



Institute of Actuaries of India

www.actuariesindia.org

the Actuary INDIA

INDIAN ACTUARIAL PROFESSION
Serving the Cause of Public Interest

THE MAGAZINE OF THE INSTITUTE OF ACTUARIES OF INDIA

DECEMBER 2012

Pages 32

SOME OF THE SPEAKERS AT 15TH GCA

₹20

VOL. IV ISSUE 12



J. Hari Narayan



Jill Hoffman



Allan E. O'Bryant



Ashvin Parekh



Paul Murray



Andrew Rear



Chirag Rathod



Guy Chenelle



Gary R. Josephson



David Alexander



Siao Wearn Leong



DARRYL G. WAGNER



Sanket Kawatkar



Richard Holloway



Patricia L. Renzi



Barry Hewett



J. Meenakumari



K. Sriram



Dr. Amarnath Ananthanarayanan



Srinivasa Rao



Rob Leonardi



Anuj Gulati



Marielle Theron



K. Subrahmanyam



Nirav Patel



Ankur Agrawal



Michael Sherris



R Chandrasekaran



Sudhin Roy Chowdhury



John Holden



Krishnan Ramachandran



S Rajesh



Tania Chakrabarti



Herbert Meister



Sandeep Patel



M Ramaprasad



Tony Cheng



Kulin Patel



Gary Comerford



James E. Oatman

For Private Circulation Only

SOME OF THE SPEAKERS

Allan E. O'Bryant

US
Executive VP &
Head of Operations and Markets
RGA Reinsurance Company

Ashvin Parekh

INDIA
Partner & National Leader
Global Financial Services
Ernst & Young Pvt Ltd

Darryl G. Wagner

US
Principal
Deloitte Consulting
& LLP

David O'Brien

HONG KONG
Deputy Managing Director
Asia Pacific, Scor Re

David Alexander

HONG KONG
Director Head of Business Development, Asia
Swiss Re Services India Private Limited

DR. Amarnath Ananthanarayanan

INDIA
CEO and MD
Bharti AXA General Insurance

Frank Ashe

AUSTRALIA
Associate Professor
Macquarie University

Gary Comerford

CANADA
Chief Marketing Officer
RGA Reinsurance Company

Gary Josephson

US
President
CAS

Guy Chennells

SOUTH AFRICA
Product Marketing Actuary
Old Mutual Corporate

J Hari Narayan

INDIA
Chairman
IRDA

James E Oatman

US
Senior Vice President
McKinsey Healthcare
Revenue Solutions (MHRS)

Jill Hoffman

SINGAPORE
President of Singapore Actuarial Society
Munich Re

M Ramaprasad

INDIA
Member (Non-Life)
IRDA

Nirav Patel

UK
Principal Consultant
PricewaterhouseCoopers

Paul Murray

HONG KONG
Managing Director
Life & Health Products - Asia
Swiss Re Services India Private Limited

Professor Michael Sherris

AUSTRALIA
Professor
University of New South Wales

R Chandrasekaran

INDIA
Secretary General
General Insurance Council

Richard Holloway

SINGAPORE
Managing Director
Milliman's South East Asia
and India Life Consulting Business

Sanket Kawatkar

INDIA
Practice Leader
(Life Insurance) - India
Milliman India Private Ltd.

Sudhin Roy Chowdhury

INDIA
Member (Life)
IRDA

Tassos Anastasiou

UK
Chief Actuary
Royal Sundaram Alliance Insurance Co.Ltd

Tony Cheng

HONG KONG
CEO- RGA Asia
RGA Reinsurance Company

An event for you to join in, even if you are not an Actuary

Event Date: 17th -19th February, 2013 **Venue:** Hotel Grand Hyatt, Santacruz East, Mumbai, India

Last Date for Registration: 10th February, 2013 **Last Date for Early Bird Registration:** 31st December, 2012

Key Highlights : 60+ Speakers from across the Globe

Some of the Topics: **Enterprisewide Risks Behavioural Economics:** • Biases and their impact on Judgement • Regulatory changes in Singapore and implications for Asia-Pacific • Impact of the Digital Age • Global developments in ORSA • **India: Global Destination For Service Delivery** • Offshored Actuarial Work in India • **Actuarial Frontiers** • Advanced analytics and roles for actuaries to play • Global trends in actuarial computing • Modelling Techniques - nucleous to the insurance business managing • **Insurance Markets: Reinsurance Solutions** • Reinsurance and Capital • The role of life and health reinsurance in emerging markets – a comparison of China, India, and Brazil experiences • Concurrent Sessions on Health Care Insurance • Concurrent Sessions on Pension, Employee Benefits & SS • Concurrent Sessions on Life Insurance • Concurrent Sessions on General Insurance

SOME OF THE KEY PARTNERS



Chief Editor

Taket, Nick

Tel: +91/22/6740-3333

Email: nick.taket@idbifederal.com

Editor

Sharma, Sunil

Email: sharma.sunil@icicprulife.com

Puzzle Editor

Mainekar, Shilpa

Email: shilpa_vm@hotmail.com

Marketing Manager

Rautela, Binita

Tel: +91 22 6784 3314

Email: binita@actuariesindia.org

Librarian

Damre, Akshata

Tel: +91 22 6784 3325

Email: library@actuariesindia.org

COUNTRY REPORTERS

Smith, John Laurence

New Zealand

Email: Johns@fidelitylife.co.nz

Sharma, Rajendra Prasad

USA

Email: rpsharma0617@yahoo.com

Cheema, Nauman

Pakistan

Email: info@naumanassociates.com

Leung, Andrew

Thailand

Email: andrew.leung@iprbthai.org

Krishen, Sukdev

South Africa

Email: Krishen.Sukdev@absa.co.za

Balgobin, Vijay

Mauritius

Email: Vijay.Balgobin@sicom.intnet.mu

For circulation to members, connected individuals and organizations only.

C O N T E N T S

2

FACE TO FACE WITH

Offshored Actuarial Work in India - Success Stories

- **Ankur Agarwal**
- **Viswanathan Balamurugan**

8

THE ACTUARY INDIA - EDITORIAL POLICY

9

REPORTAGE

- 8th Seminar on Current issues in Life Assurance (CILA) by **Pratyay Bhattacharya**.
- 3rd Capacity Building Seminar in general insurance by **Prerana Sadarangani**

15

FEATURES

- Basics of Monte Carlo Simulation:- by **Aseem Kumta**
- Tackling Climate Risk: An Insurance Contribution to the COP Discussions—COP 17 Background Document by **the Geneva Association**

27

COUNTRY REPORT

An Update from South Africa by **Krishen Sukdev**

28

FROM THE PRESS

- IANS: No Cover notes, no impact on vehicle owners
- IANS: New India not to be impacted by Claims on grounded Ship

29

BOOK REVIEW

Pension mathematics with numerical illustrations
Reviewed by K. Ganesan

30

SHILPA'S PUZZLE

COMPANY PROFILE

11 Jardine Lloyd Thompson

19 AXA Business Services

CAREER OPPORTUNITY

14 Consulting Actuary - Milliman India Pvt. Ltd, Gurgaon

31 Actuarial Expert - Mckinsey, Gurgaon

Disclaimer : Responsibility for authenticity of the contents or opinions expressed in any material published in this Magazine is solely of its author and the Institute of Actuaries of India, any of its editors, the staff working on it or "the Actuary India" is in no way holds responsibility there for. In respect of the advertisements, the advertisers are solely responsible for contents and legality of such advertisements and implications of the same.

The tariff rates for advertisement in the Actuary India are as under:

Back Page colour ₹ 35,000/-

Full page colour ₹ 30,000/-

Half Page colour ₹ 20,000/-

Your reply along with the details/art work of advertisement should be sent to library@actuariesindia.org

ENQUIRIES ABOUT PUBLICATION OF ARTICLES OR NEWS

Please address all your enquiries with regard to the magazine by e-mail at library@actuariesindia.org.
Kindly do not send it to editor or any other functionaries.

Printed and Published monthly by Gururaj Nayak, Administrative Officer, Institute of Actuaries of India at ACME PACKS AND PRINTS (INDIA) PRIVATE LIMITED, A Wing, Gala No. 55, Ground Floor, Virwani Industrial Estate, Vishweshwar Nagar Road, Goregaon (E), Mumbai-63. for Institute of Actuaries of India : 302, Indian Globe Chambers, 142, Fort Street, Off D N Road, Near CST (VT) Station, Mumbai 400 001.
• Tel +91 22 6784 3325 / 6784 3333 Fax +91 22 6784 3330 • Email : library@actuariesindia.org Website : www.actuariesindia.org



OFFSHORED ACTUARIAL WORK IN INDIA - SUCCESS STORIES



ANKUR AGRAWAL HEAD-ACTUARIAL FUNCTION AXA BUSINESS SERVICES

ankur.agrawal@axa-abs.co.in

Ankur Agrawal is a Fellow of the Institute and Faculty of Actuaries and Institute of Actuaries of India. He is heading the Actuarial function at AXA Business Services and is based out of their Pune office.

After completing B.Tech from IIT Delhi in 2003, he was involved in various assignments on financial research and risk analytics. Post which he joined Towers Watson (formerly EMB Consultancy) and was working as an Actuarial consultant on personal lines pricing and reserving projects for European and emerging markets. Thereafter, he joined Max Bupa Health Insurance Company as Head Actuary and was involved in product development, pricing, reserving, FCR, ALM, reporting and reinsurance. Post which he joined AXA Business Services in August 2011, and is involved in setting up a team of actuaries carrying out work for AXA Entities, globally. Currently, he is overseeing technical work in the area of Property & Casualty, Health Insurance actuarial and also managing Life Insurance actuarial team.

PERSONAL

What jobs and experiences have led you to your present position?

At EMB, I have done various projects in personal lines pricing and reserving for various European Entities and also for emerging markets. At Max Bupa, I was responsible for setting up the team and actuarial processes from scratch. I was involved from the beginning in product designing, business planning, investments, reinsurance and setting up the framework for regulatory compliance. In Aug 2011, I joined AXA Business Services as the Head of the actuarial function.

Describe your current roles and responsibilities?

I am leading a growing team of 16 actuarial staff involved in carrying out actuarial work for various AXA offices in the area of pricing (GLM, predictive modeling), financial reporting, experience studies, new technical/ developmental initiatives supporting AXA's growth target for geographies such as the US, Europe, Middle East, and Asia region.

Communication

Job involves talking to various stakeholders to showcase our capabilities, understanding AXA Entities (client) needs and requirements. This is then followed by internal discussion within the team on how they could be supported. The proposal then has to be agreed with the client.

It also involves communicating with local support teams to ensure that all administrative responsibilities are met.

Business/ Technical Skills

My job involves understanding the position of an AXA Entity (client) and providing them with suggestions on initiatives they can undertake to improve their operating performance. This attribute require me to think about the Entity's operating environment and challenges faced by them, followed by discussion with those Entities on proposed recommendations.

Challenges that you faced on the route to becoming an Actuary?

Managing work (including extensive travel, especially in my earlier jobs), personal life, and studies.

How did you balance your job, studying for exams, and personal time?

I have always enjoyed my job (including the travel part of it) – as I used to get opportunities of working on new actuarial assignments and get to meet with new people. Studies and personal life at times used to take a back seat for me, normally. As with most of the students (I believe), my personal life used to take a beating closer to the exam.

PROFESSION

Please describe a typical day at work?

My day starts with replying to emails, followed by meeting with my team. This is followed by reviewing work/ deliverables of the team. In the afternoon, I am usually involved in meetings with AXA Entities on video/ teleconference.

What can you tell me about the employment outlook in your occupational field?

My primary area of specialization is Property and Casualty. Actuaries are increasingly involved in various areas in P&C domain. The demand far exceeds the supply; this is especially true for Asia. With a lot of changes in the global insurance market due to climate change, uncertain economic climate, regulatory changes around Solvency 2, ERM gaining importance – is creating demand for actuaries in this field. Within India also, managements and boards are realizing the importance of actuarial support in decision making process. This will be further propelled by proposed regulatory changes and increasing FDI cap in insurance.

What do you consider to be the key areas where actuaries add value to the business?

Actuarial work nearly touches all the areas within an insurance company. Some of the areas where actuaries are involved (or can get involved) are- Product designing, pricing, risk management, business planning, investments, reserving, capital modeling, marketing and claims analytics and financial reporting.

What impact do actuaries have on consumers and society? What should they do to connect with the society?

While designing products, actuaries should understand the needs/ issues of the customers by attending focus group discussions, and incorporate this understanding in product designs. Simpler products addressing needs of the customers leads to lower claims rejection and hence increase the overall trust in the insurance market amongst consumer. This will certainly increase take-up rate of insurance products. Complex products with ambiguous terms and conditions leads to higher claims rejections/ customer grievance and will act as a deterrent to the industry.

Actuaries should interact with the sales partners and customers to understand their needs, then design products which caters to the customer requirements and is priced properly with adequate underwriting and claims control.

How do you think IAI can support better its members?

IAI can continue to support its member by means of conferences/ seminars on new topics of interests like emerging risks, ERM, new technology etc. These events also act as a good forum to meet and interact with other practitioners within the industry and act as a platform for knowledge exchange.

You being a fellow member of IFA as well as IAI, what do you see commonality of approach amongst these two organizations?

Both IFA and IAI have similar exam structure (even same course material) – except SA level exam. There is a lot of commonality between the two organizations. IFA has a larger member base and is a lot more evolved. We (IAI) have to learn from IFA and other bodies and especially promote research on new topics. Some steps have already been taken by IAI in this direction in last few years like setting up of Research and Publication advisory group, but I think we still have a long way to go.

Insurance Industry in India

What trends do you see for this industry in the next 3 to 5 years?

I am very optimistic about the general insurance industry in India in the short to medium term. With continued growth of wealth and improvement in infrastructure – coupled with increasing awareness about risk management at the current state should see a significant increase in premiums from the current levels. This growth will be further fueled by regulatory interventions (aimed at protecting customers) and increase of FDI cap in the market.

What are the top three issues facing the Insurance sector in India.

- High combined ratios - High operating costs coupled with high fraud in some lines of business
- Price cutting – not having risk based pricing leading to price cutting in some lines of business
- Slower pace of regulatory approvals/ changes

What do you believe are the inefficiencies in the insurance industry? How do you think such inefficiencies can be overcome? What are its strengths?

Third party pool was a key source of inefficiency in the market. However, the regulator has announced dismantling of third-party risks in April'12 – which should reduce the inefficiency.

Under-pricing especially in the commercial line business, lower pace of innovations in the market, higher levels of fraud in insurance (especially in motor and health care lines of business) are other sources of inefficiencies affecting the market.

Offshored Actuarial Work in India

Can you elaborate on the geographies to which you are providing support?

Currently, we are providing actuarial support to various AXA Entities – including North America, Europe, Asia Pacific, Mediterranean and Middle-East region in P&C, Life and Health insurance actuarial work. This is a growing team and we are getting engaged in new technical initiatives with AXA Entities, globally.

Any specific challenges facing actuarial workers in this area of employment within India?

Indian industry is facing shortage of experienced P&C and health care actuarial professionals. In our company, we overcome this challenge with training/ seminar support. We also engage our actuarial students to interact and work with seasoned actuaries in the western markets.

