Institute of Actuaries of India
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the Actuary INDIA

THE MAGAZINE OF THE INSTITUTE OF ACTUARIES OF INDIA

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INDIAN ACTUARIAL PROFESSION
Serving the Cause of Public Interest

17-19 February 2020

21st Global Conference of Actuaries (GCA) & AGFA 2020

Theme: "Actuaries: Striving for excellence, creating sustainable future"

Venue: Renaissance Mumbai Convention Centre Hotel, Mumbai

Chief Actuarial Officer

Location: Port Louis, Mauritius

The SICOM Group (www.sicom.mu), a major player in the Insurance and Financial Services sector in Mauritius, is inviting applications from suitably qualified candidates for the post of **CHIEF ACTUARIAL OFFICER** on a contractual basis for an initial period of three years and renewable upon mutual consent.

Candidate Profile

- Fellow member of any of the member Associations of the International Actuarial Association (IAA) with a minimum of 10 years' experience out of which should be at least five years post fellowship, preferably within Life Insurance.
- Exposure in General Insurance and Pensions Actuarial areas will be an advantage.
- Experience in developing business solutions and insurance products.
- Relevant experience in Risk Management.
- Ability to build and maintain relationships.
- Highly effective interpersonal and presentation skills.
- Written and spoken proficiency in English
- Other attributes being same, knowledge of French language will be an advantage.

Key Functions and Responsibilities

Reporting to the Chief Executive Officer, you will head the Actuarial Functions of the Group while overseeing the Life, General Insurance and Pensions Actuarial areas and the Risk Management function.

You will provide actuarial input including the development of actuarial work in the area of risk management and will also be responsible for benchmarking practices.

You will work alongside the team in a client-facing, Business Development & Client Solutions capacity with portfolio management and product-design responsibility.

You will also advise on and formulate the actuarial strategies of the various lines of business of the Group, including future expansion plans.

You will review existing processes and be responsible to upskill the team within the actuarial areas.

The responsibilities of the post will include the following:

- Ensure that the Group adopts sound actuarial principles, controls and processes in producing actuarial reports and/or calculations which are utilised by the various lines of business within the Group or by external actuaries.
- Provide actuarial support to Life, General Insurance, Pensions, Investments and Risk Management functions.
- Carry out actuarial work such as quarterly reserves for Life Insurance, review the annual technical reserving exercise for General Insurance.
- Formulate pricing of new products and Schemes and review of existing ones in relation to desired performance.
- Review and/or sign-off all actuarial reports produced by the actuarial teams.
- Provide technical and actuarial support in developing risk management techniques and frameworks.
- Provide technical input such as reserve calculations, budgeting, investments (asset-liability matching), re-insurance and risk management to relevant areas of the business.
- Provide actuarial support to the product development area including pricing and profit-testing.
- Provide or co-ordinate technical input and support on any special projects or corporate activities.
- Report or provide input to the Board on any risk aspects pertaining to the Company's operations and strategies.
- Work closely with any other technical external service providers where needed.
- Engage with the relevant regulatory body/ies and Auditors as required.

How To Apply

- Application with details covering above and other aspects listed below should be emailed.
  - Personal details such as marital status, children and other dependent family members.
  - Year of Fellowship and name of the Actuarial body; if more than one, please mention all.
  - Work experience details including country and places of work.
  - Language/s Proficiency.
  - Declaration about disciplinary action/s by the actuarial body, if any.
- Application should be sent by email only at **human.resources@sicom.intnet.mu**
- Last date for application: 30th November 2019

Confidentality

All the applications and information contained therein will be treated with utmost confidentiality.

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"A noble man's thoughts will never go in vain. -Mahatma Gandhi."
"I hold every person a debtor to his profession, from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavour themselves by way of amends to help and ornament thereunto - Francis Bacon"

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ENQUIRIES ABOUT PUBLICATION OF ARTICLES OR NEWS

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Kindly do not send it to editor or any other functionaries.

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From the Desk of President

Mr. Sunil Sharma

Dear Members,

Greetings of the month!

