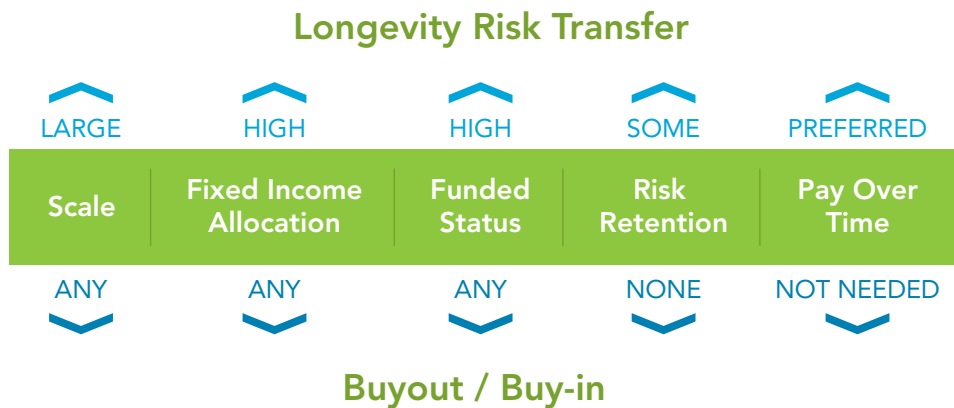
- Solidify market leadership;
- Create more consistent financial results;
- Eliminate a potential cash call on the company; and
- Maximize strategic flexibility.

Companies that manage pension risk set themselves apart from their peers. Three years ago, when large pension risk transfer agreements began coming to market, the question on most plan sponsors' minds was whether or not to reduce their pension risk. Today, with the opportunity to customize the approach, the question becomes: What de-risking path will they take? **A**

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EXHIBIT 6: HOW PLAN SPONSORS CHOOSE A SOLUTION



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A Personal

of the Defined-Benefit Plan

A radio ad announces that every day “10,000 baby boomers retire.” I wonder, is that correct? A check of annual births for those born from 1946 to 1964 shows a range from approximately 3.5 million to 4.5 million. A quick calculation from the RP2000 tables yields a probability of survival to 65 of 89 percent for males and 92 percent for females.

But the numbers have been increased by immigration. And finally, not everyone can or wants to retire. I find approximately 2.7 million retirees claimed Social Security (SS) benefits in 2012, but not everyone collects SS; and some of those retirees were born before 1946. My tentative conclusion:

The 10,000-per-day number may be a bit high, but it is in the ballpark.

THE PREVALENCE AND ATTRACTIVENESS OF DB PLANS HAVE DECLINED OVER THE PAST 35 YEARS. WHAT DOES THE FUTURE HOLD? BY RICHARD BERGER

History



1978



Inflation hit **9 percent** and rose to **13 percent** the next year.

1980



The electronic calculator was the only tool to use for calculations done on paper spreadsheets.



What did the previous exercise demonstrate? One, that I am far from unique, in my generation and in the ranks of retired actuaries. Two, habits of analysis were ingrained in me as a consulting actuary. I retired after 35 years as a consulting actuary, specializing in single-employer defined-benefit (DB) plans. I look back at my career not to recap the highs and lows of my professional life but to revisit the forces that have shaped retirement today and the past and future of the pension actuary.

I graduated from college with a Bachelor of Arts in economics. I wanted to be an economist and soon realized that graduate school was necessary; I was in the process of applying when serendipity struck. Through an acquaintance of my then-girlfriend (soon-to-be spouse), I was led to a recruiter who asked me if I had taken mathematics in college. I had, and he asked me if I was familiar with the actuarial field; I was not. I interviewed at an actuarial consulting firm, took a mathematical aptitude test, and was hired as a trainee at a significant pay cut from my then-job (transit bus driver).

The year was 1978, and a revolution in pension actuarial practice had occurred just two years before with the Employee Retirement Income Security Act (ERISA). ERISA introduced a new set of minimum funding rules, accelerated vesting requirements and a new agency to insure the benefits of participants whose employers had become insolvent. Even under ERISA, the actuary had wide discretion in choice of assumptions including

the discount rate and funding method. There was a minimum contribution and a maximum contribution, both using the same assumptions and methods. There were no quarterly contribution requirements, and contributions were typically made after the plan year ended and just before the Schedule B was due. Accounting requirements were flexible—no mandated assumptions or methods. The actuarial report reflected this simplicity, unlike current reports with their building blocks of interlocking and interrelated calculations and overrides.

In the same year, section 401(k) was added to the Internal Revenue Code. The conventional wisdom at the time was that my generation (then in our 20s and 30s) would not be interested in a pension starting at 65 but would take to the immediate benefit of a 401(k) plan. This proved to be true, but also demonstrated our lack of foresight.

The U.S. economy was in turmoil. Inflation hit 9 percent in 1978, and it would rise to 13 percent the next year. Rates on 30-year Treasury bonds also hit 9 percent in 1978. The start of the long bull market in U.S. equities was still several years away. The investment return assumption for the typical private pension plan was more likely to be 6 percent, but would also be rising to reflect higher returns in the 1980s.

THE 1980s

Actuarial valuations were run on mainframe computers, large jobs were scheduled

overnight and on weekends, and computer time was charged as an expense to clients. The electronic calculator was our workhorse; when the office was quiet, the clicking of plastic keys was like the sound of white-collar crickets. Many calculations were recorded on paper spreadsheets, performed by hand.

The decade brought laws known by their acronyms: TEFRA, DEFRA, REA, TRA86, OBRA. Each law was followed by regulations, plan amendments and questions. Among the changes made were:

- Reduction in maximum DB and defined-contribution (DC) benefits
- Age 70 ½ distribution rules
- Restriction on the elimination of optional benefit forms (anti-cutback rules)
- Qualified domestic relations orders (QDROs)
- Effective elimination of a popular plan design (the integrated plan) that took SS benefits into account
- Limits on the compensation that can be taken into account in the plan's formula
- Nondiscrimination rules that required testing on a controlled group basis

1981

The IBM PC was introduced.

Rates on 30-year Treasuries peaked at 14.7 percent in October 1981, then bounced up and down during the decade, ending at 8.3 percent in January 1990.

- Increase in Pension Benefit Guaranty Corporation (PBGC) per-participant premiums to \$16 and a variable rate premium based on the unfunded liability
- Cap on maximum deductible contributions and introduction of quarterly contributions

These changes made DB plans more difficult to understand and more costly. After TRA86 eliminated the safe harbor for so-called integrated plans, consultants were engaged to analyze new formulas that would mirror, as closely as possible, the formulas that were now “illegal.” These studies boosted the revenues of consulting firms, but employers could only see the cost as an unnecessary expense to change a plan formula that they had no desire to change.

Nondiscrimination rules also required complicated “busy work.” Plans that were designed to cover a specific location, such as headquarters, were suddenly suspect even if that choice had been purely a practical business decision. Because these new rules provided numerous options, it was almost always possible to demonstrate compliance. Compliance came with consulting fees but



1990

The Internet had a revolutionary impact on culture and commerce, including the rise of near-instant communication by electronic mail.

had little value to the client. The cap on compensation had two harmful side effects: The qualified plan became less attractive as a retirement benefit for top management, and it reduced advance funding of plans by capping the level of projected salaries.

In the mid-1980s, the Financial Accounting Standards Board (FASB) decided to revamp pension accounting with Statement of Financial Accounting Standard No. 87 (SFAS87). The new standard made the determination of accounting expense completely different from the funding determination. Many clients wanted to understand the relation between contributions and expense, but the simple answer was, “Don’t bother.”