Suggestions for the IAI which can support better such work in India?

IAI could help by organizing additional knowledge sharing sessions around Health and P&C insurance. They have already started this process, but we can do more to improve the knowledge level of actuaries/ students in this area. This can also be done in conjunction with other professional bodies like CAS, SOA, IFA etc.



With a light Hert

De Morgan was explaining to an actuary what was the chance that a certain proportion of some group of people would at the end of a given time be alive; and quoted the actuarial formula, involving p [pi], which, in answer to a question, he explained stood for the ratio of the circumference of a circle to its diameter. His acquaintance, who had so far listened to the explanation with interest, interrupted him and exclaimed, 'My dear friend, that must be a delusion, what can a circle have to do with the number of people alive at a given time?'

– W. W. R. Ball



OFFSHORED ACTUARIAL WORK IN INDIA - SUCCESS STORIES



BALAMURUGAN VISWANATHAN **CHIEF EXECUTIVE OFFICER, JLT GROUP SHARED SERVICE** **CENTRE IN MUMBAI, THE GROUP DIRECTOR OF** **BUSINESS PROCESS MANAGEMENT.**

V_Balamurugan@JLTGROUP.COM

Bala is Chief Executive Officer for the 700 people strong JLT group shared service centre in Mumbai, India and is also the Group Director of Business Process Management.

Previously at Prudential, where he was Director - Operations and Knowledge Services (India) from 2003-2006, Bala was responsible for setting up and building the 1300 strong customer and knowledge services activity in Mumbai. From 2001, he was Head of Operations & Business Development at AXA where he set up their Bangalore operations and grew the team from 50 to 1000 people responsible for delivering customer services across Asia, Australia, America and Europe.

About JLT Group

JLT Group is an international group of Risk Specialists and Employee Benefits Consultants and one of the largest companies of its type in the world. It offers a distinctive choice to its clients and partners through a combination of independence, scale and specialism.

As an independent business, JLT is able to operate with autonomy and flexibility. JLT has the scale to provide solutions to the complex demands of the world's leading companies and to deliver global servicing whilst recognising that the needs of each of its clients are unique. By developing highly specialised services, JLT provides its clients with a depth of expertise and experience. The Group was formed in February 1997 by the merger of Jardine Insurance Brokers and Lloyd Thompson Group. Lloyd Thompson was founded in 1981 and listed on the London Stock Exchange in October 1987. The merger combined Lloyd Thompson's specialist skills in the London Market with Jardine Insurance Broker's international network which included a significant presence in the Asia Pacific region.

The value we create is driven through the personal determination of our 6,500 highly motivated and skilled people.

PERSONAL

What jobs and experiences have led you to your present position?

I started my life as a finance professional in corporate strategy and investment analysis domain after having completed my MBA. I thereafter worked with a bank managing their operations and subsequently moved to the offshoring domain in the late 90's. Over the last 12 - 14 years, since I joined the offshoring industry, I have had the good fortune of having been a part of teams that have established 5 extremely successful start-ups culminating in my current role at Jardine Lloyd Thompson.

Describe your current roles and responsibilities?

I carry out two roles for Jardine Lloyd Thompson. The first is as the Chief Executive for Jardine Lloyd Thompson India wherein I manage both the offshoring entity and also look after the group's interest from entry in to India. My second role is as the Group Director for Business Process Management wherein I help shape the operations strategy for the group and its continuous improvement journey.

What are the key qualities required in your position?

The most important aspect is to be a people's person which requires one to be attentive, responsive and supportive. The second is to be, controversially, impatient and drive change and improvement which are the only routes to success. The third is to be innovative and therefore risk taking.

Challenges that you faced on the route to becoming an Actuary?

Thankfully none as I chose not to be an actuary by qualification but only by practice.

PROFESSION

Please describe a typical day at work?

The most outstanding part about my role is that there is actually no typical day! Each day provides me with new opportunities, challenges and most importantly new people to interact.

What can you tell me about the employment outlook in your occupational field?

I believe there is a tremendous opportunity in the knowledge services domain. We have outstanding talent available in India in abundance which needs to be nurtured such that they can be tapped to make the most of the opportunities available.

How much demand is there for people in this occupation? How rapidly is the field growing?

The knowledge services market is expected to be growing over 20 per cent CAGR over the next 5 years. From the Actuarial profession's perspective there is latent demand, but Actuaries need to look beyond the traditional fields of Life & health. The Actuarial function, in my view, needs to be aligned more to risk /capital management. This would require building capabilities in areas such as capital management, catastrophe modeling, risk management, etc. The off - shoring business provides lots of opportunities to actuaries in non traditional areas like capital modeling, claims analysis.

What do you consider to be the key areas where actuaries add value to the business?

Three key areas where Actuaries can add value are a) Risk Management b) product proposition development c) extending statistical and modeling capabilities in non traditional fields.

What impact do actuaries have on consumers and society? What should they do to connect with the society?

Actuaries tend to be far removed from customers; hence the Actuarial profession needs to do more to reduce this gap. Further initiatives in key areas such as Product Proposition could help connect with the needs of the society.

How do you think IAI can support better its members?

Though a clichéd response could be to focus on non-traditional fields, which is essential for the profession. I also believe a stronger focus is required in supporting the traditional fields in India such as the General Insurance market where new product innovation is lacking; the industry also needs better product innovations for sustainable annuity products, healthcare and pension products. I believe in this regard, IAI has a huge responsibility to fulfill.

INSURANCE INDUSTRY IN INDIA

What trends do you see for this industry in the next 3 to 5 years?

For the Life insurance Industry, I see greater transparency in its interactions with the customers, the efforts taken by IRDA in order to protect consumer interest such as revamping product design practices need to be appreciated and this would go a long way in shaping the future of this industry. Also, consolidation in the industry seems inevitable.

For Non Life Insurance industry – I am hoping to see better product innovations and greater clarity of pricing.

Are there things that the IRDA or the Government should have or should not have done to assist the industry?

Three areas which the Government/regulator could have done

- Capital requirements- The FDI issue has been dragged for too long, the industry is starving for more capital infusion. This has constrained the growth potential
- Consistency on tax laws
- Insurance companies and insurer brokers should be treated different and should have different rules on foreign direct investment and other regulations.

What market share do you see the private sector players having in ten years time?

This is difficult to comment on, as long as the public sector companies remain competitive and innovative, I see no real change from the current market scenario.

What are the top three issues facing the Financial sector, Pension provision & Insurance sector in India.

The three top issues would be

- Access to foreign capital
- Multiplicity of regulations
- Limitations in product innovations- There are still not many good annuity products, as the economy ages, post retirement solutions would be required.

What do you believe are the inefficiencies in the insurance industry? How do you think such inefficiencies can be overcome? What are its strengths?

The inefficiencies in the industry could be related to

- Distribution channels- traditional distribution models are still prevalent and have not helped in product marketing. There is still a poor level of consumer awareness and hence there is a requirement for strong customer education programs and promotional strategies. Innovative distribution channels of micro-insurance for untapped rural market is also crucial
- Underwriting practices- The underwriting practices are extremely dated. The internal underwriting and risk management practices need to be tightened. This is extremely crucial to sustain growth and maintain profitability.
- Limitations in innovation in General insurance market- The GI market has a lot of scope but we unfortunately have not seen much in terms of new product innovation and self insurance /captive structures. Further there is a necessity to bring in more clarity in pricing GI products.

On the strengths, the insurance products in the market still form a vital source of financial security and the regulator has worked hard to ensure customers are treated fairly.

OFFSHORED ACTUARIAL WORK IN INDIA

Your current area of responsibility is managing actuarial work that belongs to Insurance Entity of the UK. Can you expand on this?

The Actuarial team working in JLTi assists UK actuaries in providing a range of advisory services to UK Pension funds. This includes valuation work, preparing accounting disclosures for sponsors of the pension funds, advice on exit strategies. The team also is involved in research activities related to deficit tracking of FTSE listed companies and funding levels of companies on the regulators basis.

What are your views on such work being carried out within India: its volume, spread over countries etc?

In the offshoring business, we are steadily seeing a trend where high end knowledge service/analytical work is moving where cost efficiencies are achievable without compromising on quality of the final output. Most of the volumes still remain to be US & UK centric.

Any specific challenges facing actuarial workers in this area of employment within India?

The Actuarial curriculum is more focused on domestic industry requirements. This does turn in to a challenge for offshore work. There is little focus on complex pension structures, captive insurance management and triangulation methods for long tail risks such as workers compensation

Suggestions for the IAI which can support better such work in India?

IAI could help organize seminars/workshops on topics related to offshoring business. This would help build upon Actuarial skills in these areas.



“IF YOU DON'T KNOW WHERE YOU ARE GOING, ANY ROAD WILL GET YOU THERE.” - GEORGE HARRISON

THE ACTUARY INDIA – EDITORIAL POLICY

(VER. 2.00/23RD JAN 2011)

Version history;

Ver. 1.00/31 01 2004

Ver. 2.00/23rd Jan. 2011

- A: "the Actuary India" published monthly as a magazine since October, 2002, aims to be a forum for members of the Institute of Actuaries of India (the Institute) for;
- disseminating information,
 - communicating developments affecting the Institute members in particular and the actuarial profession in general,
 - articulating issues of contemporary concern to the members of the profession.
 - cementing and developing relationships across membership by promoting discussion and dialogue on professional issues.
 - Discussing and debating issues particularly of public interest, which could be served by the actuarial profession,
 - student members of the profession to share their views on matters of professional interest by way of articles and write-ups.

B: The Institute recognizes the fact that;

- there is a growing emphasis on the globalization of the actuarial profession;
- there is an imminent need to position the profession in a business context which transcends the traditional and specific actuarial applications.

➤ The Institute members increasingly will work across the globe and in global context.

C: Given this background the Institute strongly encourages contributions from the following groups of professionals:

- Members of other international actuarial associations across the globe
- Regulators and government officials
- Professionals from allied professions such as banking and other financial services
- Academia
- Professionals from other disciplines whose views are of interest to the actuarial profession
- Business leaders in financial services.

D: The magazine also seeks to keep

members updated on the activities of the Institute including events on the various practice areas and the various professional development programmes on the anvil.

E: The Institute while encouraging stakeholders as in section C to contribute to the Magazine, it makes it clear that responsibility for authenticity of the contents or opinions expressed in any material published in the Magazine is solely of its author and the Institute, any of its editors, the staff working on it or "the Actuary India" is in no way holds responsibility there for. In respect of the advertisements, the advertisers are solely responsible for contents of such advertisements and implications of the same.

F: Finally and most importantly the Institute strongly believes that the magazine must play its part in motivating students to grow fast as actuaries of tomorrow to be capable of serving the financial services within ever demanding customer expectations.



IT'S GCA TIME AGAIN !

Inviting all IAI students to join us to display your artistic talents and connect with colleagues, and above all, have fun while providing entertainment and possibly winning a prize!

The Actuarial Gala Function provides a platform where you can showcase your talents, to an audience comprising of all the delegates attending the **15th Global Conference of Actuaries** in Mumbai, from across the world. If you are **a magician, a dancer, a mimicry artist, a singer or an actor or have any other talent**, and believe your performance should be showcased on the 15th GCA Platform, we will make it happen... so write to us **before 31st December 2012**.

Hurry!!!



send in the following details, through email:

- 1) Name
- 2) Contact number (preferably mobile number)
- 3) Email id (preferably one that you check regularly)
- 4) Employer's name (if applicable)
- 5) Description of the talent you possess and/OR performance you have planned.

The details should be sent to the following members of the Social, Cultural and Youth Affair Advisory Group:

Delhi NCR - Aditi Sodhi (Member): sodhi.aditi@gmail.com

Mumbai - Suruchi Bhargava (Member): sb.suruchi@gmail.com

Bengaluru - Harshita Gupta (Member): harshitagupta2003@yahoo.com

Other Locations - Nidhir Gupta (Secretary): nidhir_gupta@yahoo.com



We look forward to see you perform live on stage at the 2013 AGFA!!!

8TH SEMINAR ON CURRENT ISSUES IN LIFE ASSURANCE (CILA)

by Pratay Bhattacharya

Organized by : Institute of Actuaries of India

Venue : Orchid Hotel, Vile Parle

Date : 29th & 30th November, 2012

The 8th Seminar on Current Issues in Life Assurance (8th CILA)

was held in Mumbai on 29th and 30th of November 2012 at The Orchid. The seminar, attended by members of Institute of Actuaries of India (IAI) and industry professionals, sought to highlight the key issues that have profound effects on the management of life insurance business, and to engage the profession and the wider industry in debate on these issues.

Avijit Chatterjee, Chair of Life Insurance Advisory Group, inaugurated the seminar by welcoming everyone.

This was followed by a brief address from **M Karunanidhi**, President of IAI. He expressed hope that the actuarial community gathered would benefit from the seminar which provides an excellent opportunity for exchange of ideas on topical issues.

The first session was by **S B Mathur**, former LIC Chairman and recently appointed Member IRDA, who spoke about the **current environment in life insurance**. He expressed concerns on the current state of affairs in the industry, particularly regarding the spate of recent regulatory interventions. The key concerns raised by him are listed below.

- Insurers may not sell pension business due to adverse consequences of mandated capital guarantee for investment strategy. So, is pension business being

destroyed due to regulatory changes?

- It is unlikely that LIC's annuity exposure is any cause for concern. In any case, the annuity liability in total is not significant. So, is the removal of Open Market Option for annuities justified?
- The reinsurance life market is small. So, is there any need to reconsider reinsurance and restrict it?
- There has been a lot of discussion on the product regulations but little change in stance of the regulatory authority. Is that an indication that we are reverting to pre-liberalisation status?
- Regarding bancassurance, the regulatory view is that banks have been involved in a lot of mis-selling. Will geographical split of bank distribution address this issue?

Mathur ended his speech on an optimistic note, stating that the worst phase for the industry is almost over.

The next speaker was **Mr. J Hari Narayan**, Chairman IRDA, who spoke about the **regulator's expectations of Appointed Actuaries (AA)**. Hari Narayan said that the AA is an arm of the Regulator in the Company. He is, in principle, the Company's regulator. His roles and responsibilities are vast. Actuarial advice is needed in practically every aspect of management except human resource management. It is the AA's duty to oversee the policyholders' interest, not to

About the Author



pratay_bhattacharya@iciciprulife.com

Pratay Bhattacharya is a Fellow of the Institute of Actuaries, UK and the Institute of Actuaries of India.



Mr. J Hari Narayan

represent management. However, there is a gap between promise and delivery. IRDA had recently conducted a review of product design and actuarial valuation. This showed that expectations are not being met by AAs. The key findings of the review were as follows.

- Product designs do not meet customer requirement.
- Products are not compliant.
- There is too much reinsurance.
- ULIP fund values are insufficient.
- Surrender values are inadequate.
- New business strain is not in line with benefits offered.
- Pricing and reserving assumptions are inappropriate.
- Persistency assumptions are especially not in accordance with reality (possibly due to different term of outlook).
- There are inconsistencies between forms filed.
- Forms do not reconcile to statements of accounts.
- Allocation of expenses across lines of business is arbitrary and not consistent from year to year. IRDA is considering making a request to IAI to provide guidance on expense allocations.
- Analysis of surplus method varies between companies.
- Renewal expenses are wrong.
- Some areas are alright e.g. mortality.