In October edition of the Actuary India magazine I touched various important topics. 21st GCA and 2020 AGFA, AAC, AJP, GAD and coaching and training. I feel delighted to share with all of you that IAI marched ahead on all counts mentioned therein and many more new.

The theme of 21st GCA has been finalized. Though the time to respond was short but I was overwhelmed to see the response from members. It was not easy for members of the GCAOG under chairpersonship of **Mr. Liyaquat Khan** to select the best. Unanimously the theme selected is - **'Actuaries: Striving for excellence, creating sustainable future'**. The Subject, Sessions and Programme content of 21st GCA would revolve around the theme. All members of the group are energized and some organisations have already come forward to support the GCA. There has been a meeting and program chalked out. The contract with the hotel and vendors would be finalized this month.

Another information of importance is that IAI has re-established strong ties with other actuarial professional bodies across globe e.g IAA, IFoA, SoA, ASSA, AAC etc Looking to IAI activities and 75 years of completion of actuarial profession in India, I request international community to register for 21st GCA and enjoy 2020 AGFA.

Vice President, IAI Mr. Richard Holloway and I attended 4 days AAC. You all know that the actuarial profession in India have witnessed 75 years and in that spirit the GCA would have flavor of the grandeur and respect for the Profession that the Profession has traversed so long. I am happy to share with you that IAA President honoured the President, IAI in AAC held at Singapore. A plaque was handed over to the President to commemorate the occasion.

November 2019 examinations are on its way. The Institute has taken many initiatives to extent support and guidance to students in many ways. Beside regular online coaching classes for CM, CS and CB, webinars and class room trainings are also conducted and scheduled. The webinar series for R is an add-on this time offered to all students, irrespective of their current examination requirements. A class room training for excel has also been conducted; however response to such webinar and class room trainings are found to be not encouraging in terms of participation by students. Candidates who have registered for SP and SA level examinations also supported by "meet the expert" webinar programs, absolutely free of cost. I strongly recommend and encourage all students to make use of all guidance and support programs offered by the Institute in order to increase their chances in the examinations.

Important seminars during November are data science and analytics, ERM and IFRs 17. IFRS Foundation vice chair would be one of the speaker along with other speakers. This shows the IAI rising brand. Earlier in data seminar held at Bengaluru, IFoA President was speaker.

There was important announcement for education curriculum. The Profession has welcomed the announcement. This is evident from the communications received from senior members from the Profession.

The PR and digital marketing would be norm to popularize the profession. The agency would be finalized soon.

IT is backbone for any organization and same to IAI. The help from Government wing- National Information Centre is being sought. This would help strengthening IAI IT services to various stakeholders.

The regulation allowing attendance in various IAI meeting through video conferencing is being promulgated. The VC system in IAI office is already in place. Once the regulation enacted, it would help saving travel expenses.

The group under chairpersonship of **Mr. Kulin Patel** submitted report on GAD. It would be presented to Government. The group worked hard. I thank whole group for their support despite the fact that all group members were travelling in different territories and different time zones.

The AJP is being appreciated by members and employers. It has given a platform to both for employment needs. This is proving mutually beneficial.

With this I would like to sign off with a promise to come back with more updates from IAA Council meeting.

From the Desk of Chief Editor

Ms. Bhavna Verma

"Time management is life management". Nothing resonates more with me in these times of increasing business complexity, expanding verticals of work and every shrinking turnaround times, new reporting frameworks, dynamic operating and external environment and swift technological strides. It is imperative that we manage the self well-enough to effectively achieve results, responsibly mentor young actuaries and manage multiple relationships while also continuously 'Sharpening the Saw'. As the profession looks to expand horizons, the responsibility naturally onto senior professionals to drive contribution of actuaries beyond the 'core' areas within and outside the traditional domains.

We are indeed living in times of change. This does make me ponder whether change should be a natural reactive process or requires a structured approach to change management as described in various books written on the subject. As leaders, as with everything else, I guess the key lies in tailoring our change management approach to the situation and challenge at hand.