The 1980s were a good time for markets. In January 1980, the Standard & Poor’s (S&P) index stood at 111. Ten years later it had increased to 340, for a compound return of almost 12 percent without dividend reinvestment (16.6 percent with reinvestment). Inflation declined from 13.5 percent in 1980 to 1.9 percent in 1986 (rebounding to 5.4 percent in 1990 before resuming its decline). Rates on 30-year Treasuries peaked at 14.7 percent in October 1981, then bounced up and down during the decade, ending at 8.3 percent in January 1990. All of these factors were favorable to plans and plan sponsors.

The IBM PC was introduced in 1981, but there were initially few in service (my firm had two for an office of 500 in 1983). Prices of PCs dropped and their use spread in

actuarial firms. By the end of the decade, every staff member had one on his or her desk. Mainframe computers still existed, but their use was coming to an end. Electronic spreadsheet programs had supplanted the old paper sheets. Overhead projectors and acetates were abandoned, and the Power-Point era started.

THE 1990s

The S&P 500 rose from 340 at the beginning of the decade to 1,426 in 2000; the compounded rate of return was 18.2 percent (with dividend reinvestment). Inflation averaged slightly less than 3 percent over the decade, so real returns were very generous. The 30-year Treasury rate declined from 8.3 percent to as low as 5 percent in October 1998, before finishing at 6.6 percent in January 2000.

The assets of the typical pension portfolio (60 percent equity/40 percent fixed income was very common) rose even without contributions. Interest rate declines boosted the market value of the fixed income allocation on one hand, but also increased liabilities (especially on the accounting measures). Net, it was a good time for pension plans.

The development of intranets centralized information within the firm and made it accessible to all users. The Internet first enabled electronic communication within actuarial firms and then with clients via email; the pace of dialogue accelerated. Outsourcing of benefit calculations and



2000

2002

The S&P peaked at 1,527 in March of 2000 and fell to 800 by September 2002.



other functions through websites took off. Files could be transmitted quickly; data was exchanged electronically; and reports and letters were expected not overnight, but later that day.

Low-cost PCs became so powerful that actuarial valuations were now done on the desktop—the incremental cost of a valuation was essentially zero. Spreadsheets and databases allowed the development of standardized tools and sophisticated projection models, which was fortunate as the increasing complexity of regulatory requirements necessitated more extensive calculations.

Legislative developments continued, but not at the same pace as in the 1980s. One important law, commonly known as GATT, installed new rules to boost contributions to underfunded plans and restricted the interest and mortality rates used for certain contribution calculations. This was a foretaste of more stringent restrictions to come.

AFTER 2000

The financial euphoria of the 1990s came to an abrupt end in the first few months of 2000. The S&P peaked at 1,527 in March of 2000 and fell to 800 by September 2002. The 30-year Treasury rate slowly declined (coming back after the bonds were not issued for four years in 2001–2005), hitting a record low of 2.9 percent in December 2008 before rebounding into its current range of 2.5 to 3.0 percent. The long decline in interest rates that began in the early 1980s was ending, and gains in the

market prices of bonds due to falling interest rates are much less likely. The principle that pension liabilities should be measured based on current bond rates had been firmly established; liabilities based on bond rates ballooned and plan sponsors lost control of their pension costs.

By August 2006, the S&P had risen almost 500 points and interest rates had settled in a range around 5 to 6 percent. Enter the Pension Protection Act (PPA) of 2006. The main purpose of the PPA was to strengthen the PBGC. This was to be accomplished by:

- Increasing PBGC premiums
- Mandating discount rates, mortality tables, and the use of a single actuarial cost method (accrued benefit) for calculating plan liabilities and contributions
- A seven-year period for curing any underfunding
- Even faster funding for severely underfunded plans

The PPA was designed to protect pension benefits, but not necessarily pension plans' existence. As of FYE 2006, the PBGC's financial position showed a deficit of \$18.9 billion. In retrospect, it might have been much less disruptive to simply write a check to the PBGC.

Before PPA became effective, the great financial crisis hit. By March 2009, the S&P 500 had fallen below 700. Long-term corporate

interest rates (used for accounting expense and now cash contributions and liabilities) held up for a while longer, but slipped in 2010 and nosedived in 2011 and 2012. The double hit in assets and liabilities drove funding ratios down and contributions up.

After PPA, discretion and flexibility in funding a DB plan were sharply curtailed as the most important assumptions (discount rate and mortality table) and the actuarial method are mandated. Funding ratios can only be managed safely with additional cash contributions and adjusting asset allocations so that assets and liabilities track each other more closely. Unfortunately, reducing or eliminating the accrual of additional benefits is one of the few sponsor options that will definitely reduce plan costs.

Although the goal of PPA is to reach a fully funded status over seven years, I doubt that many plans have gotten there in this eighth year of PPA. The PPA is tilting plan sponsors toward a fixed income investment strategy to avoid a mismatch between assets and liabilities. With lower expected returns (compared to equity investments), the cost of retirement benefits is increased. Because the PPA funding regime has made a DB plan more costly, it has made a DC plan more attractive. Participants can afford to be more enterprising with their own investments in DC plans and thus can generate more retirement income from each dollar contributed. An objection can be made that the extra return is coming by accepting greater risk

President George W. Bush signed The Pension Protection Act of 2006 to strengthen the PBGC.

and volatility, but that should be a trade-off that each individual should be free to make.

Over the last 35 years, the prevalence and attractiveness of DB plans have sharply declined. Although it is impossible to separate out demographic and economic causes of this decline, legislative and regulatory changes have had a major role. They reduced the attractiveness of sponsoring a DB plan, making them more costly and complex to administer. I believe sponsors realized that a DB plan was a long-term commitment that made them vulnerable to the whims of lawmakers and economic forces. This vulnerability discouraged the formation of new plans, and increased attrition among existing sponsors.

WHAT NEXT?

What will the future of DB plans be? If you are a new actuarial student, what are your prospects in this field? Imagine the following scenarios:

Conditions Favor Termination of DB Plans

Some combination of interest rate increases and market gains brings many DB plans to full funding. Plan sponsors decide to close their plans down. After the wave of terminations has passed, the private DB plan universe is much smaller, maybe 10 to 20 percent of its current size. The termination process is complicated, with extensive data clean-up and benefit calculations; it would require a significant amount of consulting work by actuaries. Bids will need to be solicited from insurance companies for annuity



purchases (and actuaries will be needed in the insurance companies to develop bids). The PBGC is likely to be overwhelmed if there is a rush to the exits. Even if the attainment of full funding occurs very quickly, years will pass before the work is done.

Economic Status Quo

Interest rates remain low for the foreseeable future, and the only way to reach full funding is for DB plans to make significant additional contributions. Plan sponsors decide to dig in for the long run and emphasize efficient administration, diligent asset allocation/management, and constant monitoring of changes in conditions. Plans will gradually shrink in size and will be ready for termination when circumstances change. Because of the size of the remaining DB plans, considerable work remains.

Regulatory Climate Changes to Revitalize DB Plan Market

The switch to a DC retirement system has its own well-known problems: Individual participants may not be temperamentally or intellectually prepared to be investment managers, and there is the common failure to appreciate the necessity of beginning

saving early in your career. Unfortunately, the funding flexibility that used to offset the fixity of the DB promise has been replaced with funding rigidity. To revive the DB plan market, flexibility will have to be reintroduced, perhaps by allowing the benefit to be variable in reaction to investment returns or converting retirement plans into whole lifetime vehicles for a range of needs. The regulatory framework needs to be cut back and left alone for an extended period (or allow plan sponsors to exit their DB plans if future changes prove burdensome).

The future is likely to be different from what we can expect (ask any actuary!), but the likelihood is that there will be a role for actuaries in the DB world for quite a while. In addition, the supply of actuaries is likely to shrink as those who grew up with ERISA ride off into the actuarial sunset. No profession is a guarantee of employment and prosperity, so flexibility and adaptability are essential if you decide to be a DB actuary. **A**

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OPERATION DEF-



**CREATIVE ARRANGEMENTS
FOR SHARING RISKS**
BY JOHN TURNER, CONRAD
FERGUSON, RAJISH SAGOENIE AND
MARK-ANTHONY MACHARIA

DB
PLANS

RISK



EMPLOYERS ARE REDUCING THE PENSION RISKS THEY BEAR.