Speaking on the subject of the recent regulatory interventions, Mr. Hari



M Karunanidhi, Avijit Chatterjee, V Rajagopalan, S B Mathur

Narayan said that every regulatory intervention in India replicates, usually in a more benign manner, provisions already made in other countries. Across the world, reinsurers are required to hold assets in the country of the direct writer. Lots of products sold in India no longer exist elsewhere e.g. endowments. This exemplifies the relative laxity of regulation in India. According to Hari Narayan, the regulatory rigor in India should increase further. Responding to a participants' question on his vision for the future, Mr. Hari Narayan said that some of the things he would like to see are simpler products, pull products instead of push, greater usage of electronic media and a "boring" industry.

The third session of the day was on **life insurance product regulation** by **Dilip Chakraborty** from Towers Watson. He said that the new exposure draft regulations for ULIP and conventional products will introduce a lot of restrictions on product design.

The next session on **risk based capital** by **Rajesh Dalmia**, Appointed Actuary of Reliance Life, covered the evolution of approaches towards risk-based capital and issues regarding implementation of Solvency II guidelines in India. Differences were outlined between a factor based approach which uses standard formulae and a stress based approach that evaluates capital requirements under specified extreme scenarios. Several implementation issues were also highlighted.

The fifth session was "**Introduction to GN6 – Management of Participating Business**" by **Sanket Kawatkar** from Milliman. The proposed draft prescribes an overall framework and aims at addressing differing practices in the



Mark Saunders, Heerak Basu and James Creedon

industry, specifically on management of participating life insurance business with reference to distribution of surplus. Kawatkar covered each section of the GN in detail, emphasizing on a standardised definition of asset share, interplay and relation of surrender value scale to the underlying market value of asset share and policyholder's reasonable expectation with regards to the same. Kawatkar suggested that this GN be a Practice Standard and not a Recommended Practice.

The final session of the first day was on **APS 10** by **Mark Saunders** and **James Creedon**, both from Towers Watson. Saunders said that life insurer IPOs are tremendous opportunities for the actuarial profession. The actuarial report on an IPO is one of the most vital and most scrutinized documents related to the IPO. Actuaries also need to be prepared for the post IPO phase which is a paradigm shift as a listed company is always under the microscope. Creedon said that EV results are the key valuation basis for life insurer IPOs. The EV report should include comment on data, method, assumptions and result

along with an opinion. Sensitivities to assumptions and risks in the reported values should be highlighted. In the seventh session of the seminar and the first session of the second day,



Subha Neelakantan

Ms. Subha Neelakantan from Gen Re spoke about the **reinsurance regulations and its impact on the life industry**. Ms. Neelakantan highlighted the benefits of reinsurance and gave an overview the draft reinsurance regulations. Some of the notable aspects of the regulations are no quota share, product level cap on reinsurance premium and retention limits that are dependent on the age of the company irrespective of underwriting practices, type of business, risk appetite etc. of the company. Ms. Neelakantan concluded that these regulations will reduce diversification, make innovative product launch difficult, increase the volatility of results and the capital requirements of insurance companies. The speaker for the eighth session was **Paul Sauve** from RGA, who shared



Sanket Kawatkar



Paul Sauve & Nick Taket

some **global insights on mortality trends**. Sauve spoke about the need for insurance companies to pay close attention to trends in mortality experience in light of factors like increasing protection, compulsory annuitisation, falling interest rates and historical underestimation in the rates of mortality improvements. The presentation included graphical representations of trends in mortality observed in various countries. The effects of events like the great depression, the HIV epidemic, oil shocks, etc. on the mortality experience of the exposed cohorts were highlighted. He recommended that companies should start collecting, retaining and sharing data in its most granular form and build mitigation measures for model risk.

The final session of the seminar was a **global survey of the role of ALM in**



Peter Duran

prudential supervision by **Peter Duran** from Deloitte. The session covered the guidelines in Insurance Core Principle (ICP) – 16 pertaining to Enterprise Risk Management (ERM) established by International Association of Insurance Supervisors (IAIS). ICP-16 requires insurers to periodically perform an Own Risk and Solvency Assessment (ORSA) that provides management's assessment of the adequacy of its risk management and current and likely future solvency position based on all

reasonably foreseeable and material risks. The session contrasted the Risk Based Capital (RBC) approaches in the US and the EU with the American approach being principles based, bottom up and recognizing credit spreads while valuing liabilities.

The event, which was replete with interesting debate and insightful discussion over a two-day period, finally came to a close with a vote of thanks by **Nelius Bezuidenhout**, Secretary to the Life Insurance Advisory Group.



Nelius Bezuidenhout

OFFSHORED ACTUARIAL WORK IN INDIA - COMPANY PROFILE

India has a fast growing actuarial talent pool and a matured outsourcing industry, and is thus increasingly recognized as a force to reckon in the actuarial outsourcing arena. With regulatory environments changing, and greater focus on driving costs down around the world, India can emerge a preferred destination for actuarial services off-shoring besides location of Actuarial Consulting a la Hong Kong and Singapore. This month we present company profile of Jardine Lloyd Thompson India Private Limited.

Jardine Lloyd Thompson India Private Limited



Jardine Lloyd Thompson India Private Limited (JLT India) is part of the JLT Group based in Mumbai, India.

JLT India was setup in May 2007 as the Global Shared Services Centre for the JLT Group, offering access to local talent and expertise in order to improve cost and operational efficiency. Situated in India's financial capital, Mumbai, the office has state of the art infrastructure and has built a reputation as an employer of choice.

Since its launch, JLT India has grown rapidly and represents approximately 8% of the Group's employees supporting both Employee Benefits and Risk & Insurance operations of the Group. JLT India provides a number of services to the JLT Group including:

- Pensions Administration
- Insurance Broking & Claims Administration
- Finance - Captive Insurance Accounting, Pension Fund Accounting
- Consolidation, Insurance Broking Accounting
- Analytics - Actuarial, Investment Consulting, Business Analysis
- IT - Application Development, Maintenance, Testing
- JLT India is a ISO 27001 (the world's leading information security standard) and ISO 9001 (quality management standards) certified organization.

3RD CAPACITY BUILDING SEMINAR IN GENERAL INSURANCE

by Prerana Sadarangani

Organized by : Institute of Actuaries of India

Venue : Hotel Grand Sarovar| Mumbai

Date : 10th November, 2012

The 3rd Capacity Building Seminar was held on the 10th of November, 2012 at Hotel Grand Sarovar, Mumbai. The opening address was delivered by Mehul Shah, Appointed Actuary -L&T General Insurance, who gave a brief overview of the day's sessions. The purpose of the seminar was to discuss certain sections of the Financial Condition Assessment Report, which can be improved and Asset Liability Management process, which needs to be developed for General Insurance business in India.

Session 1: Structuring the Executive Summary of the Financial Condition Report



Gautham Subramaniam

Speaker: Gautham Subramaniam, Lux Actuaries Gautham commenced the session by stating the importance of the Executive Summary of the Financial Condition Report (FCR), the smallest section, yet the most challenging to draft. The FCR needs to be summarized in the Executive Summary and hence has to be concise.

He continued to the reasons for preparing an Executive Summary. The readers of the FCR are diverse and so a well-defined Executive Summary appeals to a non-technical audience. It acts as a starting point to a massive report and should also highlight the areas of concern and comfort.

Some of the key elements to be incorporated in an Executive Summary are significant results in the various sections of the report along with conclusions and recommendations for the same, and the quality and credibility

of data used. Gautham emphasized on the importance of the data and also



Raunak Jha

discussed the format in which the key elements should be stated along with the structure of the Executive Summary.

Session 2: Framework for assessing and reporting on the adequacy of premium & reserves

Speakers: Raunak Jha & Hiten Kothari, Towers Watson

Raunak presented the first part of the session on adequacy of premium. She started with how the various components of the premium individually need to be adequate to make the premium adequate. The discussion continued to how experience analysis can be used to identify these inadequacies. This involves identifying different components which maybe/are causing the actual experience to deviate from what was assumed in the pricing basis. She supported this discussion with the help of examples from Health Insurance using one-way and two-way analysis. This involved analyzing claims statistics over different age bands, across underwriting years, between genders and a combination of these. She concluded by discussing the solutions for inadequacy in terms of gap analysis for future business and valuing premium liabilities for existing business.

Hiten presented the second part of the session on adequacy of reserves. He stated the importance of adequacy of reserves as they can affect the financial health of a company in terms of underlying profit/loss, the technical price to be determined and the solvency ratio.

About the Author



Prerana.Sadarangani@tata-aig.com

Prerana Sadarangani is a part of the Actuarial team at TATA AIG General Insurance Company

He continued to give an overview of the steps involved in a reserving process and the factors affecting adequacy of reserves such as:

- i) Lack of understanding or misinterpretation of data
- ii) Inappropriate methods or judgments used



Shalabh Mathur

- iii) External environment factors such as inflation
- iv) Deviation of actual experience from what was planned

There was a discussion on how to assess the adequacy due to the above mentioned factors.

Hiten concluded the session by discussing the assessment of reserve inadequacy using stochastic reserving.

Session 3: Framework for assessing and reporting on the adequacy of reinsurance arrangements

Speakers: Shalabh Mathur & Hiten Kothari, Towers Watson

Shalabh started his session by discussing the reasons for taking reinsurance.



Hiten Kothari

Then he talked about the assessment of historic and future reinsurance (RI) arrangements. The assessment of historic arrangements can involve:

- analyzing the gross and net of reinsurance triangles,
- applying the net to gross ratio,
- analyzing individual claims by dividing them into attritional, large and CAT claims and hence determining the recoveries.

To assess the adequacy of future RI arrangements, gross loss distribution can be determined which is then passed through the proposed RI arrangement. The credit ratings of the reinsurers and



Mehul Shah & Ruan Van Rensburg

concentration of risk should also be considered.

More reinsurance translates into a lower level of capital requirement but too much reinsurance can also reduce overall profitability. Shalabh illustrated this through an example wherein he compared two RI arrangements to show how a higher retention increased profitability.

He concluded by discussing how the adequacy can be monitored over time.

Hiten covered the last part of the session where he discussed how adequacy of reinsurance can be reported in the FCR.

Session 4: Framework for assessing and reporting capital adequacy and Asset Liability Management (ALM)

Speaker: Ruan Van Rensburg, Lux Actuaries

Ruan commenced the session with a brief overview of his experience and background. His session was interactive and also involved many anecdotes from his experience to support his discussion. There was a detailed discussion on who might be interested in the financial strength of a company and why.

Regulatory measures to determine capital adequacy could range from determining whether or not the IBNR provided is

adequate to a Solvency II regime. Ruan went on to discuss the current method of calculating the Required Solvency Margin (RSM) and discussed how RSM can be reduced.

IRDA requires us to comment on the future solvency. He stated the need for a reasonably robust model which recognizes the main drivers, the results from which could be used to report future solvency.

The last part of the session covered ALM. Here, Ruan mentioned that an Investment Policy should be designed by someone like an actuary, since actuaries understand the liability and asset side of the balance sheet. The range for asset classes should be mentioned along with reasons if they comprise of assets other than cash or bonds. Ruan concluded by discussing how assets and liabilities can be matched and how various risks can be taken care of using appropriate asset classes.

Session 5: Appointed Actuary's presentation of the Financial Condition Report to the Board

Speaker: Manalur Sandilya, Appointed Actuary, ICICI Lombard

In his introductory comment, Manalur stated that the FCR could be made into a more concise document so that the Board members could go through it quickly. While making a presentation it



Manalur Sandilya

is important to understand the audience, i.e., to understand the background of the respective Board members and hence to focus on aspects that they are not familiar with or do not understand. This session was very interactive as the audience shared their views and individual experiences on the presentation of the FCR.

Manalur discussed the manner in which he made the presentation to the Board along with typical questions that could be asked. The Executive Summary is the most important section and the Board is likely to raise questions on the same. He discussed some of the areas of interest to the Board members such as Actual v/s Expected analysis, top line growth, remedial steps to manage loss ratios, market share, future financial condition and marketing strategies.

Different areas that can be covered under each section of the FCR along with questions asked/expected were discussed.



The window

A young couple moves into a new neighborhood. The next morning, while they are eating breakfast the young woman sees her neighbor hand the wash outside.

"That laundry is not very clean," she said. "She doesn't know how to wash correctly. Perhaps she needs better laundry soap."

Her husband looked on but remained silent.

Every time her neighbor would hang her wash to dry, the young woman would make the same comments.

About one month later, the woman was surprised to see a nice clean wash on the line and said to her husband, "Look! She has learned how to wash correctly. I wonder who taught her."

The husband said, "I got up early this morning and cleaned our windows." And so it is with life. What we see when watching others, depends on the purity of the window through which we look.

Before we give any criticism, it might be a good idea to check our state of mind and ask ourselves if we are ready to see the good rather than to be looking for something in the person we are about to judge.

CAREER OPPORTUNITY**McKinsey&Company****Career Opportunity with McKinsey**

McKinsey & Company is developing actuarial expertise in US Healthcare domain to provide US health insurance companies with advanced actuarial solutions that help them optimize their revenue and profit given the changes brought on by US Health reform. This business also provides the clients with advanced analytics solutions.

We are assembling a dedicated team of actuarial experts, advanced analytic experts, data management experts and strategy analysts.

In our endeavor to expand the India Health Actuarial team, we are looking for select actuarial experts who see the opportunity that US health reform presents and are excited to help us build a new business. Role of actuarial experts includes building World- class tools for product design, pricing, forecasting, risk adjustment, building up actuarial analytics.

This team is located in Gurgaon, with hubs in New York and Chicago. We have number of openings for candidates at various stages of their career, with analytical and modeling expertise.

Interested candidates, please forward your CV with complete details of your actuarial exam credits and academics to yogita_arora@mckinsey.com and rashi_mayor@mckinsey.com by 20th January'13.

**FAREWELL**

I WISH YOU ALL AND EVERYONE IN
THE LARGER IAI FAMILY, ALL THE VERY BEST.
IT IS WITH MIXED EMOTIONS THAT I WRITE THIS NOTE.
I HAVE ACCEPTED A POSITION AT ANOTHER COMPANY AND
HAVE DECIDED TO MOVE ON.

MANMEET KUNNAR

**WISH YOU ALL
A VERY HAPPY NEW YEAR 2013**

INTRODUCTION: We as actuaries have come across the term “Monte Carlo simulation” many a times within our course as well as in normal course of our work. However, to refresh in simple words Monte Carlo Simulation (simulation is more generally well known) is a technique used to understand the impact of risk and uncertainty in financial projection(s). While assumptions are primarily set based on past data, there are inherent risks in the assumptions as these are always be evolving – we are working with human behavioral tendencies (interest rates, persistency, equity returns, credit spreads etc.) and not with universal laws of physics.