Nearly 20 years after privatization, the life insurance industry has come together to launch a large scale media campaign 'Sabse Pehle Life Insurance' to encourage Indian households to opt for adequate life insurance cover as the fundamental necessity in their lives. This is a welcome step and should aid in driving the desired behavioral 'change'.

The 21st GCA themed "Actuaries: Striving for excellence, creating sustainable future" has been announced for 17-19 February 2020. The Indian actuarial profession celebrates 75 years in 2019 which is a proud occasion for all the members of the profession.

This issue includes features on interest rate modelling and block chain technology and ED updates on recent seminars and other matters. Looking forward to the next line up of seminars on IFRS 17, data science and analytics and Enterprise Risk Management (ERM).

Happy reading! We would love to hear from you at library@actuariesindia.org.

Report for IAA

By Dinesh Chandra Khansili, ED (IAI)

In 2006, the Institute of Actuaries of India (The IAI) became a statutory body regulated by the Actuaries Act 2006. The IAI develops and regulates the Actuarial Profession in India. Its governance is in such a way that Council is supreme, then there are committees to supervise various tasks e.g but not limited to education, examination, professionalism, administration, finance, maintaining external relations etc. The advisory groups have been formed to carry out the job responsibilities which report to relevant committees. There is IAI office situated in Navi Mumbai, India and is headed by its Executive Director.

IAI conducts the actuarial examinations and are held twice a year. These examinations comply the IAA latest syllabus standards and are managed in highly professional and confidential manner. There is mutual recognition with some international actuarial bodies as well.

Currently the total membership including students is around 9K. These members are spread over India and overseas. For practitioner actuaries, Certificate of Practice (COP) is issued only to those who comply the provisions of the relevant actuarial practice standard. The minimum CPD hours need to be completed as per this standard.

The Actuaries Day celebration is held on 21st August in various places to commemorate the birth anniversary of India's first Actuary late Sh LS Vaidyanathan.

The Global Conference of Actuaries (popularly known as GCA) is held every year. This year it is slated from 17th Feb 2020 to 19th Feb 2020. 700+ delegates from India and various other countries are expected to assemble, deliberate the current issues and to have bit fun also together during evenings.

The entry and continually pursue the Actuarial Profession is primarily driven by desire to satisfy the intellectual pursuit. To keep oneself professionally and technically updated post examinations and qualification throughout the career and even thereafter, the continuous learning is of utmost importance. This could be through various ways; e.g abreast with print, visual, social media, attending seminars and webinars, etc.

In this connection, in financial year 2018-19 (April to March) there were 19 seminars held at various locations within India. These ranged to current issues in Life, General Health, professionalism and wider areas.

IFRS 17 is current important topic. A full- fledged seminar on IFRS was held in month of May 2019. The subject is still being debated. Many enthusiast speakers and delegates attending the seminar took active interest. The practical approach for Linked, Par and Non-par and transitional approach fair value assessment were deliberated discussed and debated at length. Another Seminar on this topic is going to be held in the month of November 2019 where vice Chair of IFRS foundation Ms Sue Lloyd would also be speaking.

IAI President, Mr. Sunil Sharma has set Big and Brave (B&B) goals for IAI. Traditionally in India, the actuaries' role was concentrated in Insurance area. One of B& B goals of IAI are targeted to have reach in wider areas say- data science and analytics, Banking finance and investments and risk beyond insurance. In each of these areas a seminar has been conducted so far. The interest in IAI activities is so much that one of IAI seminar on data science and analytics held at Bengaluru, India attracted IFoA President, Mr John Taylor as one of the speaker. The current topics as augmented intelligence, machine learning, and actuaries in gaming industry, role of actuaries in banking industry, econometric models- CCAR were some of the interesting topics discussed which were appreciated by the personnel working in banking area. This would pave the way for employment of actuarial personnel in banking area and data science area.