They have done so in at least three ways. First, they have shifted from defined-benefit (DB) plans to defined-contribution (DC) plans. Second, they have engaged in pension de-risking techniques, such as by selling their DB pension liabilities to insurance companies (Ed. Note: This de-risking technique is discussed in a separate article in this issue of *The Actuary*.) and by offering lump sum payments to their participants and retirees. Third, they have shifted from traditional DB plans to hybrid plans.

Around the world, numerous types of hybrid pension plans are in use, and even more have been proposed by pension experts. This article discusses the risk-sharing arrangements provided by a number of different types of hybrid pensions. It focuses on hybrid designs in the United States, Canada and the Netherlands, discussing some of the major types. These countries have been chosen as they all have a robust system of employer-sponsored pension plans (“second pillar”) in addition to social security pension systems. A detailed discussion of the New Brunswick (Canada) shared risk plan is included because of the extensive attention it has received as a desirable model of a hybrid design. The article categorizes the hybrids as to the type of risk-sharing arrangement they involve.

PLANS THAT SHIFT RISK TO PARTICIPANTS DURING THE ACCUMULATION PERIOD

Traditionally, the second pillar of the pension system in the Netherlands has consisted of DB schemes where the employer bore almost all the investment and longevity risk of the plan. As a result of the increasing risk and earnings losses associated with these plans, many companies in the Netherlands have moved toward risk-sharing DC plans.

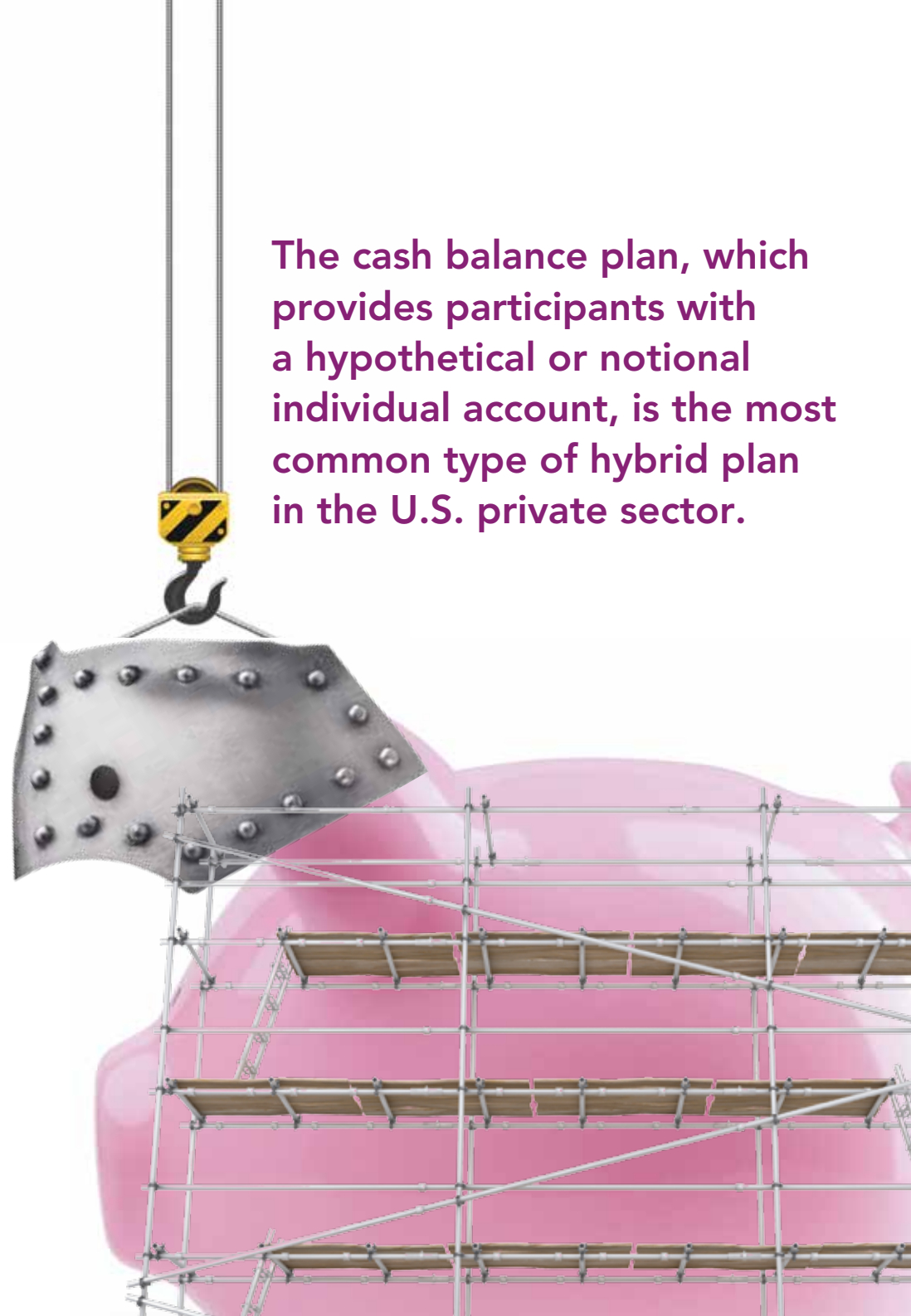
These DC plans typically have contributions that increase by age, and the accrued capital must be used to buy an annuity at retirement. In recent years, however, a variation of the DC plan that has elements of a DB plan has been introduced into the country in the form of the Collective Defined Contribution (CDC) plan.

Unlike a DC scheme, where employees have individual accounts, within a CDC scheme contributions are pooled for investment and longevity risk-pooling purposes. Contributions to the fund are normally made in the form of a fixed percentage of salary from both the employer and the employee. There are no contribution risks for the employer and employee. On retirement, instead of purchasing an annuity for retiring members, benefits are typically paid out of the plan. These benefits are in the form of a DB-type, career-average benefit and are received as consumer-price-indexed payments.

PLANS THAT SHIFT FUNDING RISK TO PARTICIPANTS BY CUTTING BENEFIT ACCRUALS FOR FUTURE BENEFITS

Multiemployer plans in the United States are collectively bargained plans that are DB plans from the perspective of participants, with benefit formulas that determine the value of benefits. However, from the perspective of employers they operate like DC plans. Over a bargaining cycle, typically two or three years, the employers' contributions are fixed but can be adjusted when a new contract is negotiated. Participant benefit accrual rates are more likely to be reduced in contract negotiations when funding shortfalls occur rather than when there are no shortfalls, which shifts investment risks to participants. Until recently, benefits already accrued could not be cut back, but a law passed in 2014 permits benefit cutbacks in some circumstances.

The cash balance plan, which provides participants with a hypothetical or notional individual account, is the most common type of hybrid plan in the U.S. private sector.



OPERATION
SHARED RISK PLAN



PLANS THAT SHIFT INVESTMENT RISK TO PARTICIPANTS THROUGH A DC PLAN THAT IS TIED TO A DB PLAN

Floor offset plans, also called floor plans in the United States and underpin plans in the United Kingdom, combine a DB plan and a DC plan. They differ from other hybrids that are single plans in that they are two different plans working in combination. The DB plan provides a guaranteed minimum benefit, and, like cash balance plans, is insured in the United States by the Pension Benefit Guaranty Corporation (PBGC). The retiree receives the higher of the amount provided by the DB plan or by the DC plan. Thus, the DB plan can be viewed as providing a notional account that, if larger than the DC plan account, becomes the source of the annuitized retirement benefits. These hybrids protect participants from the downside risk of financial market investment, but to the extent that the DC plan accumulations produce a larger benefit, participants can gain from that upside potential. Whether the DB or the DC benefit is larger may depend on the participant's age when joining the plan and age at retirement. If the participant takes early retirement and is eligible for an early retirement subsidy, the DB benefit is likely to be larger. If the participant delays retirement, has a longer working career and is not eligible for an early retirement supplement, the DC benefit is more likely to be the larger of the two.