How it works:

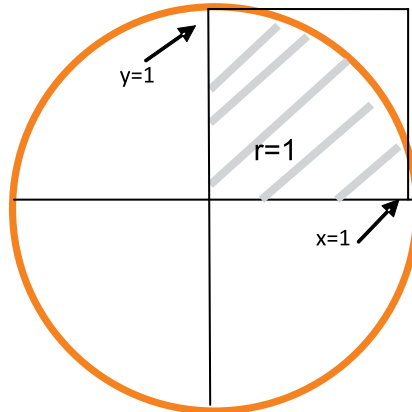
How a simulation works, is that a random value is selected for the assumption(s) based on the range of input values provided. The output is calculated based on our model using the simulated number so generated. This process is repeatedly carried out generating a new random value each time, recording the output at the previous step. At the end of the entire process we will end up with a large number of outcomes (depending on the number of runs). These results are used to calculate the likelihood or probability of each outcome and an average value of the total of the outcomes.

Lets take an example. Say we want to estimate the value of pi. This can be represented simply as the ratio of the area of a unit circle in the first quadrant to the area of square of unit area in the same quadrant on the Cartesian coordinate.

In the figure below we find this circle defined by the equation $x^2 + y^2 = 1$ with its centre at the origin. The unit square has also been shown below. It can be observed that the shaded area of the circle is $\frac{\pi r^2}{4}$. Hence the ratio of the area of the 2 regions (shaded circle to square) would equal (as shown in the shaded region below)

To approximate the value of pi, all we need to do is generate 2 pairs of random number; count “1” if $x^2 + y^2 < 1$, and discard the value otherwise.

Note that any pair of random numbers generated would fall in the square shown in the diagram below if they were generated from a uniform distribution.



The steps in simulating:

1. Generate 2 random numbers (you may use the function RAND in MS-Excel) for x and y
2. Calculate $x^2 + y^2$
3. If $x^2 + y^2 < 1$ this point falls within the circle and we assign 1 (i.e. a hit in the region we approximate). If $x^2 + y^2 \geq 1$, then this will be rejected as the point falls outside the unit circle region in the first quadrant.
4. Repeat this process for say a 1000 times and add all the “1’s” that we have got.
5. Dividing the sum by the number of times we have repeated the process (1000 in this case) and multiplying by 4 (as mentioned above) should give a figure close to the value enough to the value of .

You may use the code to try to check yourself:

Simulating pi value

```
Function picalc (N As Long) As Double
Dim i As Long
Dim x As Double
Dim y As Double
Dim Sum As Double
Sum = 0
For i = 1 To N
x = Rnd()
y = Rnd()
If (x^2 + y^2) <= 1 Then Sum = Sum + 1
Next i
picalc = 4 * (Sum) / i
End Function
```

Below is an illustration of the values for different number of runs:

	pi = 22/7	100 runs	1000 runs	1000 runs	10000 runs
Pi vals calculated	3.142857143	3.24000*	3.15600	3.13360	3.14224
% error		3.0909%	0.4182%	-0.2945%	-0.0196%

*Values will be different if you run code due to different random numbers.

About the Author



aseem.kumta@gmail.com

Aseem Kumta is a Student member of the Institute of Actuaries of India. He is currently working in RGA SIPL.

As you see above, the value continues to converge as we generate larger number of random variables.

Intuitively enough it can be concluded, that the convergence in (most) simulations follows the law of large numbers, which actuaries are quite conversant with. Just to refresh, the law of large numbers (strong form) states that a random variable $X_n \rightarrow X$ as $n \rightarrow \infty$ almost surely (convergence theorems are beyond the scope of discussion here)

Random numbers and random number generation:

Random numbers are useful for a variety of purposes, such as generating data encryption keys, simulating and modeling complex phenomena and for selecting random samples from larger data sets. They have also been used aesthetically, for example in literature and music, and are of course ever popular for games and gambling. When discussing single numbers, a random number is one that is drawn from a set of possible values, each of which is equally probable, i.e., a uniform distribution. When discussing a sequence of random numbers, each number must be statistically drawn in such a way that it is “independent” of any others.

In today’s world of course the requirement is for random numbers to be generated by a computer. To ask a computer to generate actual random numbers is requiring some sort of physical process such a coin toss or a dice roll is rather hard. Hence, we make use of algorithms which makes it much easier for generating random numbers. However these numbers are no more generating

purely random numbers but what are called as “pseudo-random” numbers (PRN).

Pseudo random number generators (PRNG) are efficient, meaning they can produce many numbers in a short time, and deterministic, meaning that a given sequence of numbers can be reproduced at a later date if the starting point in the sequence is known. Efficiency is a nice characteristic if an application needs many numbers, and determinism is handy if you need to replay the same sequence of numbers again at a later stage. PRNGs are also typically periodic, which means that the sequence will eventually repeat itself. While periodicity is hardly ever a desirable characteristic, modern PRNGs have a period that is so long that it can be ignored for most practical purposes. True random number can be done by considering say the time between 2 keys are typed on the keyboard or variations in the mouse movements. While these are random in the true sense, these take a long time to generate and it may not be possible to generate the same set of numbers again, if required.

A lot of work has been done around random number generating for computer applications and we look at some of the methods in which have been developed and used over period of time.

Methods of generating random numbers:

A) The Middle Square method:

One of the earliest methods for generating random numbers was suggested by John von Neumann, one of the scientists working on the Manhattan Project during World War II to describe neutron behavior. The method needs a 10 digit number as a seed, squared and the middle 10 digits as a sequence of random numbers. This 10 digit number then is the seed for the next step and so on. This method has been discarded because of its obvious statistical weakness.

B) Linear Congruential Generator (LCG)

The most common form of a random number generator is of the Linear Congruential Generator. An LCG random number algorithm is of the form $X_{n+1} = (aX_n + b) \text{ mod } m$. The ‘mod m’ is the remainder operator after division. Most LCG’s start with an initial value called a seed and generally tend to have a periodicity i.e. the first random number will be repeated once its entire length is exhausted. The LCG method is good for non-complex simulations as it is efficient

and fast, requiring small memory spaces. That is the primary reason why LCG’s have till early 90’s, been the most used random generating algorithms. The VBA script in MS-Excel uses an LCG for its random number generation.

However, there have been a few drawbacks due to which this has lost its shine in the last decade or so:

Let’s work with an example to bring out some of the drawbacks of LCG’s

Consider an LCG of the form mentioned above and choose $a = 7$, $b = 4$ and $m = 2^4 - 1 = 15$.

First case: With an initial seed = 4, the following are the sets of random numbers we get”

Seed (Initial Value) = 4			
Run number	Random number	Run number	Random number
0	4	12	4
1	2	13	2
2	3	14	3
3	10	15	10
4	14	16	14
5	12	17	12
6	13	18	13
7	5	19	5
8	9	20	9
9	7	21	7
10	8	22	8
11	0		

As can be seen from the yellow markings, $I_{12} = I_0$ which implies the periodicity as 12 runs. The periodicity cannot obviously exceed $m (=15)$

Second Case: Consider an initial value (seed) = 11. The results of the algorithm are as below:

As is seen above, the periodicity is now reduced to only 3 – *which is quite a terrible thing!!*

The above example illustrates a couple of points:

1. An LCG algorithm should not depend on seed value
2. Its periodicity should be at least equal to the number of random numbers that are required to be generated
3. The constants a , b and m need to be carefully chosen to ensure there exists **no** correlation between

Seed (Initial Value) = 11					
Run number	Random number	Run number	Random number	Run number	Random number
0	11	3	11	6	11
1	6	4	6	7	6
2	1	5	1	8	1

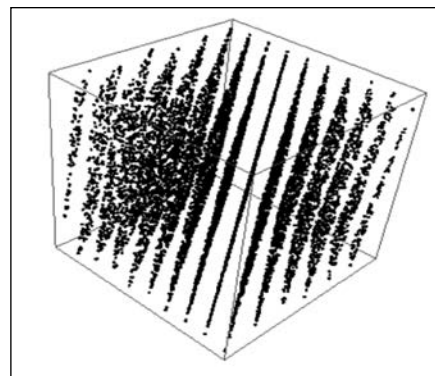
numbers

Some of the common points to be borne in mind while developing random numbers:

- b and m should have no common prime factors
- $a - 1$ is divisible with all the prime factors of m

Of course the above may not lead to an optimal generator, but they are basic rules.

Another criticism that came to LCGs was these were not suitable for simulating more than 2 independent variables. The resultant values when plotted appeared to be lying on a hyper-plane rather than a hyper-cube as shown in the figure below.



Output of 10,000 triplets (x, y, z) plotted in 3D

Source: http://www.lomont.org/Math/Papers/2008/Lomont_PRNG_2008.pdf

C) Mersenne Twister

This method was published by 2 researchers of Japanese origin – Makoto Matsumoto and Takuji Nishimura in 1997. This method has a periodicity of 10^{6001} versus LCGs which to date have a maximum period of around 10^{12} used in some applications. This was a phenomenal increase also combined with the fact that this method was faster than the LCGs. Another important improvement was the Mersenne Twister algorithm could generate equidistributed random numbers up to 623 dimensions. This along with its periodicity doubts the requirements of any additional random numbers for any scientific computation. Without surprise, this has been the most popular tool for most mathematical and statistical applications world over.

D) Quasi Random Numbers (an introduction to low discrepancy numbers):

Quasi random methods of generating random numbers are much recent concepts. While mathematical literature may not have a “set definition” for quasi random numbers, these may be identified as sequences of (pseudo) random numbers generated with some level of algorithmic (manual) intervention so that the (sequence of) numbers follow some logical pattern (possibly to avoid clustering or and yet are statistically independent).

The simplest form of quasi random numbers is the Van der Corput (VDC) sequences. This method tries to generate random numbers in base 2 so as to cover the unit real line completely. So our first random variable will be 0.5, followed by 0.25 then 0.75 and so on till we are able to fill in the real line with total number of points we want to generate. An important property of the VDC sequence is that the binary representation of the point of generation of a number will be reflection of the binary representation of the random number generated at that position on the opposite side of the decimal. So the fourth number generated in the sequence would be 1/8, with the binary representation of the 2 being 1,0,0 and 0,0,0,1 respectively.

There are many other random number generating algorithms such as Truncated Linear Congruential Generators, Linear Feedback Shift Registers, Inverse Congruential Generator and the Lagged Fibonacci Generator. Similarly there are other methods of generating quasi random numbers which have VDC as the base logic but differ in the base prime used in calculations or may include a combination of primes depending upon the dimensions. However, they are complex to understand as these interact with the machine’s system of allocating memory spaces and require a good grounding in number theory and some hardware knowledge. Hence, it is left to the reader to research into these methods if interested. One of the books that may be recommended is Monte Carlo Methods for Financial Engineering for by Paul Glasserman.

Generating random variates from a pre specified distribution:

In the above section we briefly discussed on random number generators. But what help are the random numbers? Random numbers are used to further draw random variates from a specific distribution which is assumed to be the underlying distribution of the random

variable whose behavior we are trying to study such as Normal, Chi squared or a log-normal distribution. There are 3 primary methods of generating random variates:

A) Inverse Transform:

As the name suggests this method applies the inverse of the distribution to be modeled, to the random numbers to generate random variates. This is a fairly simple method and can be easily applied and is computationally efficient as well. E.g. are Weibull and Exponential distributions. However, the primary drawback of this method is that it cannot be used for complex distributions where no closed form inverse is obtainable (such as the normal or gamma distribution) or in case of truncated distributions. This method has been dealt in-depth in the actuarial courseware CT-6 and interested readers can go through the topic of “Monte Carlo Simulation” in it.

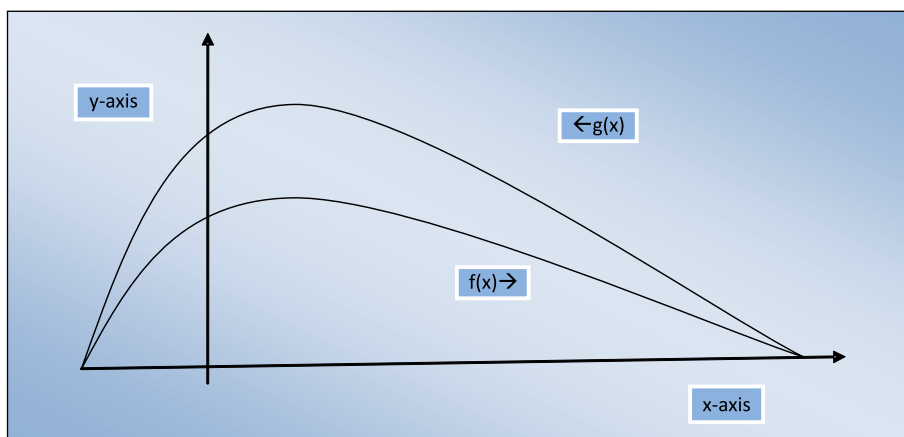
B) Acceptance – Rejection/ Envelope Rejection method:

The underlying logic of this method is that if we are able to generate random variates from a given distribution say $g(x)$, then we can use this information to generate random variates from another distribution $f(x)$. That is, to generate a number from $f(x)$ we generate a random number from the enveloping distribution $g(x)$ and accept it with a probability proportional to $f(Y)/g(Y)$.

In the figure above we see that we have a distribution $f(x)$ which is enveloped by $g(x)$. To generate random numbers from $f(x)$, we may generate random numbers in the area of $g(x)$ and accept them if they lie within the region of $f(x)/cg(x)$. Since random numbers are generated between 0 and 1, we accept those proportion of numbers which are less than or equal to

Specifically

- let ‘c’ be a constant such that $f(y)/g(y) \leq c$ for all y;
- Simulate Y having density g and simulate another independent random number U.
- Step 2: If $U \leq f(Y)/cg(Y)$ set $X = Y$; else reject it and move back to Step 1



$f(x)/g(x)$.

This method is useful where it is difficult to generate random variates from $f(x)$, while it is relatively easier to generate random variates from $g(x)$, say using an inverse transform method.

This method is however not without its own shortcomings:

- Requires 2 random numbers to be generated – computationally more exhaustive
- Determining the constant ‘c’ accordingly choosing a suitable $g(x)$.

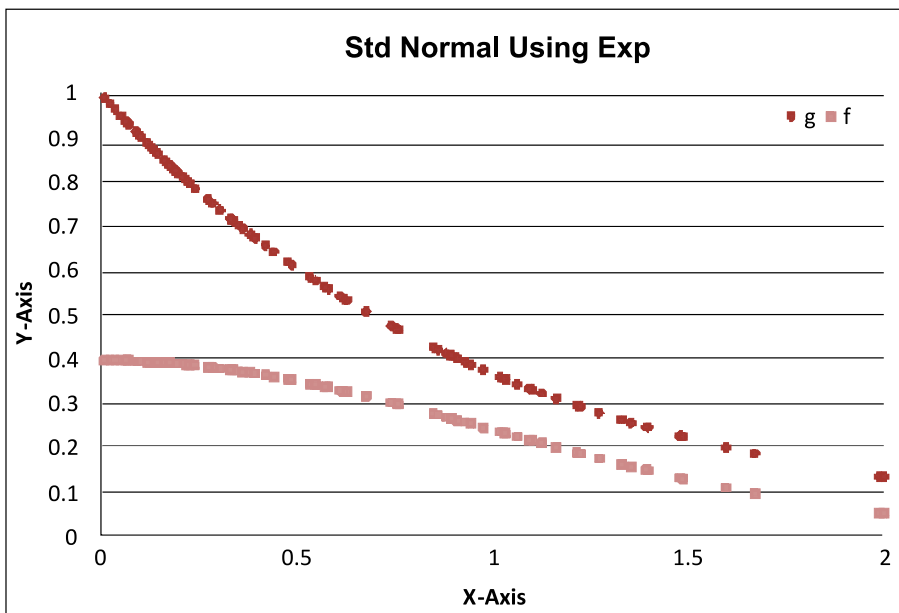
Informally, all this process does is samples $x(i)$ from some distribution and then it decides whether to accept it or reject. The main problem with this process is that M is generally large in high-dimensional spaces and since $p(\text{accept}) / 1/M$, many samples will get rejected.