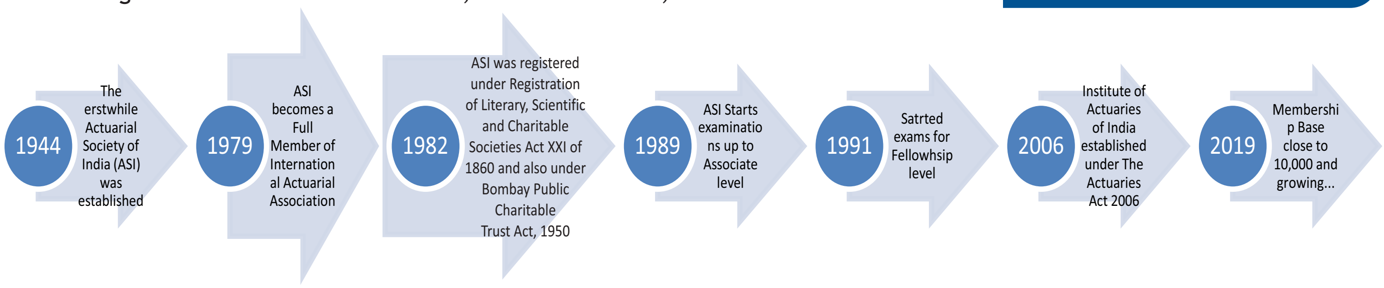
IAI is concerned about job opportunities for students as well. The launch of Actuarial Job Portal (AJP) shall provide seamless connect between the Employer hiring actuarial personnel services and the actuarial personnel. The AJP is expected to make recruitment much easier for user of actuarial services. The Actuarial talent is scarce and HR of companies put their relentless efforts to hire such talent. AJP would prove to be cost-effective and solution provider.

Written by

Mr. Dinesh C. Khansili

ED@actuariesindia.org

"Mr. Dinesh Chandra Khansili is an Executive Director of IAI."



ANNOUNCEMENT

2nd Capacity Building Seminar on Risk management (2nd CB RM)

Organised by: Advisory Group on Risk Management
Venue: Hotel Sea Princess, Mumbai **Date:** 13th November, 2019 **Time:** 9am to 6pm

Background:
What can actuaries do to help financial institutions manage their risks? A whole lot actually!!

Actuaries are recognized experts at determining risk-based capital (economic capital) required to cover long-term risks and can play a significant role in helping banks or NBFCs assess their risks and make sound business decisions, especially in light of the new regulations and reporting standards (Basel III, IndAS) that banks need to abide by.

This, coupled with the strict code of conduct and practice standards that govern actuaries, will provide such entities with the confidence to rely on the advice provided by actuaries.

Join us as we take a deep dive into the management of risks in banking, calculating economic capital, developing economic scenarios and other burning topics in enterprise risk management, while leveraging on our understanding of the insurance domain.

The Advisory Group on Risk Management invites you to attend the 2nd CBRM, in Mumbai on November 13, 2019.

The Seminar would focus on the following topics: (detailed agenda to be announced shortly)

- Using Economic Capital to manage risks
  a. Generating Economic Scenarios and Calculating Economic Capital
- Managing risk in Banking / other non-traditional actuarial businesses
  a. Confluence of risk modeling tools and techniques used in Actuarial and Banking;
  b. Risk modeling tools and techniques as used in the Banking and NBFC Space;

Pre Requisites:
Since the above topics will be coupled with **hands on exercises and examples**, delegates are requested to **carry laptops** to maximize their learning.

Presenters:
Kinshuk Pal - Director, Financial Risk Management, KPMG
Subhash Khanna - Consulting Actuary, Milliman
Megha Mehra - Actuarial Associate, Milliman

Who Should Attend?