To limit the financial market risk to the employer, the plan may limit the investment options the participant may choose in the DC plan, or the plan may select the investments. The DC plan must be converted into an annuity, but the participant generally must bear the longevity and interest rate risk of the conversion.

Flexible pension plans in Canada offer a participant in a DB plan a tax-sheltered

savings account to which he or she can contribute. The participant bears investment risk on that account. At retirement that person uses the savings account to purchase extra benefits from the DB plan. For example, a participant could purchase automatic inflation indexing and unreduced early retirement benefits. A flexible pension plan provides participants both DB and DC features and gives participants the ability to have a role in designing their benefits. A risk of flexible plans is the risk of accumulating assets in the DC account that exceed the value of ancillary benefits a member can purchase. In this case, the member runs the risk of forfeiting those excess assets.

PLANS THAT SHIFT RISKS TO PARTICIPANTS DURING THE PAYOUT PHASE

The following plans shift annuitization risk to participants.

The most common type of hybrid plan in the U.S. private sector is the **cash balance plan**. Unlike a traditional DB pension plan or a traditional DC plan, a cash balance plan provides participants with a hypothetical or notional individual account. Each participant's account is periodically credited with an amount, usually based on a percentage of the participant's salary. The hypothetical account balances are also credited with interest earnings. Participants accrue benefits in a pattern similar to the accrual in a DC plan, with the exception that accrued benefits cannot fall, as can happen in a DC plan during a financial market downturn, because the interest crediting is always positive.

Pension equity plans (PEPs) in the United States, called by the more descriptive name of final salary lump sum plans in the United Kingdom, allow for the accrual each year of a certain percentage of final average pay. That percentage can increase with tenure or age so

as to reward long-tenure or older participants. At retirement, the annual percentage amounts accrued over the participant's career are summed and then the total percentage is applied to final average pay to determine the participant's final account balance. The benefit payable is then determined from that balance. Compared to a traditional DB plan, this plan shifts annuitization (interest and longevity) risk to participants. In a PEP the

employer bears the investment risk on the assets in which the plan is invested. PEPs are classified under U.S. pension law as DB plans and are insured by the PBGC.

The PEP is similar to a cash balance plan in that participants have notional individual accounts that are credited each year. The value of the account grows with increases in the participant's earnings, rather than growing

due to crediting of interest payments, as is done with cash balance plans. Participants do not bear any investment risk. Like in cash balance plans, participants bear interest rate risk if they choose to convert their account balances to annuities, and they bear longevity risk if they do not convert to annuities. While cash balance plans have accrual patterns similar to DC plans, PEPs have accrual patterns similar to final average DB plans.

NEW BRUNSWICK SHARED RISK PENSION PLAN



NEW BRUNSWICK INTRODUCED A NEW PENSION REGIME IN 2012 NAMED THE SHARED RISK PLAN (SRP). This model received the highest mark in a review of recently enacted pension regimes by the American Academy of Actuaries.

The SRP was introduced as an *optional* new form of pension regulation with identical risk management and funding protocols applying to public and private sector plans, single- and multiemployer plans, and all types of DB structures.

The new law attempts to increase both plan member benefit security and plan sponsor contribution stability by introducing a hybrid target benefit risk managed pension regime to which existing DB plans can be converted or new pension plans established.

The SRP was built on the premise that a successful pension model would rest on the following key principles:

PRINCIPLES ESTABLISHED	WHAT DO THEY MEAN?
Sustainability and Affordability	<ul style="list-style-type: none"> • High degree of pension security for members • Stable contributions for employers and members • Risk management to maintain plan for the long term
Integrity (Transparency)	<ul style="list-style-type: none"> • Pension goals and risks clearly stated upfront • Who shares in risks and rewards and by how much is pre-established in the pension plan documents
Equity	<ul style="list-style-type: none"> • No party can game the system at expense of another • All groups of members treated consistently

The model's development involved intensive discussions with unions in the public and private sectors, and the employers. The required contributions for some pre-existing benefits were shockingly high for the desired security level. Testing alternative future benefits against desired security levels served as a foundation to build the pension legislation. By moving away from traditional thinking (best-estimate assumptions about future results) and focusing on stochastic analysis of possible economic futures, a benefit and operations structure emerged.

By dividing future benefits into "base benefits" (in the public sector usually without cost-of-living or final salary adjustments) and additional "target benefits," it was possible to achieve very high security for "base benefits" with a high likelihood that "target benefits" would be met.

In effect, four actions occurred:

- Retirement age for future benefit accruals was modified to make the plans affordable given most recent credible mortality and improvement data.
- All "target benefits" were made contingent with the "cushion" between "base" and "target" becoming a form of "risk-based capital."

PLANS THAT SHIFT RISKS TO PARTICIPANTS DURING THE ACCUMULATION PHASE AND THE PAYOUT PHASE

Target benefit plans in the United States set contributions by employers and participants at a fixed level or within a fixed range based on a target benefit level. They operate like a pooled DC plan, with pooling of investment risks and longevity risks among participants. Employer contributions can be

structured so that they are a higher percentage of pay for older workers. These plans use funding reserves to smooth fluctuations in benefits over time.

These plans have some similarities with multiemployer pension plans in that the employer contribution is fixed in advance. In these plans, longevity risk is pooled because they provide a benefit as an annuity.

In addition, the problem of participant management of investments can be avoided by having a single pooled management of investments, but often the plans' investments are participant-directed.

A noteworthy development in the area of hybrid plans was introduced in the Canadian province of New Brunswick. See the sidebar, "New Brunswick Shared Risk Pension Plan."

- Contributions were set to have over a 20-year period a minimum 97.5 percent likelihood of delivering "base benefits" as well as a minimum 75 percent likelihood of delivering the "target benefits."
- Market-consistent risk analysis was used to set both an "investment policy" to control investment volatility and a "funding policy" to distribute gains over the amount needed to sustain "base benefits" or absorb losses below that level so that future contributions could be regarded as "next to fixed" with only minor future variability. In effect, the small variability in contributions becomes another source of "risk-based capital."

Funding levels are measured not only against assets backing accrued base benefits but also against these assets plus the present value of contributions above the normal cost for future "base benefits" over the next 15 years, reflecting replacement of current members (the open group funding ratio, "OGFR"). In effect, the funding valuation measures funding capacity and not funding level. The 15-year period was selected because it already existed in the DB legislation for funding going-concern deficits.

The funding liabilities are initially measured using a market-linked discount rate (near the rate derived from AA corporate yield curve). Once established, the discount rate becomes part of the spending test each year. If it is on the high side, spending can occur earlier, risk is increased, and spending will be lower in later years because the model is self-correcting (i.e., it is the actual investment returns that are distributed, not the expected future returns). The opposite is true if the discount rate is lower.

Every year, a funding valuation is conducted to assess the OGFR, which serves as a trigger for actions that can or must be considered by the trustees under a "funding policy." This policy must contain a Funding Deficit Recovery Plan and a Funding Excess Utilization Plan based on constraints established in regulations.

While requiring high security in the short term was not realistic, the combined actions of benefit and contribution decisions via a fully integrated funding policy produced a model that is expected to become stronger over time.

The future "base" and "target benefits" vary considerably by plans that have converted to the SRP to date. The constants are the commitments to conduct comprehensive stochastic risk management; to develop "investment policies" appropriate to the plan; to develop a "funding policy" with which to share returns; and to establish future contribution schedules with only a very small variability (up or down) in long-term contributions.