Lets work out an example:

Say we want to generate random numbers from the standard normal distribution. We are aware that the normal distribution has no closed form inverse and hence using an inverse transform is not possible. However, we can calculate the inverse transform of an exponential variable with mean parameter 1. If we are to observe closely we notice that $\exp(-x)$ has a curve that closely follows the curve of the standard normal for normalized values greater than or equal to 0. Hence, we choose this as the bounding function for our standard normal distribution. We also know that the area of normal curve can be represented as twice its curve for $x \geq 0$ and we use this to derive random numbers from $-\infty$ to ∞

Our logic here would be:

- We use $f(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}$ as our



primary distribution from which we want the random variates from $0 < x < \infty$ for the one sided Gaussian curve

2. Define $g(x) = e^{-x}$
3. Generate 2 uniform random numbers U1 and U2 from Uniform (0,1). Find the point x such that $P(X < x) = U2$ under the exponential distribution with mean parameter 1, using the inverse transform method.
4. Calculate the ratio of $f(x)/g(x)$.
5. If $U1 < f(x)/g(x)$ we accept U1 else reject it.
6. Generate a third uniform number U3.
7. Note that the above exercise helps generate positive standard numbers only. To get random numbers across the normal distribution, you would generate another random number and assign it to a binary variable. For example, if U3 is < 0.5 , then U1 will be $-U1$ and U1 otherwise.
8. Continue this process till you are able to generate the required number of points.

Note that:

$$f(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{x^2}{2}\right) \text{ (for absolute value of } x\text{)}$$

$$g(x) = \exp(-x)$$

$$\frac{f(x)}{g(x)} = \frac{\frac{1}{\sqrt{2\pi}} \exp\left(-\frac{x^2}{2}\right)}{\exp(-x)} \leq \left(\sqrt{2e/\pi}\right)$$

And hence Accordingly our exercise requires a geometrically distributed number of iterations of step 5.

If we observe the figure above, we can see that the exponential curve is a dominant function to the standard normal curve. The figure below shows how the values generated fit within the function we define as $f(x)/g(x)$

This method has the following primary drawbacks:

If the constant 'c' is too large, (as will be the case in high dimensions) rejection sampling fails because the acceptance rate is too small.

If the contours of the ground truth distribution don't correspond to those of the proposal distribution (e.g., one is

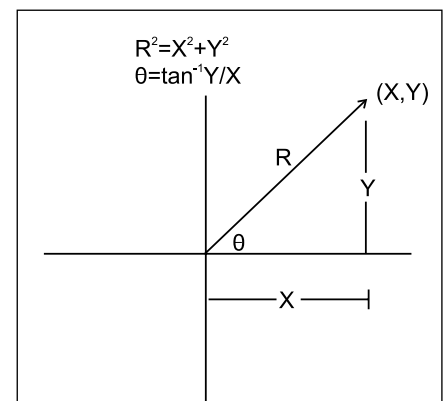
multi and the other is unimodal), then rejection sampling fails to properly capture those contours.

C) Box-muller:

Many simulations require the generation of Normal random numbers. The property of the Normal Distribution is such that it allows us to generate a normal variate Z with mean 0 and variance 1, as any variate can $X \sim N(\mu, \sigma)$ can be obtained as $X = \mu + \sigma * Z$. The Box-Muller method is an easy process to generate 2 standard normal numbers simultaneously. This requires the generation of two IID $U(0,1)$ random variables to product two IID from $N(0,1)$. The method is computationally more efficient and also helps us obtain values that are more accurate compared to the Acceptance-Rejection method. Mathematically however, it is more complex as it involves a Jacobian conversion from one region to another to generate random variates.

Let X and Y be independent standard normal random variables (r.v). Thus they have joint density function:

$$f(x,y) = \frac{1}{2\pi} e^{-\frac{(x^2+y^2)}{2}}$$



Consider now the polar coordinates of the point (X,Y) as shown in figure below:

$$R^2 = X^2 + Y^2$$

$$\theta = \tan^{-1}\left(\frac{Y}{X}\right)$$

Working backwards we identify that $X = R \cos \theta$ and $Y = R \sin \theta$ and hence we realize that the area we are looking at the area within a circle with radius R.

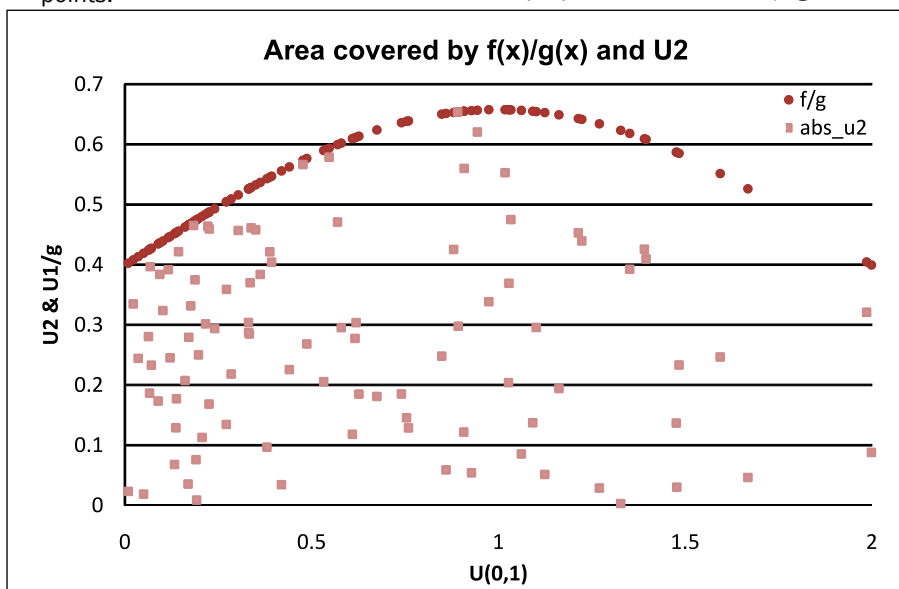
So if we were consider the Integral of the joint density function

$$\iint e^{-\frac{(x^2+y^2)}{2}} \frac{dx dy}{2\pi}$$

Using a Jacobian transform of the form

$$\iint_R f(x,y) dx dy = \iint_S f(g(r,\theta), h(r,\theta)) \left| \frac{\partial(x,y)}{\partial(r,\theta)} \right| dr d\theta$$

$$\text{Where } \frac{\partial(x,y)}{\partial(r,\theta)} = \begin{vmatrix} \frac{\partial x}{\partial r} & \frac{\partial x}{\partial \theta} \\ \frac{\partial y}{\partial r} & \frac{\partial y}{\partial \theta} \end{vmatrix} \rightarrow \text{Jacobian of } x \text{ and } y \text{ w.r.t } r \text{ and } \theta$$



the integral of our joint function in x, y reduces to

$$G(r, \theta) = \int_{r=0}^r \int_{\theta=0}^{2\pi} \frac{e^{-r^2/2}}{2\pi} r \, dr \, d\theta$$

It can be observed that the above function is radially symmetric with being bounded between 0 and 2. We also observe that r and θ are independent and hence can be integrated independently as

$$\int_{r=0}^r \frac{e^{-r^2/2}}{2\pi} r \, dr \int_{\theta=0}^{2\pi} d\theta$$

Integrating the above, we get

$$G(r, \theta) = \frac{\left(1 - e^{-\frac{r^2}{2}}\right)\theta}{2\pi} = (1 - U_1)U_2$$

Where $U_1 = \left(1 - e^{-\frac{r^2}{2}}\right)$ and $U_2 = \theta/2\pi$. Solving for r and in terms of U_1 and U_2 respectively, we get

$$r = \sqrt{-2 \ln(U_1)} = x \cos^{-1} \theta$$

$$\text{or } x = \sqrt{-2 \ln(U_1)} \cos \theta$$

$$\text{and } y = \sqrt{-2 \ln(U_1)} \sin \theta$$

Thus we may sample for r and uniformly over $(0, 1)$ to get 2 independent standard normal variables.

Part of this method was generating a point "at random" on the unit circle. This can be done by choosing uniformly in the interval $[0, 2]$ then taking the point on the circle to be $(\cos, \sin)$. This has the possible drawback that the computer must evaluate the sine and cosine functions.

Another way to do this is to choose a point uniformly in the 2×2 square with $-1 \leq x \leq 1$, $-1 \leq y \leq 1$ then rejecting it if it falls outside the unit circle. The first accepted point will be uniformly distributed in the unit disk $x^2 + y^2 \leq 1$, so its angle will be random and uniformly distributed. The final step is to get

a point on the unit circle $x^2 + y^2 = 1$ by dividing by the length.

Both methods are equal in arithmetic accuracy, but are distinguished in terms of computational speed as in the second case we accept only those points falling within the area of unit circle with a probability of $\pi/4$ (an extension of first example dealt with on the calculation of area of π). This is the underlying principle of the Marsaglia polar method, which avoids the use of trigonometric functions in generating the random numbers x and y .

References:

Monte Carlo Methods in Financial Engineering by Paul Glasserman [Edition 2004]

<http://www.random.org/randomness/>

http://www.lomont.org/Math/Papers/2008/Lomont_PRNG_2008.pdf

<http://beam.acclab.helsinki.fi/~knordlun/mc/mc4nc.pdf>

OFFSHORED ACTUARIAL WORK IN INDIA - COMPANY PROFILE

Be a frontrunner from day one

AXA Business Services, a 100% owned AXA Group Subsidiary based in Bangalore and Pune is the shared services center for the AXA Group. Our consistently high quality of services has helped us grow comprehensively over last 15 years and enjoy a strategic position within the AXA Group. The company's focus now is to become a 'trusted advisor' within the Group.

The Actuarial practice at AXA BS is our key growth engine for the coming years. The team works in technical pricing, experience analysis, reserving, financial reporting, financial projections and other new actuarial initiatives, and serves several AXA entities across the world. Presently we are working with entities from North America, Europe, Asia Pacific, Mediterranean and Middle-East region in P&C, Life and Health insurance actuarial work.

AXA Group* | 57 countries | 1,63,000 employees | 101 million clients

***Ranked world's No.1 insurance brand for the 3rd consecutive year by Interbrand.**

AXA Business Services, 21/6, Bund Garden Road,
Pune 411001



THE GENEVA ASSOCIATION'S CLIMATE RISK AND INSURANCE PROJECT

TACKLING CLIMATE RISK: AN INSURANCE CONTRIBUTION TO THE COP DISCUSSIONS COP 17 BACKGROUND DOCUMENT BY THE GENEVA ASSOCIATION

(The article is reprinted with the kind permission from The Geneva Association)

December 2011

Introduction

As the negotiators gather for the Conference of the Parties 17 (COP17) in Durban, South Africa to reinforce the fragile momentum gathered in Cancun in 2010, international insurance economics think tank, The Geneva Association has issued this paper to emphasise the key role that insurance plays when it comes to dealing with climate and environmental risks and how this industry can contribute in a positive way to cope with the challenges confronting humankind. The document builds on the central messages of The Geneva Association's 2009 Kyoto Statement¹ and the 2010 Developing Countries Statement,² issued in collaboration with ClimateWise, the Munich Climate Insurance Initiative (MCII) and UNEP-FI.

Negotiators gathered in Durban have commented that the main near-term challenge is the achievement of progress on an international and binding agreement to curb greenhouse gas (GHG) emissions and thereby the mitigation of their long-term effects on climate. However, a broad spectrum of scientific evidence suggests that even if an international agreement freezes GHG emissions at year 2000 levels, climate change will be inevitable due to past emissions.³ It is therefore very important to focus on how societies can adapt to and manage the inevitable consequences for our economy, environment and society. Whilst efforts at mitigation require broad international political consensus amongst governments, decision-making on adaptation measures will take place primarily on a national, regional or even local level where insurers' specific risk expertise resides. It is also at this level that private market solutions work best. The insurance industry

therefore represents a potential and valuable private sector counterparty for governments both as an advisor on risk management but also as an industry that, when backed by an appropriate legal and regulatory framework, can send risk-based pricing signals, can encourage climate resilient behaviour and support sustainable development.

Engaging Insurance

There are many possibilities for engaging the insurance industry to support governments and authorities in addressing the challenge of climate change. But this engagement needs to take either the form of joint public-private initiatives or requires some preconditions that governments should establish to maximise the insurance industry's contribution to economic adaptation to climate risks.

There is a strong case for regulatory and public involvement in climate risk protection, be it through the "carrot" (e.g. subsidies and trading schemes) or the "stick" (e.g. taxes and levies). In order to fully capture the insurance industry's potential, a conducive political, legislative and regulatory framework needs to be established.

An international agreement on reducing greenhouse gas emissions

A well thought-out and efficient international plan to reduce GHG emissions and a robust national plan for adaptation are necessary preconditions for the insurance industry to make a meaningful contribution to the management of climate risks. If the economy, businesses and households are not prepared for GHG reductions and adjustments to climate change, insurance is likely to become more expensive and, in some cases and areas, maybe no longer feasible

and available as the foundations of insurability, especially the quantifiability and fortuitous character of risk, would be under threat of erosion.

Promoting prevention and adaptation

As highlighted in the 2010 Developing Countries Statement, national governments should develop strong regulatory framework for adaptation across various sectors of the economy. This applies to governments in the developed world also. In some areas, adaptation may simply need to become a condition for insurance to remain available in the future.

Insurers have the tools to make a significant contribution to climate risk adaptation, for example through property insurance coverage provisions which stipulate the replacement of existing materials with weather-resilient materials following an insured event. Policymakers could unlock the insurance industry's full potential by, for instance, making resilience mandatory in building code standards. The economic case for mandating certain building code changes is straightforward: after a disastrous event, massive damage to public infrastructure and private businesses is set to cause widespread economic disruption, placing a significant burden on society at large. Due to this "public good" characteristic of post-event damage, climate risk-adaptive prevention measures should be mandated by policymakers: the benefits of a general improvement in resilience accrue to both insured individuals, the community as a whole, as well as nation states as insurers of last resort. By encouraging prevention through regulatory measures, policymakers would act in line with the 2008 European Union waste directive, which makes waste prevention its number one priority.⁴

1 The Geneva Association (2009) *The insurance industry and climate change -Contribution to the Global Debate*, The Geneva Reports No. 2, p. 7, The Geneva Association: Geneva.