- Actuaries at mid and senior level working closely with ERM or interested in working in ERM
- Delegates working in risk management domain in their organisation
- Delegates interested in understanding the roles and responsibilities of ERM function and how it works
- Non-members are welcome to attend

Registration Fees (Excluding 18% GST):

Categories	Amount in INR
Students & Associate Members	3,500
Affiliate & Fellow Members	7,000
Non Members	7,500

General Points

- **Register at:** http://www.actuariesindia.org/seminarregistration.aspx
- **CPD Credit for IAI members:** 6 hrs. Technical (Any one practice area As per APS 9 -Rev. Ver 2; to be selected at the time of registration)

ANNOUNCEMENT

15th Current Issues Seminar in Life Assurance (15th CILA)

Organised by: Advisory Group on Life Insurance

Venue: Hotel Sea Princess, Mumbai **Date:** 19th–20th December, 2019 **Time:** 9am to 6pm

Background:

15th CILA is the flagship event of the Institute of Actuaries India, in the Life Insurance area, scheduled on 19-20 December, 2019 in Mumbai. It is an annual seminar organized by the 'Advisory Group on Life Insurance' of the Institute.

The objective of the seminar is to present, discuss and deliberate on the various issues and possible solutions that are of significance today to the Indian Life Insurance Industry.

The seminar is a combination of speeches, presentation and panel discussions. The coverage is broad so as be of interest to a diverse set of participants working in different areas of the life insurance industry.

The content, in large parts is non-actuarial, non-technical and hence of relevance to the non-actuarial audience as well. In the past, we have seen a significant part of the audience drawn from very diverse areas of Life Insurance practice.

Seminar: Structure and Topics:

- Session 1 - Product regulations, Benefit illustrations, With profits management
- Session 2 - Interest Rate Management
- Session 3 - Alternative Forms of Capital
- Session 4 - Growing Life Insurance (FinTech, Regulatory Sandbox, New age distribution)
- Session 5 - Young Actuary sessions: ESG and Expense allocations

Who Should Attend?

All financial professionals associated with the Life Insurance industry.

Registration Fees (Excluding 18% GST):

Categories	Amount in INR
Students & Associate Members	6,000
Affiliate & Fellow Members	12,000
Non Members	12,500

General Points

- **CPD Credit for IAI members (2 Days):** 12 hrs. Technical in Life Insurance (As per APS 9 Ver.3)
- **Registration last date:** 14th December, 2019; Registration on first come & first serve basis
- **Register at:** http://www.actuariesindia.org/seminarregistration.aspx

Report of 21st GCA Subgroup on Program, Structure and Content

Date: 17 – 19 February, 2020
Venue: Hotel Renaissance, Powai, Mumbai, India
Theme: *Actuaries: Striving for excellence, creating sustainable future*

1. Background

In its meeting held on 19th October 2019 the 21st GCA Organizing Group constituted a 3-person subgroup [comprising **Heerak Basu** (Chair), Sanjeev Pujari and Mayur Ankolekar] to advise on the program structure and content of the 21st GCA having due regard to the theme "Actuaries: Striving for excellence, creating sustainable future".

The terms of reference of the Group were further elaborated in an email from the Chairperson of the 21st GCA Organizing Group on 20th October 2019 following a request from the Chairperson of the subgroup as follows:

1) Articulate the criteria which would apply, given the theme for taking a view on the subjects, Sessions and its content.

2) Within the framework of the criteria suggested in (1) above to articulate a view on," whether we invite speakers for submissions and select out of such submissions or approach suitable speakers". Reliance can be had upon the experience out of the practice during 13th, 14th and 15th GCAs when no speaker submissions were required and all the speakers were selected keeping in view the subjects that were decided upon. On the other side we do have experience of later GCAs including the 20th GCA when we had submissions as well as on some topics speakers were invited.

2. Criteria for subjects, sessions and content

2.1 Meaning of the theme

We analyse the theme "Actuaries: Striving for excellence, creating sustainable future":

The verb "strive" means
" to try very hard to do something or to make something happen, especially for a long time or against difficulties"
(https://dictionary.cambridge.org/dictionary/english/strive)

The word "excellence" means "The quality of being outstanding or extremely good."
(https://www.lexico.com/en/definition/excellence)

This would imply that the content should be of a very high quality and cover studies/research conducted over a long period. It does not seem to imply anything regarding the subject matter aside from the fact that it should be an area where actuaries are involved in.

In terms of the second part of the theme "creating sustainable future" the word "sustainable" would appear to be the key.