The "shared risk pension plan" is, in effect, a **modified target benefit plan** built with a focus on stochastic security testing as opposed to best estimates. The combination of new future benefit accruals, asset mix, spending decisions and contribution decisions form multilayers of protection against base benefit reductions. They also produce a resilient plan that can weather the vast majority, but not all, economic climates with quite secure target benefits.

While the exact rubric may be unlikely to emerge in other jurisdictions, the methodology used in New Brunswick is robust and may well merit consideration in other jurisdictions.

CONCLUSIONS

This article describes a number of different types of hybrid pension plans, focusing on plans being used in the United States, Canada and the Netherlands. Hybrid pensions differ from traditional DB plans, where employers typically bear all the investment risk, and traditional DC plans, where individual employees typically bear all the investment risk related to their pension accounts. Hybrid pensions offer creative solutions to the question of how investment and longevity risks should be shared between employees and employer.

Hybrid plans generally have been developed out of a desire of employers to shift to workers some of the risks that the employers have traditionally borne in DB plans. Hybrid plans have been developed that, for example, provide predictable, stable contributions for employers, thus dealing with the problem employers may encounter in DB plans of large swings in required contributions. In some cases, hybrid plans have also been motivated by the desire to protect workers from some of the risks they would bear in traditional DC plans. For example, they can involve workers collectively bearing investment risks but with pooling of investment risks, allowing the provision of a stable, predictable benefit. In sum, hybrid plans can combine the best features of traditional DB and DC plans. ▣

Note: Portions of this article have been extracted from Turner's research paper cited here. Turner, John A. 2014. "Hybrid Pensions: Risk Sharing Arrangements for Pension Plan Sponsors and Participants." Society of Actuaries. <https://www.soa.org/research/research-projects/pension/hybrid-pensions-risk-sharing.aspx>. The principal author, John Turner, would like to thank Conrad Ferguson for his information on the New Brunswick Shared Risk Pension Plan, and Rajish Sagoenie and Mark-Anthony Macharia for their contributory comments that focused on the Netherlands.

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SOCIETY OF ACTUARIES

Education

ENHANCED UNIVERSITY ENGAGEMENT

BY KORY OLSEN AND GENA LONG

THE SOCIETY OF ACTUARIES (SOA) IS TAKING STEPS to build and support actuarial communities through enhanced university engagement. This increased focus on strengthening the relationship between the academic and professional arms of the profession follows the SOA Strategy Map.¹

As part of an ongoing effort to build and strengthen the relationship with universities and increase engagement, three new programs have been created in the past year:

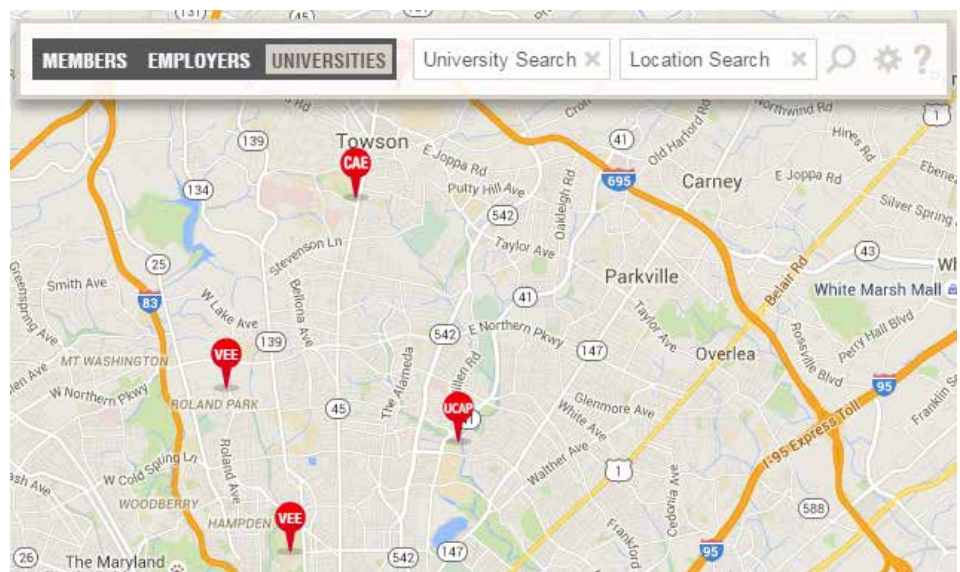
- Universities and Colleges with Actuarial Programs (UCAP) list
- Actuarial Teaching Conference (ATC)
- University Program Resource: A Guide for University Actuarial Programs.

UNIVERSITIES AND COLLEGES WITH ACTUARIAL PROGRAMS (UCAP) LIST

A potential starting place for a prospective actuarial student is the new UCAP list, which can be found at <http://bit.ly/1IRiZm1>. Applicant schools have been vetted to ensure that all schools approved for the list have course coverage for at least two actuarial exams and have approved courses for at least one Validation by Educational Experience (VEE) topic. For convenience, the UCAP list can be sorted by state/province, country or degree

program offered. Students can then review the information provided for each school and link directly to university websites or reach out to an actuarial program contact.

Through this tool, the SOA is able to help connect a prospective student with an actuarial learning community.



SOA Explorer Map

“With the newly added university filter, SOA Explorer becomes a convenient tool for students. The new feature really helps bring the actuarial profession and the prospective students closer.”

– David Liu, fourth year student, University of Waterloo



Kory Olsen



Gena Long

Building on the UCAP list, the recently launched SOA Explorer Map has been enhanced to include a university filter. Already displaying the location of SOA members and actuarial employers, the map has been expanded to include UCAP schools, Centers of Actuarial Excellence (CAE) and schools offering VEE approved courses. The map can be filtered to show only specific categories (e.g., UCAP schools) and provides an efficient way to search for one (or all) of these categories in a specific geographic area. Just as is possible when viewing members and employers, clicking on a pin for a particular selection/university will open a card with additional data about the school, contact information and related links. The combination of the new UCAP list and the SOA Explorer Map offers an effective way for a prospective student to search for university actuarial programs by geographic

area. It also provides the opportunity to build a stronger actuarial community in a particular region.

ACTUARIAL TEACHING CONFERENCE (ATC)

In addition to connecting prospective students with schools, the SOA developed an opportunity for faculty members from university actuarial programs to learn and connect. In June 2015, the SOA hosted the first ATC in Indianapolis. The successful event provided an opportunity for faculty members engaged in actuarial education to come together. Faculty participated in learning sessions, shared ideas, networked, and learned more about the SOA and the actuarial profession. The conference included sessions on SOA exam preparation, best practices for actuarial programs, innovative teaching methods, and a discussion by

an employer panel regarding the current job market and industry needs.

The ATC provided actuarial faculty members with an opportunity to network and build connections that will enhance their own programs. This opened a much-needed avenue for actuarial faculty with limited ways to connect. The sold-out event was well received by the faculty members in attendance and will help support the faculty community as it endeavors to educate developing actuaries.

Attendees gave the conference an enthusiastic thumbs up.

- “Great networking and community-building opportunity!”
- “Sessions were well done. It was a great group; very open and friendly.”
- “I am glad that I was able to attend this inaugural event, and I hope that it becomes a regular tradition.”



The ATC conference provided many networking opportunities for faculty.

University Program Resource—Four Principles of a Quality Actuarial Program

Principle I—Well-Rounded Curriculum

The program should include courses, interactions and opportunities that provide a well-rounded education for its students. In addition to coursework in mathematics, statistics and actuarial topics, students should have access to business, economics, finance and accounting courses as well as courses in communication.

Principle II—Robust Coverage of Actuarial Topics

Instruction on actuarial topics should go beyond teaching solely to the actuarial exams. While preparing students adequately for the exams is critical, providing a thorough understanding of the underlying concepts tested on the exams and methods of applying these concepts are equally important in building capable actuaries.