2 See page 7 of this paper.

3 See Intergovernmental Panel on Climate Change IPCC (2007) "*Climate Change 2007: The Physical Science Basis*", in *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC: Geneva.

4 See The Geneva Association (2009), op. cit., p. 2. The author also draws a parallel to the waste directive's second priority, which is re-use, arguing that repairs using second hand parts (e.g. in automotive liability) could prevent a significant amount of carbon emissions and reduce insurers' claims costs by an estimated 10 per cent. In this case, emissions cuts would go hand-in-hand with cost savings which, in competitive insurance markets, would ultimately translate into lower premiums, i.e. direct benefits to customers.

Promoting mitigation

As mentioned above, claims management practices are a powerful potential tool for curbing GHG emissions. Based on property insurance extensions, energy-efficient appliances and systems can be used for repair, restoration and rebuilding purposes. A public mandate, such as building code amendments which make climate-conscious policy extensions mandatory, would serve as an important catalyst. To date, such extensions remain voluntary in most jurisdictions, taken up by a small minority of policyholders.⁵

Promoting corporate disclosure

Not only investors, but society at large would benefit greatly if companies had to disclose (as annex to their financial statements) specifically what they do to protect their assets and manage potential liabilities relating to climate risks. This information should be of value to the financial markets, entice better risk management and stimulate demand for risk solutions and insurance. Such an extension of disclosure requirements would boost the corporate sector's willingness to address existing and emerging climate-related risk exposures and ultimately contribute to the successful conversion to a lower carbon and more climate-resilient economy. Initiatives such as the International Integrated Reporting Council⁶ are already making significant steps in this direction and should be supported.

Respecting the fundamentals of the insurance business model

Insurers set premium rates which are commensurate with the underlying individual or corporate risk profile. By sending out risk-based pricing signals "insurance has the ability to encourage loss reduction like no other economic tool".⁷ In order to maximise the industry's contribution to climate change mitigation and adaptation, policymakers should resist the

temptation to distort market forces. Private incentives to mitigate and adapt to risk can and are being undermined by ill-designed public vehicles, e.g. public disaster relief schemes which remove individuals' incentives to manage risk or government-sponsored or

-owned insurance initiatives that set premiums below the level at which a private sector insurer could run

a viable business, as in some natural catastrophe prone parts of the U.S.

Further, legislators and regulators must respect the three basic principles of insurability: for an insurer to take an underwriting decision, the risk must be quantifiable, i.e. a maximum possible loss (MPL) must be calculable. Also, the risk must be fortuitous, i.e. driven by randomness. And finally, the insured must have a demonstrable interest in loss prevention.⁸ Any interference with insurers' fundamental underwriting mechanism (e.g. deductibles, coinsurance, contractual liability limits and exclusion causes) jeopardises the industry's major role in addressing the climate change challenge.

This does not mean condemning areas below any potential flood or natural catastrophe line; buildings and constructions can be adapted accordingly. For example, elevated railways and motorways should be preferred to underground ones in planning.

Towards meaningful public-private climate initiatives⁹

The scientific evidence of global climate change and its potentially disastrous consequences has definitely grown stronger. It remains to be seen if there is the political will and leadership to address the causes and consequences of climate change; it will certainly be encouraged by an increasingly sensitised public.

So what political initiatives, incentives and degrees of freedom are needed to fully engage an industry

"whose core expertise is managing the balance between risk exposure and financial sustainability"?¹⁰

Where governments and insurers could join forces¹¹—Floods stormwaters and windstorms

In a wide variety of areas, market-based insurance solutions have the potential to significantly enhance the efficiency and effectiveness of public policy measures designed to address the climate challenge. Basically all elements of the insurance value chain, ranging from prevention, risk absorption and claims handling to accompanying services, are potential contributors to this objective.

Loss prevention

Many sectors will be affected by climate change. Some examples are coastal management, infrastructure, buildings, water and energy supply, land-planning, health and rescue preparedness. In buildings and infrastructure, for instance, a plethora of effects has to be taken into account: heavy downpours can flood basements and affect drainage, sewers, roads, tunnels, etc. Warmer summers and wet winters may pose a problem to building interiors. More severe storms may affect houses and bridges.

Based on its in-depth risk expertise, the insurance industry could play an even stronger role in suggesting and implementing amendments to relevant regulations such as building codes. An encouraging example in this respect is the Association of British Insurers' (ABI) active engagement in supporting the integration of climate risks into future development decisions.¹² New constructions should take into account the evolutionary nature of climate change over time. Existing construction should be adapted and the challenge of climate change should be reflected in maintenance investments plans, e.g. for local drainage and sewer systems. However, it is impossible for insurers

⁵ See Zurich Financial Services Group (2009) The Climate Risk Challenge: The role of insurance in pricing climate related risks, p. 6f, Zurich Financial Services: Zurich.

⁶ See www.theiirc.com

⁷ Zurich Financial Services Group (2009), op. cit., p. 2.

⁸ See Berliner (1982) Limits of Insurability of Risks, Englewood Cliffs, NJ, Prentice Hall, for an in-depth discussion of the notion of insurability and its limits.

⁹ See The Geneva Association (2009) op. cit., pp. 73ff.

¹⁰ Zurich Financial Services Group (2009) op. cit., p. 3.

¹¹ See The Geneva Association (2009) op. cit., pp. 78ff.

¹² See ABI (2008) Revised Statement of Principles on the Provision of Flood Insurance, ABI: London

to do this on their own—the resultant costs would need to be reflected in premiums but the client remains price sensitive and will still usually opt for one of the cheapest options. In a market environment, this therefore renders action by individual insurers impossible and highlights the need for a legal framework to mandate such changes and create a level playing field.

Another important task for the insurance industry to perform in collaboration with governments is to push for behavioural changes, for example the adoption of a more forward-looking and climate-sensitive approach to land planning rather than simply erecting higher dikes.

Insurance and risk management

Governments should engage the insurance industry in a closer dialogue on specific climate risks based on actuarially sound risk-based premium rates that can influence individual and corporate behaviour. For example, anticipated premium deductions (or, alternatively, the prospect of higher premiums) for a group of homeowners could incentivise political decision-makers in municipalities to improve local drainage systems.

But also on a national scale, risk partnerships between insurers and governments should be carefully considered, particularly as the higher frequency and severity of extreme weather events are expected to make it increasingly difficult for private sector insurers to fully absorb catastrophe losses linked to climate change. Some climate risks might be non-insurable and call for the insurance industry and governments to join forces in exploring options which offer affordable cover to businesses and individuals, whilst maintaining a well-functioning private insurance market and its crucial risk-based signalling role. This is of particular relevance to emerging and developing countries where the presence and risk absorption capacity of private carriers

is still very limited and public finances offer little latitude in case of disaster.¹³

Claims management

A significant share of the insurance industry's regular claims payments relates to damaged cars, production facilities and private homes. These pay-outs are directly linked to activities which add to climate change by energy consumption and carbon emissions. Given its substantial claims payments,¹⁴ the insurance industry has a powerful lever to take climate-friendly (mitigative) and climate-resilient (adaptive) action by guiding and engaging customers and suppliers on climate-conscious claims-handling.¹⁵

Governments should more actively support climate-conscious claims handling practices through regulatory measures. A series of initiatives are already underway in the EU, for example, where new buildings must mandatorily achieve certain efficiency standards.

Services promoting public awareness and preparedness

Another promising component of a comprehensive climate partnership between insurers and authorities is preparedness in the event of major weather-related catastrophes. Promoting preparedness is a core service offered by insurers as well as an important role performed by the national, regional and local authorities' emergency services.

Governments, supported by the insurance industry, should initiate and facilitate an overview of existing national preparedness systems in relation to climate change risk and provide the public with easy access to this information. One example of private-public cooperation in this area is an agreement between the U.K. government and the ABI on an extensive action plan to improve the management of flood risks to people and property, with the ultimate objective of ensuring

the long-term availability of flood insurance. This specific joint effort was prompted by the most severe weather-related event in decades in the U.K., the floods of summer 2007. The insurance industry covered around £3 billion of losses and received around 180,000 claims.

Conclusion

The Geneva Association supports the international and intergovernmental negotiations on climate change mitigation but it also points out that action should not only be concentrated on mitigation—adaptation and efficient climate risk management are at least equally important. At a national and local level, the insurance industry is uniquely positioned to provide specialised services for countries and businesses facing climate risks worldwide. However, there remain a series of unrealised opportunities for governments to facilitate the adaptation measures necessary either through drawing on insurance risk management expertise or through the creation of certain regulatory conditions in which the business of insurance can operate. The Geneva Association encourages politicians to recognise the potential advantages of a market-based solution including the involvement of insurance. It also proposes to bring such expertise explicitly into a national climate risk context and the public policy dialogue about future long-term development and protection of national and local infrastructures.

Global insurance industry statement on **Adapting to climate change in developing countries**

Four leading insurance climate change initiatives, whose combined membership includes more than a hundred of the world's leading insurers across Africa, Asia, Europe, North and South America, and Oceania, have combined their members' expertise to present this Statement. ClimateWise,

¹³ A recent example is a joint transaction of the World Bank, the Mexican government and Swiss Re. MultiCat Mexico 2009 is an innovative deal based on insurance-linked securities, i.e. the transfer of catastrophe risk to the capital markets. The transaction offers the Mexican government additional financing options following a major natural catastrophe and helps mitigate the negative impact on public finances. If the catastrophe bonds are triggered capital market investors' funds will be available to cover the costs of emergency and relief efforts as well as subsequent reconstruction of infrastructure. Most governments shoulder the burden of financing after a disaster event, for example by issuing debt, reallocating budget positions or raising taxes. With this transaction, Mexico is diversifying its financing mix with risk transfer instruments. For more information: www.swissre.com

¹⁴ There are no figures available on global claims payments, but assuming an average claims ratio of 65 per cent would take the global amount of non-life insurance claims payments to about US\$ 1.15 trillion.

¹⁵ Climate-conscious claims handling could be insurance products for buildings and automobiles encouraging the substitution of energy-efficient materials and products for traditional ones.

The Geneva Association, the Munich Climate Insurance Initiative (MCII) and leading insurance companies within the United Nations Environment Programme Finance Initiative (UNEP FI) are collaborating to highlight the huge potential benefits of using government action to enable the knowledge and expertise from the insurance industry to play its fullest role in risk management in developing countries, particularly those most vulnerable to the impacts of climate change. This government action includes implementing national risk management processes and using limited government investment to measure and reduce those risks.

Climate change science underscores the imperative for societies to urgently mitigate greenhouse gas emissions. The insurance industry is facilitating investments to harness new technologies and help

move towards a low carbon economy. However, it is clear that a massive scheme of adaptation measures will also be needed, especially in the most vulnerable countries – countries that have contributed least to climate change but will suffer worst from its effects. Insurance solutions have the potential to provide tangible results for the most vulnerable countries and soften the blow of climate-related disasters.

Governments must recognise that they and all stakeholders, including the insurance industry, have a common interest in enhancing welfare and sustainable growth in the developing world. They should therefore take into account the need for, and opportunity of, stronger global collaboration to respond to this challenge and take steps to reduce climate-related risk in the developing world, particularly for the most vulnerable communities.

Insurance is one of a broad scope of risk management approaches that can facilitate adaptation to climate change and shore up sustainable development.

In particular, the insurance industry can support adaptation efforts through:

- **Expertise in risk management**, particularly in areas such as risk and vulnerability assessment, putting a price tag on risk, and the design of risk reduction and risk transfer activities
- **Prioritising adaptation measures** by enhancing adaptive capacity and advising on the cost- effectiveness of resilience measures
- **Incentivising loss reduction** by informing economic actors about the risks they face, advising them on risk mitigation options and providing them with existing insurance options for loss reduction
- **Developing new insurance products** which cover risks affected by climate and weather events, such as human health, crop yields and animal diseases
- **Raising awareness among the many stakeholders of the insurance industry** – including governments and regulators, clients and business partners, business and industry, civil society and academia – about the impacts of climate change, the adaptation needs of those most at risk, and the role that the insurance industry can play in advancing adaptation, as described in this Statement.

International climate negotiators and governments are looking towards insurance as one of a set of solutions to reduce the impact of climate change on the developing world. However, governments must act to create an enabling environment in which insurance can operate effectively.

To date, governments still have much work to do to implement commitments already made at the 2005

World Conference on Disaster Reduction to effectively address the nature and scope of risks, especially those facing developing countries. Notwithstanding missing the potential opportunity to improve the lives of millions, continued government failure to implement loss prevention and risk transfer measures

could have significant consequences such as the potential loss of life, a perpetuation of the poverty trap, mass migration and a potential increase in widespread disease.

Effective government support and implementation of risk management measures is the critical path in addressing these issues and the creation of an environment in which insurance can work effectively. We therefore call on governments to:

- Support proposals to **catalyse adaptation efforts through risk management, loss prevention and risk transfer**, particularly in those countries most vulnerable to the impacts of climate change
- Consider language such as the following for **Paragraph 8** of the Adaptation negotiating text under the United Nations Framework Convention on Climate Change:
 - a. *“Enhancing climate change related disaster risk reduction strategies, considering the Hyogo Framework for Action where appropriate; early warning systems; risk assessment, and management and sharing and transfer mechanisms such as insurance....at local, national, subregional and regional levels, as appropriate, to address loss and damage associated with climate change impacts in those developing countries that are particularly vulnerable to the adverse effects of climate change...”*¹
 - b. *“Decides to elaborate modalities and procedures for the international mechanism to address loss and damage, for adoption by the Conference of the Parties at its seventeenth session;”*²
- **In practical terms**, we call on governments to:
 - a. Engage in risk reduction activities by taking action on the already agreed Hyogo Framework for Action 2005-2015 for disaster

¹ Paragraph 4e of the current draft UNFCCC negotiation text. See UNFCCC (2010) Second iteration of the text to facilitate negotiations prepared by the Chair of the AWG-LCA FCCC/ AWGLCA/2010/8. <http://unfccc.int/resource/docs/2010/awglca11/eng/08.pdf>

² Paragraph 8, Option 1 of the current draft UNFCCC negotiation text. See UNFCCC (2010) Second iteration of the text to facilitate negotiations prepared by the Chair of the AWG-LCA FCCC/ AWGLCA/2010/8. <http://unfccc.int/resource/docs/2010/awglca11/eng/08.pdf>

risk reduction. These include appointing a national risk officer with the mandate to develop a holistic risk management culture, facilitating community, regional and state level loss reduction activities, climate-proofing existing infrastructure investments and putting in place appropriate zoning and building codes and enforcing these – all of which will contribute tangibly to managing risks and loss potential

- b. Provide a suitable enabling environment for risk management, including insurance, through good corporate governance frameworks and those systems necessary for financial market services to function for all levels of society and across appropriate time horizons
- c. Invest in systematic and reliable risk exposure data, both historic and forward-looking, which is made freely available to the public, with multiple adaptation applications
- d. Act on lessons learned about the role of Government in convening and seeding regional public-private partnerships such as the Caribbean Catastrophe Risk Insurance Facility and microinsurance systems which address risk reduction for weather-related risks

Market mechanisms are already operating to create and grow insurance practices in developing countries. However, without a suitable enabling economic and regulatory framework, insurance risk management mechanisms are falling considerably short of their potential to deliver adaptation benefits. By working together, governments have the means and capability to leverage this potential, increase protection of individuals and the economy, reduce weather impacts and foster growth through the implementation of insurance risk management systems.

Examples of where insurance has already provided effective risk management solutions in developing countries, particularly those most vulnerable to the impacts of climate change, include:

1. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) is a public-private partnership designed to limit the financial impact of hurricanes and earthquakes for 16 Caribbean governments. Established in 2007, the Facility provides short-term liquidity (within 2 to 3 weeks) to participating governments when the policy is triggered by a catastrophe, such as the 2010 Haitian earthquake. The Facility uses a parametric mechanism to determine the potential future risk and trigger a payout whenever a pre-defined modelled loss level is exceeded. By pooling the risks of its members, CCRIF serves as a risk aggregator and can provide insurance coverage at a comparatively low premium for otherwise mostly uninsured catastrophe risks borne by sovereigns. CCRIF member states decide on the level of coverage for each peril insured. This Facility illustrates that dialogue between governments and insurers can create tailored, institutionally light and flexible solutions for particular regions.

For more information, visit www.ccrif.org.

2. Horn of Africa Risk Transfer for Adaptation (HARITA) is a parametric insurance scheme that brings together climate change risk mitigation and crop insurance for farmers and has been rolled out in five communities in Northern Ethiopia. Underwritten by a local company, and reinsured by a global reinsurer, it uses a rainfall index to trigger compensation for farmers growing the Ethiopian three staple grain crops in case of drought. It is unique, however, in allowing farmers to pay for their premiums through labour on projects that will mitigate the effect of climate change in their area, such as tree planting. To turn the labour into monetary value, the scheme takes advantage of a national government “cash for work” programme, which enables it to reach the most vulnerable farmers. HARITA therefore integrates insurance with both risk reduction and credit provision. By allowing very vulnerable farmers to pay their premiums through risk-reducing labour, farmers benefit even when there is no payout because these risk reduction activities will help minimise vulnerability to drought and improve yields. Lack of

cash is the main reason that people do not participate in insurance schemes. Using this government national cash for work programme is a way to address this issue and to scale up the size of the programme. Cash-paying farmers also participate in the programme, advancing market development. The programme will roll out to the Tigray region in 2011. Nationally about eight million farmers are beneficiaries of the cash-for-work safety net..

For more information, visit www.oxfamamerica.org/articles/weather-insurance-offers-ethiopian-farmers-hope-despite-drought.

3. In Mongolia, the World Bank and other organisations have been actively involved in developing programmes for sustainable livelihoods that emphasise pastoral risk management including early warning systems and risk preparedness actions, access to supplementary feed and grazing reserves, coordination of pastureland use, and conflict management. These measures were combined with efforts to extend the outreach of microfinance services to herders, and community-prioritised investments in basic infrastructure. An index-based microinsurance coverage helps reduce the administrative costs of insurance, making it more affordable. Microinsurance and complementary interventions in a wider risk management framework in Mongolia are therefore helping reduce herders' vulnerability to climate and non-climate hazards. The main objectives of the insurance scheme, provided by the Government of Mongolia in partnership with local private insurance companies and banking organisations, is to provide insurance coverage against catastrophic livestock mortality events to complement household-level risk management strategies for smaller livestock mortality losses. The programme involves the domestic insurance market while protecting it against extreme losses, and also limits the government's fiscal exposure to loss and damage. Participating herders pay fully loaded risk premiums and if the livestock mortality during a harsh winter is between 6%-30%, the involved insurance companies cover the losses with some combination of herder

premiums, their own capital, global reinsurance and contingent credit from the World Bank if necessary. The government pays for losses in excess of 30% using only the contingent credit. Herders bear the cost of smaller losses which are not likely to affect their business in the long term. This self-insurance for livestock mortality, with rates of up to 6%, leads to risk-reducing behaviour by the herders because of the strong incentive to engage in activities that may decrease the mortality risk of their livestock. This index insurance does not cover every single livestock loss due to winter conditions – it is about addressing consequential losses and extra costs that come with a harsh winter, killing large numbers of adult animals.

For more information, visit www.globalagrisk.com.

4. Weather insurance in Malawi.

The value of data collection in the establishment of insurance mechanisms is well demonstrated by a project in Malawi. A combination of sufficient weather stations and start-up assistance helped by the World Bank and World Food Programme helped start a pilot weather insurance project. The insurance pilot bundles loans and insurance for nearly 1,000 smallholder farmers enabling them to buy affordable index-based drought insurance. The insurance is linked to loans and both improves the creditworthiness of participating farmers and enables them to increase their farm productivity. A challenge with such initiatives tends to be scalability: current schemes tend to cover only a few hundred or thousand farmers but with government assistance this could be scaled up. An initiative in India launched in 2007 offered insurance with crop loans and was taken up by 700,000 farmers.

5. Index-based insurance to promote climate resilience in Bolivia.

An insurance scheme has been developed in four provinces in the north and central Altiplano regions of Bolivia that combines incentives for proactive risk reduction and an insurance index mechanism. In this scheme the index is based on the production levels of reference plots of farmland in areas

which are geographically similar in terms of temperature, precipitation, humidity, and type of soil. A group of farmers identify a peer who is considered to use the best available methods. That farmer serves as a technical assistance agent to help other farmers reduce their risks and improve their yields. The system encourages other farmers to match the reference farmers in implementing risk reduction efforts to reduce the effects of drought, excess rains, hailstorms and frost. The reference farmer's land becomes the reference plot, the yields from which serve as an indicator of whether production levels have been adversely affected by environmental factors (triggering an insurance payout) or by other factors within the farmer's control. The objective becomes to perform or outperform the reference plot by improving agricultural practices and reducing risk of damage from weather hazards.

For more information, visit www.fundacion-profin.org.

The insurance climate change initiatives represented in this

Statement: ClimateWise is the global collaboration of leading insurers focused on reducing the risks of climate

change. Launched in 2007 by HRH The Prince of Wales, and facilitated by the University of Cambridge Programme for Sustainability Leadership, ClimateWise brings together over 40 international members from Europe, North America, Asia and Southern Africa all of whom abide by the ClimateWise Principles.

www.climatewise.org.uk

Contact: andrew.voysey@climatewise.org.uk | +44 20 7216 7530

The Geneva Association is the leading international insurance economics “think tank” on insurance and risk management issues. Its members are 90 CEOs of the world's leading re/insurers. The objectives of the Association's climate-linked research have been to identify and analyse issues of specific relevance to the insurance industry, such as the likely range of future claims costs, and external challenges to be addressed at the political, educational and social levels.

www.genevaassociation.org

Contact: anthony_kennaway@genevaassociation.org | +41 22 707 6606

The Munich Climate Insurance Initiative (MCII)

was initiated by Munich Re in April 2005 in response to the growing realisation that insurance solutions can play a role in adaptation to climate change, as suggested in the Framework Convention, the Kyoto Protocol and the Bali Action Plan. This initiative is formed by insurers, climate change and adaptation experts, NGOs, and policy researchers intent on finding solutions to the risks posed by climate change – both on the negotiating floor and on-the-ground in developing countries.

www.climate-insurance.org

Contact: warner@ehs.unu.edu | +49 228 815 0226

The United Nations Environment Programme Finance Initiative (UNEP FI)

is a strategic public-private partnership between UNEP and the global financial sector. UNEP works with nearly

200 insurers and reinsurers, banks and investment firms, and a range of partner organisations, to understand the impacts of environmental, social and governance issues on financial performance and sustainable development. Through a global programme encompassing research, training, events and regional activities, UNEP FI identifies, promotes and realises the adoption of best environmental and sustainability practice at all levels of institutional operations.

www.unepfi.org

Contact: butch.bacani@unep.org | +41 22 917 8777 remco.fischer@unep.org | +41 22 917 8685

About The Geneva Association's Climate Risk and Insurance Project

In May 2008, following a mandate from its members at the 2008 General Assembly, The Geneva Association began its climate change and insurance (CC+I) research project (renamed since climate risk and insurance project - CR+I) in response to one of the most multi-faceted challenges to the

insurance industry since its inception—climate risk. The project builds on the considerable expertise that The Geneva Association has acquired in this area over more than three decades through its activities as part of its ongoing Risk Management Research Programme.

As a result of the mandate, The Geneva Association established a working group of experts from a dozen members of The Geneva Association, complemented by external experts from internationally renowned institutions. The CR+I Working Group is co-chaired by Kunio Ishihara, Chairman, Tokio Marine

& Nichido Fire Insurance Company and Michael Butt, Chairman, Axis Capital Holdings and has embarked

on a multi-year programme to study the links between climate risk and insurance.

The objectives of the climate-linked research have been to identify and analyse:

- issues that are of specific relevance to the insurance industry, such as the likely range of future claims costs, new business opportunities and scenario testing;
- external challenges to be addressed at the political, educational and social levels, such as the role of government, specific provisions concerning issues such as building codes, zoning restrictions, etc., to prevent repeated losses in hazardous regions.

The reports and activity produced by the research are aimed at three different audiences:

- the insurance industry: to inform industry stakeholders widely about climate risk and its implications and support its clients adaptation and mitigation measures;
- governments, law-makers and regulators: to inform all legislative and regulatory stakeholders on critical issues, show limitations and the need for regulatory and legislative support in the management of increased impacts on the industry;
- the wider public: to raise awareness about the role of insurance and the

limits of insurability and to improve perceptions of insurance.

The harnessing of market forces is likely to be one of the most effective ways of changing individual and corporate responses to climate risk. Initiatives from the insurance sector produce very significant progress in mitigation and adaptation measures, and are likely to continue to do so. The Geneva Association has therefore positioned its research:

- to provide an overall industry understanding of climate risk in order to allow companies to better manage their own risk exposure and how to position climate risk in a holistic approach;
- to provide and occupy common ground above and beyond the individual corporate interests so that a significant body of the insurance industry can act collectively, speak with one voice and engage external stakeholders as a credible force in this most serious challenge.

Thus, at the 2009 General Assembly in Kyoto Japan (in the same room used for the signing of the *Kyoto Protocol* in December 1997), 56 of the world's leading insurance companies signed up to The Geneva Association's Kyoto Statement—a series of common commitments and undertakings on measures to adapt to and mitigate climate change. In particular, the Statement calls on governments to harness the industry's particular skills and unique position in society to help society to adapt to the impacts of climate risk.

The leading presence of The Geneva Association's CR+I working group at an official side event at the United Nations Conference on Climate Change, Committee of the Parties (COP15) in December

2009 took the government and societal angle a stage further. It demonstrated that the insurance industry supports and can complement government action, proactively interacts with concerned parties and supports the notion that there is a need for mitigation and adaptation action now.

In 2010, as featured in this report, The Geneva Association, collaborated with ClimateWise, MCII and UNEP-FI to show the potentially very significant benefits of using government action to enable and harness the risk management knowledge and expertise embedded in the insurance industry for the developing world. At a conference in the heart of the insurance sector of the City of London, the Lloyd's library, the collaborators presented the statement with industry and NGO experts to broad acclaim.

In 2011, The Geneva Association is taking part in the COP17 proceedings in Durban, reinforcing the need for governments to recognise and harness the risk management expertise embedded in the insurance industry to enhance and accelerate adaptation measures.

The CR+I project is a logical step in the development of the Risk Management Research Programme of The Geneva Association, which started with responses to external factors, such as risk engineering and the analyses of natural hazards, in the 1980s. The 1990s saw the inclusion of the challenge of sustainability, followed at the beginning of the 2000s by organisational and functional issues, such as the role of the Chief Risk Officer and solvency reforms in Europe and other regions.

The CR+I Project is directed by the Head of the Risk Management Research Programme, Walter R. Stahel. Visible results of the project are its publications (including the seminal report *The insurance industry and climate change*) and the CR+I Seminars which are open to a wider audience of experts from insurance, academia, research institutions and other relevant private sectors as well as policymakers.

International Association for the Study of Insurance Economics—"The Geneva Association" Route de Malagnou 53, CH-1208 Geneva | Tel: +41 22 707 66 00 | Fax: +41 22 736 75 36 www.genevaassociation.org



AN UPDATE FROM SOUTH AFRICA

by Krishen Sukdev



- Preservation, Portability and Governance for Retirement Funds;
- Incentivising non-retirement savings; and
- Improving tax incentives for retirement savings.

The main objectives of the government papers are to promote greater retirement fund savings and to ensure prudent management of retirement fund monies during one's working lifetime and after retirement. There has been a lot of modelling of net replacement ratios to take into account dynamic economic variables such as the impact of reduction in rates of interest on replacement rates. South Africa's largest trade union Cosatu has, however, criticised the proposal to have mandatory preservation (i.e. you cannot withdraw your money on leaving jobs). The Union argues that unemployed people would need access to their savings to alleviate economic hardships. Stakeholders are awaiting a consolidated view of reforms from Government, although the enactment of such reforms could take several years.

Key Sports Developments

The Proteas retained their number one cricket test ranking in the world following a one nil away series victory in Australia. A guard of honour was formed by the Proteas to bid farewell to Ricky Ponting. The Springbok rugby team were unbeaten on their end of year European Tour with victories against Ireland, Scotland and England; cementing their number two ranking in the world behind New Zealand. South Africa hosts the Afcon finals in January 2013, the premier soccer tournament in Africa with Zambia the defending champions. Seven South Africans feature in the latest world top 100 golf rankings with 2012 British Open Champion Ernie Els ranked at position 23.

Key Political Developments

The African National Congress (ANC) has been in power since 1994 when South Africa transitioned to a democracy. In the last national elections in 2009, the ANC won 66% of the national votes with the largest opposition party the Democratic Alliance (DA) winning 17% of the national vote. The ANC holds its quinquennial elective conference in Mangaung in December 2012 with the incumbent President Jacob Zuma certain to retain the Presidency. Whilst the ANC has moderated its economic policies, the leadership has been plagued by several high profile financial scandals and with high unemployment and widespread poverty, the ANC can expect to lose some ground in the 2014 national election.

Key Economic Developments

The key economic and other data in South Africa are as follows:

Population	51.7m
Unemployment rate	25.50%
HIV prevalence rate	18% of adults
GDP	408.2 Bn USD
GDP Growth rate	1.20%
Inflation rate	5.60%
Base interest rate	5%
Rand / dollar	1\$ = R8.9

South Africa is the world's twenty ninth largest and Africa's largest economy. Year on year economic growth moderated to 1.2% in the third quarter of 2012, a key factor being labour unrest. This is the lowest growth since the second quarter of 2009 and is particularly bad news for South Africa's 8.5m million unemployed people. The rate of inflation was 5.6% which met the South African Reserve Bank's target of keeping inflation between 3% and 6%. The rand has lost some ground to the dollar in recent weeks closing at R8.9 to the dollar at the end of November 2012. There has

also been a massive roll-out of ARV's to those who are HIV positive with South Africa having one of the world's largest population of HIV positive people.