Principle III—Understanding the Actuarial Profession

Many students who may be well-suited for a career as an

actuary do not learn of the profession until they have already started at their university or later. As the profession is not well-known to the general public, it is important that steps are taken to ensure students gain a thorough understanding of the various roles actuaries can play. Actuarial faculty members who are credentialed actuaries, along with the involvement of local industry professionals, can help to prepare students and build a strong understanding of the actuarial profession.

Principle IV—Research that Expands Actuarial Intellectual Capital

Research and scholarship are essential in the academic environment. This can include academic research, interpretation of research and the development of educational materials. Faculty should be encouraged not only to continue to learn and expand their knowledge, but to also create new intellectual capital in the actuarial field.



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UNIVERSITY PROGRAM RESOURCE

A GUIDE FOR UNIVERSITY
ACTUARIAL PROGRAMS

UNIVERSITY PROGRAM RESOURCE: A GUIDE FOR UNIVERSITY ACTUARIAL PROGRAMS

Enhancing university and college actuarial programs was the focus in developing the University Program Resource: A Guide for University Actuarial Programs (<http://bit.ly/1GSJ4ts>). The guide was designed to assist faculty at university actuarial programs who seek to provide high-quality, robust actuarial education for their students. It contains four principles of importance to a quality actuarial program as well as recommendations for implementing them in a university program. See the sidebar on page 48.

Available as a free download on the SOA website, the guide also includes an overview of the CAE program, a list of SOA-provided academic benefits and SOA staff contacts to help answer questions. **A**

END NOTE

¹ Build and support strong actuarial communities based on professional interests and/or location.

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LIVING to 100

SOCIETY OF ACTUARIES
INTERNATIONAL SYMPOSIUM

Living to 100 Symposium | January 4–6, 2017 | Orlando, Florida

Call for Papers

The Committee on Living to 100 Research Symposia requests professionals, knowledgeable in the important area of longevity and its consequences, to prepare a high quality paper for presentation for the 2017 Living to 100 Symposium in Orlando, Florida. The topics of interest include, but are not limited to:

- Theories on how and why we age;
- Methodologies for estimating future rates of survival;
- Implications for society, institutions and individuals, as well as changes needed to support a growing aging population; and
- Applications of existing or new longevity theories and methods for actuarial practice.

Please submit an abstract or outline of your proposed paper by **Sept. 30, 2015**. The abstract should include a brief description of the subject of the paper, data sources and methods to be used, key items to be covered, and how your paper will contribute to current knowledge, theory and/or methodology.

A brief curriculum vitae or resume is also required.

Submit the information by email to:

Jan Schuh

Sr. Research Administrator

Email: jschuh@soa.org

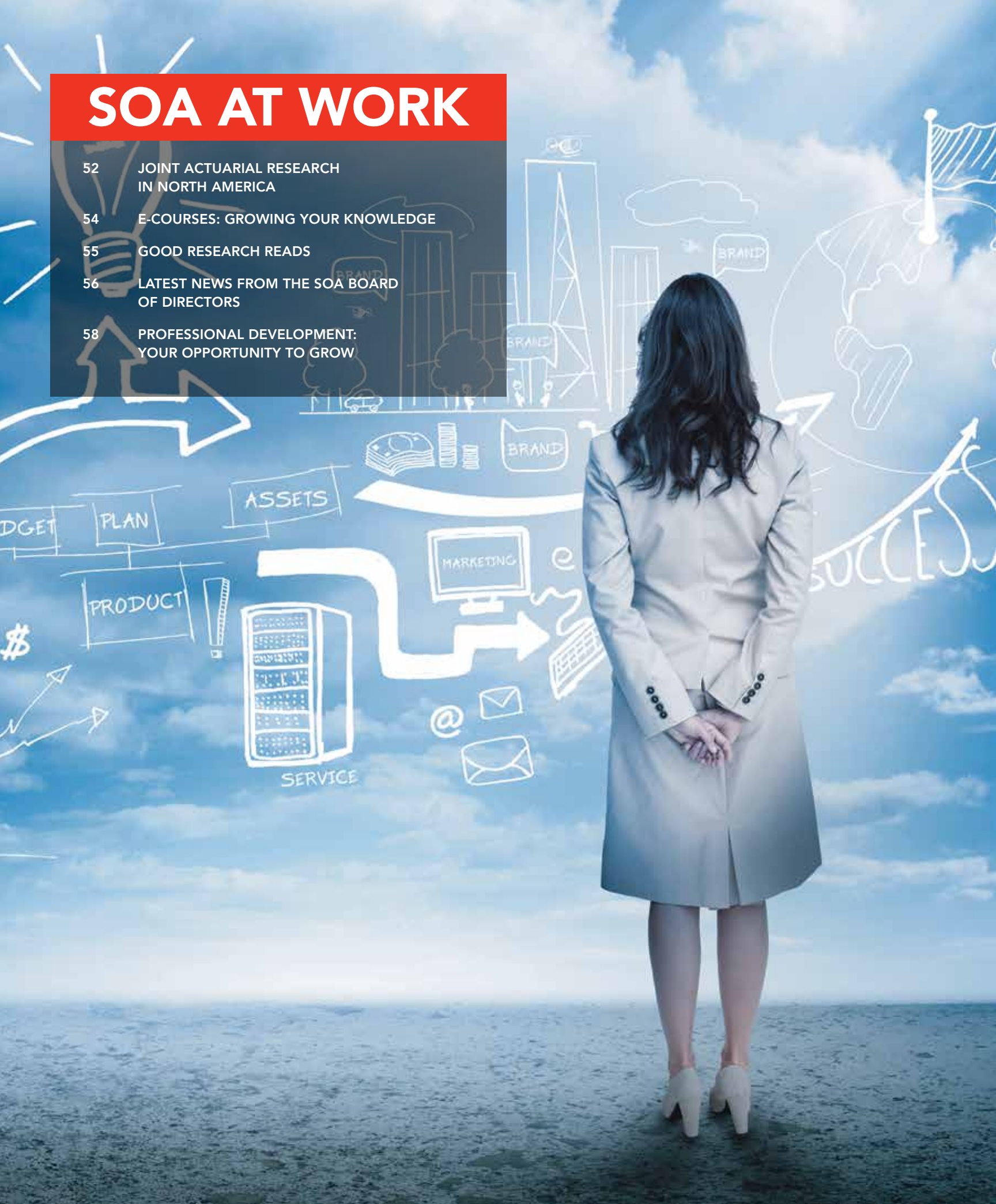


Learn more about the call for papers, including the complete topic list, by going to Livingto100.soa.org.

Questions may be directed to Ronora Stryker, Research Actuary, at rstryker@soa.org.

SOA AT WORK

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JOINT ACTUARIAL RESEARCH IN NORTH AMERICA

BY R. DALE HALL

From identifying new methodologies and best practices to understanding emerging trends and different approaches, research is an important area of interest for the actuarial profession. In addition to Society of Actuaries (SOA) experience studies and research that supports the actuarial profession and the insurance industry, the SOA also frequently partners with other associations, companies, universities and others through the North American Actuarial Council (NAAC). NAAC's Collaborative Research Group works to identify and support joint actuarial research projects on a range of topics.

For further background, NAAC's Collaborative Research Group was created at NAAC's February 2009 meeting to help identify opportunities for partnered research. The group members include the SOA, the American Academy of Actuaries, the Canadian Institute of Actuaries (CIA), the Casualty Actuarial Society (CAS), the Conference of Consulting Actuaries, the

American Retirement Association (formerly the American Society of Pension Professionals & Actuaries), the Asociación Mexicana de Actuarios, the Asociación Mexicana de Actuarios Consultores, A.C. and the Colegio Nacional de Actuarios, A.C. NAAC's Collaborative Research Group hosts quarterly conference calls, and recently it presented a recap of the recent success from joint research efforts to NAAC. CIA President Rob Stapleford serves as the current chair of NAAC's Collaborative Research Group. A future SOA president-elect will serve as the group chair from 2017 to 2018.