Key Actuarial Developments

The Minister in the President's Office running the National Development Plan 2030, Minister Trevor Manuel thanked the Actuarial Profession for their contribution to South Africa at the Actuarial Society's Annual Convention in Cape Town in October 2012. At the same time he urged the Actuarial profession to get more involved in areas of social development and to consider the wider interests of society when applying their trade.

The Actuarial Society of South Africa is engaging with stakeholders to determine whether South Africa actuaries who are members of the Institute or Faculty of Actuaries can be partially regulated. Regulators in Africa are being approached to fully recognise the South African qualification.

The Actuarial Society of South Africa appointed Mike McDougall as its CEO. His responsibilities will lie mainly in implementing the Society's strategy, managing the ASSA office team and developing relations with key stakeholders.

Felix Kagura has been elected President of ASABA (Association of South African Black Actuarial Professionals). ASABA provides mentorship, vacation work and school support to assist South Africa's previously disadvantaged students access actuarial opportunities. South Africa has 900 qualified actuaries and 2000 actuarial students.

Key Social Security Developments

The National Treasury released a series of papers which speaks to government's intentions to reform the retirement fund industry. The papers released are:

- Enabling a better income in retirement;

About the Author



Krishen.Sukdev@iac.co.za

Krishen Sukdev is an actuary working in Johannesburg, South Africa.

NO COVER NOTES, NO IMPACT ON VEHICLE OWNERS

IANs Sunday, November 04, 2012, 00:17

Chennai: The recent directive by the central government to its four non-life insurance companies not to issue cover notes for third party motor insurance policies to avoid possibility of fraud will not affect vehicle owners, a senior official said Saturday. "The government directive will not affect customers as we have stopped issuance of cover notes (temporary policy document issued till the policy is made ready) in a major way long back. The facility is offered only for selected customers based on their past experience," said a senior official of the United India Insurance Company Ltd, who requested anonymity.

Cover notes are not being issued for motor vehicles for a long time, said an official at the National Insurance Company Ltd, also a company owned by the central government.

The Department of Financial Services under Ministry of Finance wrote Oct 30 to the head honchos of four non-life insurers - National Insurance Company Ltd, New India Assurance Company Ltd, Oriental Insurance Company Ltd and United India Insurance Company Ltd - asking them to stop issuing cover notes for motor third party insurance.

The government also directed the

companies to take all necessary steps for negotiated settlement of motor third party claims.

"The private insurance companies should also participate in this process," the letter notes.

The government also asked the chairman and managing directors (CMD) of its four non-life insurance companies to identify fraud-prone areas in respect of motor third party claims and undertake necessary steps to manage the same.

"The nature of frauds to be classified and data for the same should be shared by the complete general (non-life) insurance sector," the government's directive notes. Officials of the United India and National Insurance companies told IANS that cover notes are issued only for new vehicles and by vehicle dealers against advance cash deposit.

"All the vehicle dealer sold policies are comprehensive ones and not third party policies. Cover notes for renewal of a policy and for individuals are not issued," a National Insurance official told IANS.

Welcoming the government's idea of data sharing, Amarnath Ananthanarayanan, CEO and managing director, Bharti Axa General Insurance Company, told IANS: "Once the data is shared,

mapping of the fraud-prone region will be easy."

According to him, all the non-life insurers have to look at minimising their third party claims outgo and prevent fraudulent claims, as it will have an impact on their bottomline.

"Private sector non-life insurers including Bharti Axa General are already going in for negotiated settlement of third party claims," Ananthanarayanan said.

"Motor third party claim settlement is an industry by itself with an estimated annual payout of Rs.15,000 crore. It involves various stake holders like the vehicle owners, victims and their families, the police, ambulance chasers, lawyers, insurance companies, banks and claims tribunals. The stakes are huge and it is not an easy industry to manage. Major legislative changes and their implementation will be required to contain this "growing" industry," K. K. Srinivasan, former member of Insurance Regulatory and Development Authority (IRDA) said.

He said that notwithstanding its noble intentions, the government, of itself, can have very little impact on this mammoth industry.



NEW INDIA NOT TO BE IMPACTED BY CLAIMS ON GROUNDED SHIP

IANs Tamil Nadu, Business/Economy, Mon, 05 Nov 2012 IANs

Chennai, Nov 5 (IANs) Non-life insurer New India Assurance said it will not be impacted heavily by claims owing to the grounding of oil tanker Pratibha Cauvery and the death of six sailors here Oct 31, said a senior official.

"As per information available, there is not much of damage to the ship. The ship will be refloated. Our outgo will be restricted to the refloating expenses subject to policy conditions," a senior official of the Mumbai-based company told IANS, preferring anonymity.

New India is the insurer for the double-hulled oil tanker.

When asked that insurers did not provide risk cover for vessels over 25 years and

Pratibha Cauvery was 31 years old, the official said that in the case of an existing client/ship the company extends insurance cover subject to loading the basic premium.

"We do not provide insurance cover in the case of a new client with an old vessel," he added.

Pratibha Shipping has hired a ship salvage agency to study the possibility of refloating the ship. The company is in talks with Larsen and Toubro Ltd (L&T) to dry dock the vessel at its shipyard near here.

On the issue of liability of the insurer for the death of six sailors who were drowned while trying to reach the shores

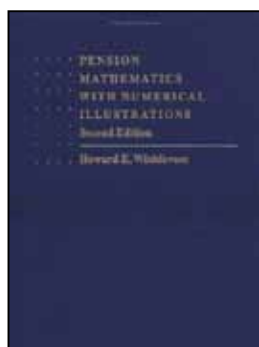
on a life boat, the official said: "We are not liable to pay compensation for sailors' death."

According to him, Pratibha Shipping might be having insurance cover from the property and indemnity (P&I) club.

Confirming this, an official in the finance department of Pratibha Shipping told IANS over phone from Mumbai that the sailors' lives are covered with P&I club and full compensation is expected.

On Oct 31, Pratibha Cauvery, anchored outside the Chennai Port area, was pushed by strong cyclonic winds to the beach. Six sailors died when their life boat capsized





PENSION MATHEMATICS WITH NUMERICAL ILLUSTRATIONS –

HOWARD E. WINKLEVOSS

Book Number : B13103

Status : Available at IAI Library

Reviewed by K. Ganesan
Pension Actuary (ganesan.k@licindia.com)

The main objective of the book is to explain the pension cost behaviour. The first edition of the book was published in 1977, when very little information was available in the published pension literature and the knowledge of pension cost behaviour were known only to actuaries in pension consultancy. The constraints of technology, laborious calculations, short cuts and approximations acted as barriers for further development. The first edition made an attempt to decodify the mystery by providing new, explicit actuarial notation for long recognized pension cost concepts and procedures. It was published at the time when Employees Retirement Income Security Act (ERISA) was enacted.

The second edition published in 1993, takes into account the changes since its first edition especially in areas such as statutory funding requirements, promulgation of FAS'87 issued by FASB.

The book is intended to serve the needs of pension actuaries, consultants, labour pension actuaries, management consultants, students and others interested in the dynamics of pension. It is to be noted that the book is published at the time when high interest rates, high inflation were prevailing and hence some of the assumptions and discussions may be inappropriate in the present time where different economic scenario prevail.

The author must be first complemented for successfully organizing the contents. His objective of introducing the concepts in pension design and its measurement is fully served in the book. The initial chapters in the book outlines the types of benefits (DB, DC), benefit functions, financial and demographic assumptions, actuarial functions, liability measured used in pension mathematics especially in USA. Introduction of "productivity component" in salary assumption, two benefit accrual function viz constant dollar and constant percentage to smooth the benefit accruals, two additional liability measures viz benefit prorates, cost prorates helps to understand the practices in USA. The values of different types of annuities, target pensions achieved under DB & DC presented in a neat tabular format will certainly help the corporate employer in selecting a design and understand its cost implications.

In the next two chapters, the author explains the method of measuring the pension cost under different approaches. He categorizes the cost into i) normal cost ii) supplementary cost and measures under different methods. The cost prorate methods discussed here, based on the value of temporary annuities is little different from the traditional methods followed in India. Although the methods builds up funds in earlier years, it suffers volatility due to changes in annuity rates. The amortization approaches discussed in the book is similar to the approaches we use in deriving the MCR's from SCR. The grading approaches discussed in the book to value ancillary benefits such as disability attempts to express the cost as % of retirement benefit. The method provides acceptable solution when their size is relatively small.

The actuarial equivalent grading functions presented in the book to allow for early (late) retirements will be useful for setting reduction(or enhancement) factor in case of early (late) retirement. But the readers must be aware of the sensitivities of the factors to the basis and method used in these calculations.

The statutory funding requirement, as stipulated by the ERISA 1974 and Inland Revenue Code is similar to the one prevailed in UK few years back. The act which aims to ensure the security of the pension benefits prescribes the basis, method to be used in measuring assets, benefits amortizing periods and set the minimum funding limit to be reached. The act prohibits use of certain method (eg. Constant per cent benefit prorate method) and imposes penalty if the calculated contributions are not paid in time. Considering the complications involved in the calculations, One has to agree with author's opinion on the failure of ERISA despite its laudable intentions.

Chapter "pension accounting" describes essential measurement of pension cost such as PBO, ABO, VBO, NPPC as stipulated in FAS'87. It is interesting to note that the implementation of FAS'87 brought a pleasant surprise by way negative pension cost due to the strong performance of capital market at the time when the standards were issued. Lots of discussion

has taken place since the publication of the book on treatment of Actuarial gains and losses and how to mitigate the volatility of profits caused by the varying pension cost. The author suggests using of service cost to determine the 10% corridor. Although this approach makes little difference for young, start-up schemes, it leads to narrowing of corridor width for larger, matured schemes. Ultimately author's suggestion will lead to immediate absorption of significant actuarial gain and losses.

Sensitivity of the pension cost to the changes in financial and demographic assumptions are well explained with tables and graphs in chapter 13.

The author underlines the importance of choosing suitable funding and investment policies in consistent with benefit plans. He demonstrates the development, implementation of both the policies using a model pension plan. The results of the model derived using deterministic and stochastic financial modelling are well presented by the author in chapters 14 & 15.

Chapter 16, covers both funding and accounting aspects of post retirement health benefits. The economic cost of providing of the benefits are explained using different approaches and basis. It enables the reader to understand the tax and statutory regulations such as DEFRA, VEBA and its impact on funding. The accounting standards applicable FAS'106 is similar to FAS'87, and it is having positive influence on funding and scheme designs as reported by author.

The author's purpose of explaining the behaviour of pension cost is well served by the book. Various illustrations, comparisons of benefits, methods, cost presented by array of Tables and Charts shows the professional approach of the author. But the limitation of the book lies in the heterogeneous group to which the book is intended. On one hand the mathematical formulae, notations used in the book are complex and difficult to understand for a client. On the other hand, for a professional actuary, this book falls below his expectations as some important areas such as risk mitigation, analysis of surplus etc has not been discussed.

My review is also constrained by the significant passage of time since its publication in 1993. We need to understand the market, financial and the limited availability of technology at the time when the book was written. This book provides fundamentals of pension mathematics in a precise way and I recommend the book to young actuarial students who wants to pursue an actuarial career in pension. For senior actuaries this book will serve as a source to revisit the fundamentals.





Shilpa's Puzzle

Puzzle No 181:

Two missiles speed directly toward each other, one at 9,000 miles per hour and the other at 21,000 miles per hour. They start 1,317 miles apart. How far apart they are one minute before they collide?

Puzzle No 182:

Imagine a $3 \times 3 \times 3$ - inch opaque cube divided into twenty seven 1- inch cubes. What are the maximum number of 1-inch cubes that can be seen by one person from any point in space.

SOLUTIONS TO PUZZLES:

Puzzle No 177:

Raised Eyebrows

Puzzle No 178:

Replace each letter in a country's name by the position of the letter in the alphabet. Goals scored is then the

smallest difference between any pair of numbers.

The result of the final tie was therefore :
Poland 1 Portugal 1

Correct Solutions were received from:

Puzzle No 177:

1. Gyanesh Jain

Puzzle No 178:

None



shilpa_vm@hotmail.com



puzzle No. 6 for the month of December 2012

HOW TO PLAY

Fill in the grid so that every horizontal row, every vertical column and every 3×3 box contains the digits 1-9, without repeating the numbers in the same row, column or box.

You can't change the digits already given in the grid.

- Sudoku Puzzle by Vinod Kumar

Hard

9	4	7	5	6		3		
2	8							
5				1		6	2	
		3		8		7		
	2	4		7				
							4	7
		5		3		2	8	1

Many Happy Returns of the day

the Actuary India wishes many more years of healthy life to the following fellow members whose Birthday fall in **December 2012**

Ramakrishna Devaraja Iyer	N. N. Jambusaria
C. S. Modi	S. P. Mulgund
S. V. Narayanan	Y. P. Sabharwal
T Bhargava	

(Birthday greetings to fellow members who have attained 60 years of age)

Solution of Sudoku Puzzle No.5 published in the Month of Nov. 2012

MEDIUM SOLUTION

4	7	6	8	2	9	5	1	7
9	8	2	1	5	3	7	6	2
5	3	1	6	7	4	2	9	6
6	5	7	2	4	1	3	8	5
8	9	4	7	3	5	6	2	3
2	1	3	9	8	6	4	5	4
1	4	8	5	6	7	9	3	1
7	6	9	3	1	2	8	4	8
3	2	5	4	9	8	1	7	9

It's time for a great career.

CAREER OPPORTUNITY



Milliman's healthcare and non-life insurance practice in Gurgaon is seeking applications for the position of Consulting Actuary.

The applicant should have the ability to lead an experienced team of student actuaries in analyzing healthcare cost and utilization data, develop and use actuarial models, and use Milliman tools and databases. The selected candidate will manage project delivery and assist with client proposals and presentations in India, as well as for services the India office provides to various Milliman offices worldwide.

Applicants must have:

- Fellowship in the IAI or actuarial exam completion near Fellowship or other equivalent status
- Team management skills and the ability to work independently and manage a profit center
- Ability to plan complex projects, identify key project deliverables and ensure compliance with Milliman quality procedures
- Knowledge of health insurance in India and keen interest to specialize in health and non-life insurance; knowledge of healthcare delivery system and treatment costs is preferable
- Experience with property and casualty claim reserving, pricing and predictive analytics is a plus
- The selected candidates will be offered a competitive fixed compensation with personal and team performance-linked bonus.

Please email resumes to hrindia@milliman.com.

For more information, visit: in.milliman.com

Plot No.121, 2nd Floor, Institutional Area, Sector - 44, Gurgaon, Haryana – 122002, India, Tel +91 124 4641 500



To see whether a risk poses a threat,
don't we have to see the big picture?

The future is like an iceberg. Most of the time what we can see before our eyes is only half the story. So how do we know the unknowable? Only those with relentless drive, expertise and foresight can see the whole picture — the risk that lies beyond. At Munich Re, seeing more is what we do. We work in interdisciplinary teams, each pair of eyes viewing something from a different perspective, all focusing on the best solution. With our worldwide network we can pinpoint complex global patterns when they arise. When it comes to grasping our future, we are never satisfied with half the story.

To find out more about what lies beyond,
check out our website at www.munichre.com