Some of the joint project topics from NAAC's Collaborative Research Group include risk management, regulatory issues, financial risks and health, among other topics. Recently funded joint research projects include the regulatory risk paper series and climate research.

The regulatory risk paper series includes

a paper on regulatory risk and North American insurance organizations. Authored by Tom Herget, FSA, CERA, MAAA, and Dave Sandberg, FSA, CERA MAAA, the paper examines regulatory structures in the United States, Canada and Mexico. The paper identifies the key influencers of insurer regulation, examines risk management strategies for insurers and regulators to consider, and provides examples of how regulatory risks can surface. The paper by Sim Segal, FSA, CERA, focuses on corporate perspectives on regulatory risk. This project includes a survey of 20 North American insurance organizations to understand their top risks, mitigation tactics, risk disclosure methods and risk metrics.

Another example of the collaborative research efforts is the past report on the effect of deflation or high inflation on the insurance industry. This research provides insights on measuring inflation, the effect of inflation or deflation, and risk mitigation strategies.



NAAC'S COLLABORATIVE RESEARCH GROUP INCLUDES NINE MEMBERS LOCATED ACROSS NORTH AMERICA.

In 2011, members of NAAC's Collaborative Research Group completed research on the impact of climate change on insurance risk and the global community. This research was phase one, and focused on key climate indicators. The follow-up project—phase two—consists of the Actuaries Climate Index and the Actuaries Climate Risk Index. Both indices are currently in development. Stay tuned for more details.

NAAC's Collaborative Research Group continues to identify possible research projects, and it is currently exploring ideas on cyber risk liability and climate predictive analytics, among others. Visit the research page on the SOA website for more information about these joint research projects and other related research efforts. **A**

R. Dale Hall, FSA, CERA, MAAA, is managing director of Research at the Society of Actuaries. He can be reached at dhall@soa.org.

RELATED LINKS

NAAC Group Members

<http://bit.ly/1GQJiWE>

Past Inflation Report

<http://bit.ly/1UclrsA>

Tom Herget and Dave Sandberg Paper

<http://bit.ly/1UclULs>

Sim Segal Paper

<http://bit.ly/1Kobe8I>

Climate Phase One

<http://bit.ly/11RxnZa>

SOA Research

<http://bit.ly/1R717NZ>

E-COURSES: GROWING YOUR KNOWLEDGE

THE SOA IS PROUD to offer 20 e-courses worth more than a combined 80.00 CPD. E-course topics range from professionalism and communication to social insurance and enterprise risk management and can be completed in as little as two hours. Whether you're changing fields, in need of some refreshers or looking to improve your communication skills, get the knowledge you desire by registering for an e-course today. See our full listing at SOA.org/ecourses.

ADVANCED TOPICS IN CORPORATE FINANCE AND ERM

Three applications of Extreme Value Theory (EVT) are covered to put the theory to work in a business context in this e-course. The candidate will learn about the factors that affect strategic thinking (external forces, environmental analysis), the organizational characteristics that influence strategic decision-making (strategy, structure, controls, leadership) and how senior management uses these to evaluate and benchmark progress toward strategic goals.

APPLYING PROFESSIONALISM WORLDWIDE

The Applying Professionalism Worldwide course focuses on situations where actuaries live and/or work outside of North America. This e-course covers the Code of Professional Conduct and provides opportunities to determine how the precepts may be applied in various scenarios.

FINANCIAL ECONOMICS: FINANCIAL MATHEMATICS

This e-course focuses on the financial mathematics branch of financial economics. You will learn about derivative securities and options, modeling returns, and option pricing and hedging.

FUNDAMENTALS OF ACTUARIAL PRACTICE (FAP)

This e-course is set in the context of the control cycle. It encompasses real-world applications and uses examples to demonstrate actuarial principles and practices. You will also have opportunities to apply these principles and techniques in traditional and nontraditional actuarial practice areas. With the fundamentals in your toolkit, you will be better prepared to apply your learning to new areas of practice that may emerge during the course of your actuarial career.

HEALTH FOUNDATIONS

The Health Foundations e-course discusses the health care system



at a micro level. It begins with an exploration of health care terminology and coding. The module moves on to discuss sources of data with regard to medical treatments and claims experience. The next step is to learn about the administrative systems that bring the data sources together. The module ends with examples illustrating how these elements combine to help provide solutions to actuarial problems.

INTEGRATED DECISION MAKING PROCESS (IDMP)

The Integrated Decision-Making Process (IDMP) provides a foundation for making decisions related to complex business problems that require the involvement of many stakeholders and decision makers. IDMP presents a decision-making process that is specific enough to provide solid guidance when making decisions, yet general enough to be applicable in a wide variety of situations.

PRICING, RESERVING AND FORECASTING

This e-course is designed to build upon the information presented in the Design and Pricing (DP) and Company Sponsor Perspective (CSP) examination syllabi and the Health Foundations module in the Group and Health FSA Track. Basic concepts that were presented in the exams will be integrated and expanded upon in this e-course. You will learn practical techniques involved in managing the financial control cycle of a health care company, from trend determination to pricing and reserving to analysis of historical results to forecasting future experience. **A**



GOOD RESEARCH READS

COMPLETED EXPERIENCE STUDIES

SOA RELEASES NEW LONG-TERM CARE BASIC TABLES

The SOA has completed an initiative to produce long-term care basic experience rate tables for claim incidence, claim termination and claim utilization. Three SOA multiplicative models have been developed, one for each of three tables that will calculate rates that vary by a number of product and policyholder attributes. A new SOA report covers the model development, usage and limitations, in addition to rates to accompany the models. The tables and report can be found at <http://bit.ly/1GagurZ>.

To view a complete listing, visit SOA.org/Research and click on Completed Experience Studies.


COMPLETED RESEARCH STUDIES

SOA.ORG FEATURES PREDICTIVE ANALYTICS APPLICATIONS AND RESEARCH

The SOA has several resources available on practical and real-world applications of predictive analytics. Watch a video, access research, read a collection of essays covering health and life topics, or listen to a podcast (<http://bit.ly/1BtsKY2>) on lapse modeling. Read more about the emerging topic of predictive analytics at SOA.org/Predictive/.

SOA RELEASES SURVEY REPORT ON TERM CONVERSIONS

A new SOA report examines the conversion provision on level term products in the U.S. life insurance industry. Based on a survey of 21 companies, the report presents results on assumptions and product features used for pricing and administering term conversions. View the report at <http://bit.ly/1QGBP6B>.

To view a complete listing, visit SOA.org/Research and click on Completed Research Studies. 

LATEST NEWS FROM THE SOA BOARD OF DIRECTORS

2015–2016 BOARD ELECTION

The final slate of candidates for the SOA 2015 elections has been published. Voting opens Aug. 17 and closes Sept. 4 at 1 p.m. Central.

RELATED LINKS

Election ballot: <http://bit.ly/1lqKBjo>

SOA elections: <http://bit.ly/1D6TT43>

PROPOSED SOA BYLAW AMENDMENT

The SOA Board approved and has given its support to a bylaw amendment eliminating the board positions of Vice President, thereby reducing the size of the board overall. A Special Meeting Notice to Fellows was sent to notify fellows of the proxy voting schedule for this

bylaw amendment. SOA President Errol Cramer, FSA, MAAA, and President-Elect Craig Reynolds, FSA, MAAA, support this amendment and encourage members to vote “yes” on this amendment. Visit the SOA.org Elections page for links to the proposed bylaw amendment, an Interactive Leadership Session with Cramer and Reynolds, and the Special Notice to Fellows.

RELATED LINKS

Interactive Leadership Session: <http://bit.ly/1lhE5Ks>

Bylaw amendment chart: <http://bit.ly/1E6iVv0>

Special Meeting Notice to Fellows: <http://bit.ly/1U4FcT7>

SOA elections: <http://bit.ly/1D6TT43>

CHINA ASSOCIATION OF ACTUARIES (CAA) PRESENTATION

CAA President Dr. Chen Dongsheng presented to the Board on the CAA’s history, primary functions, areas of influence and factors affecting the Chinese actuarial profession. Areas for ongoing discussion and exploration were identified by both the SOA and the CAA. As a part of the CAA visit, the Board witnessed the signing of the Memorandum of Understanding (MOU) between the two organizations.

RELATED LINK

MOU: <http://bit.ly/1Kxeoq6>

LEARNING STRATEGY

The Board approved further development of implementation plans for 11 initiatives



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recommended by the Learning Strategy Task Force intended to guide the future directions of SOA education activities. This initiative is intended to take account of the many changes occurring in adult education and bring those developments to SOA members and candidates.

OPPORTUNITIES FOR ACTUARIES

The Cultivating Opportunities Team (COT) presented a pilot actuarial candidate internship program aimed at introducing actuarial students and actuarial science to data analytic firms, as well as a presentation on COT efforts in predictive analytics including education content, research, marketing and specific work being conducted in the sections. The Board expressed support for the direction of the COT's work in 2015, expansion in 2016.

RELATED LINK

Predictive Analytics: <http://bit.ly/1LQz8ur>



ACTUARIAL DIVERSITY TASK FORCE

The Board discussed and provided feedback on an interim report of the Actuarial Diversity Task Force (ADTF). The ADTF was chartered to determine investments and/or programs to achieve the greatest impact on diversity in the actuarial profession both short- and long-term. The ADTF submitted recommendations to the Issues Advisory Council regarding potential 2016 strategic initiatives related to actuarial diversity.

RELATED LINK

ADTF: <http://bit.ly/1VM66Rw>

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- ___ Bits in a byte
- ___ Sum of digits of sum of digits of reciprocal of probability of club ace, then club king
- ___ As denominator, is undefined
- ___ Bytes per address in 64-bit system
- ___ $2200/\text{Area of circle with diameter } 20$ (approx)
- ___ \log , base c , of E/m , where m is mass
- ___ Ten dozen, in hex
- ___ Are any of the apples in an empty barrel green?
- ___ Second derivative of $3X^2$



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PROFESSIONAL DEVELOPMENT: Your Opportunity to Grow

When is the last time you attended a meeting or seminar, or tuned into a webcast? As an SOA member, there are a number of events you can attend, in person or from your computer. Here are just a few of the upcoming meetings and webcasts coming your way that can help you:

- Stay up to date with current trends in your area of practice,
- Continue to make meaningful contributions to your company, your team and the profession, and
- Develop or fine tune new knowledge and skill areas.

MEETINGS AND SEMINARS VALUATION ACTUARY SYMPOSIUM

Aug. 31–Sept. 1
Boston

This event will feature more than 800 of your peers and 50 education sessions, including the latest GAAP developments/hot topics in GAAP reporting; establishing mortality assumptions under VM-20; non-variable annuity PBR update; and much more. It's truly a can't-miss opportunity for the financial actuary.

SOA GENERAL INSURANCE SEMINAR

Sept. 4
Seoul, South Korea

Mark your calendars for this seminar. A comprehensive program is being developed with topics covering product design, reinsurance, ratemaking and reserving, catastrophe modeling, professionalism and other selected topics.

2015 SOA ANNUAL MEETING & EXHIBIT

Oct. 11–14
Austin

Save the date! Guest rooms in six area hotels have been reserved for this growing event. Book your room now and visit SOA.org/calendar in the coming weeks for program details.

WEBCAST AGENT-BASED MODELING AND ITS ACTUARIAL APPLICATIONS

Aug. 20

Get an in-depth look at agent-based modeling (ABM) and its actuarial applications—what they are, why they are important for actuaries, when to use them and how to start the building process.



READY TO REGISTER?

Visit SOA.org/calendar for the full complement of meetings, seminars, virtual sessions, webcasts and podcasts. We look forward to hearing from you!

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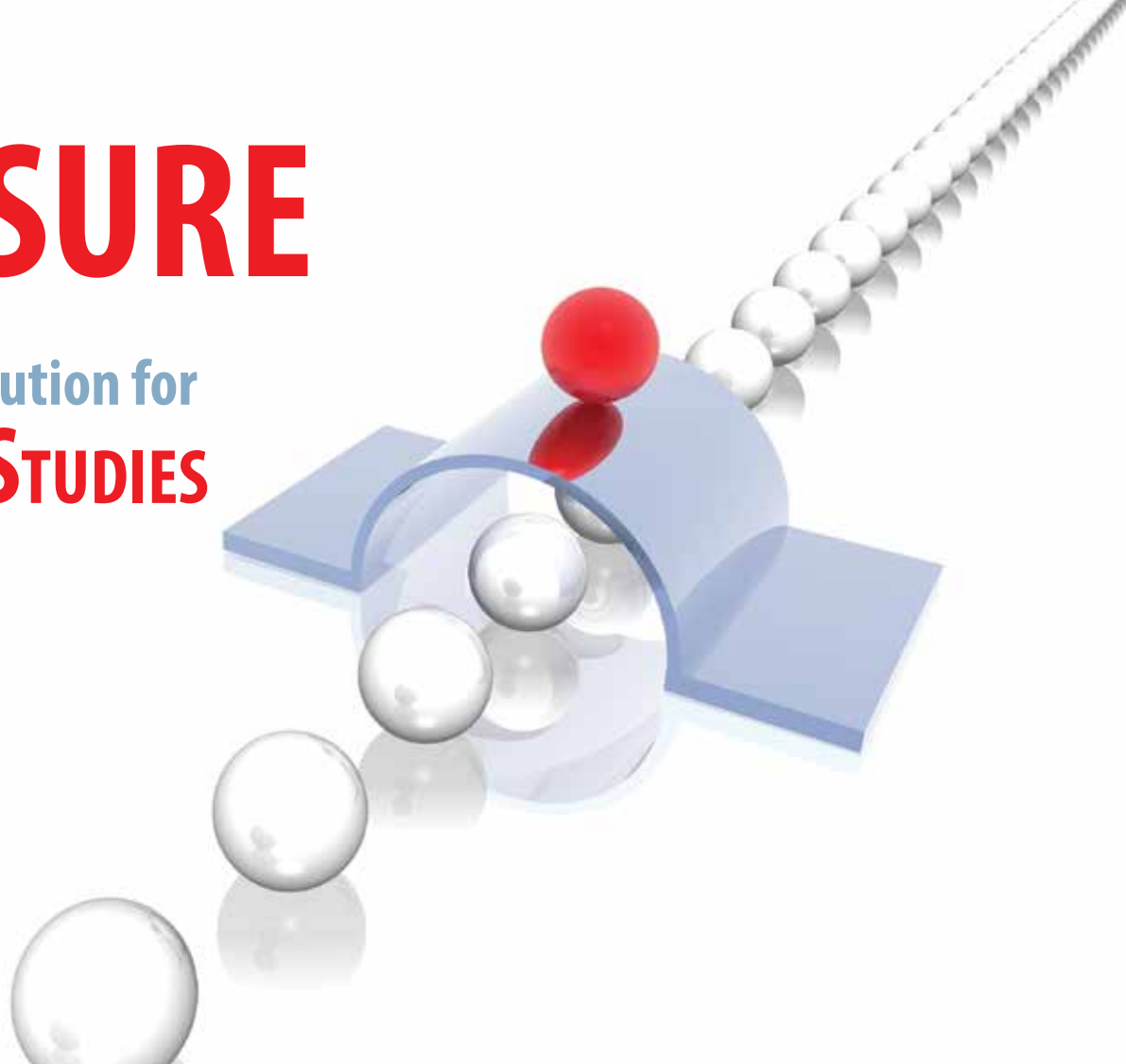
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