The adjective "sustainable" means "able to continue over a period of time"
Or
"causing little or no damage to the environment and therefore able to continue for a long time"

2.2 Implications of theme for subjects, session and content

We see the following implications for subjects, session and content:

2.2.1 Subjects/ content

Given the association of the word "Sustainable" with the environment we should look to have several papers on the subject to the environment and climate change. This will largely be for Non-life Insurance.

Aside from the environment, we can also look at various subjects in other fields such as:

- Life/ General/ Health Insurance
  - Sustainability of premium rates,
  - Sustainability of guarantees,
  - Meeting changing customer needs,
  - Socially responsible investing,
  - Product design that influences policyholder behaviour which in turn contributes to a sustainable environment
  - Social insurance schemes e.g. PMFBY, RSBY, PMJJBY, PMSBY.

- Climate Change: Protecting assets & livelihood
  - Understanding climate change, sustainability of assets: Insuring against vagaries of weather & catastrophe
  - Sustainability of livelihood: crop / weather insurance; Social / Community health insurance

- Pensions
  - Sustainability of defined benefit design and provision,
  - Sustainability of defined benefit funding policy,
  - Sustainable incomes post-retirement,
  - Socially responsible investing.

- Reinsurance
  - Sustainability of rates in India,
  - Insights into reinsurance capacity arising from climate change trends,
  - Enabling insurers to provide risk coverage and thus enabling a sustainable future.

- Actuarial Profession: sustaining professional excellence in the context of changing demands
  - Aligning actuarial education, training and skill sets,
  - Curriculum,
  - Professional Development,
  - Statutory Roles,
  - Excellence in communication.

- Regulation/ Regulatory Framework: Role of the regulator
  - Outcome/ principle-based regulation to Risk Based supervision,
  - Proportional supervision with greater emphasis on systematically important insurers,
  - Sustainability of social insurance schemes e.g. PMFBY, RSBY, PMJJBY, PMSBY,
  - Standardization / globalization of capital standards (similar to accounting standards),
  - Disclosures and customer education,
  - Market conduct supervision.

- Outsourced services (many IAI student members are employed here)
  - Core knowledge for sustenance of services
  - Data and intellectual property related compliance for excellence in services
  - Best ethical practices for sustainability

- Excellence in communication

2.2.2 Continuing from the 20th GCA

- The 20th GCA initiated a theme-based session titled "Down the memory lane." This feature should be continued as the first and plenary session on day 2, with the speaker (ex-CEO) provided specific request to discuss on how excellence in execution contributed to the organisation's success. This would also resonate with the conference's emphasis on "excellence."
- The students' forum has been a popular feature over the past few years, which records high interest from participants. Last year the topic was titled 'expanding the horizon, actuarial science in banking'. This year, the students' forum sessions may look at topics around 'Building competence for excellence' which can include core knowledge, emerging applications and excellence in communication.

2.2.3 Sessions

In 20th GCA we had 2 plenary sessions covering issues directly relating to sustainability relating to climate change. For this GCA we can have at least as many. Some ideas have been given above – there will be more.

Given the idea of excellence we should focus on quality rather than quantity and therefore target leading global speakers in the various areas. The best speakers will have to be invited in advance in order to book their calendar. The invited speakers – a mix of international and Indian - should be scholars/ researchers and practitioners in fields of sustainability and actuarial excellence.

Given the idea of "striving" we can give preference to papers written in report style over those in Powerpoint so as to give credence to the effort expended by the authors. Also we can look for papers that have conducted experimental studies over a long period to reinforce the idea of "striving" which implies efforts over a period of time. The focus on 'experimental studies' and 'report-style writing' also means that the GCA will have more academic speakers than in the past.

3. Invite or approach?

The theme being particular in terms of subject area and quality would seem to our mind to necessitate fewer papers than in previous GCAs (i.e. a focus on quality rather than quantity).

Our approach could be a mix of the two. (a) Invite speakers for submissions and select some based on merit as well as on how well they meet the criteria, and (b) Approach best suited speakers on core topics of the conference's theme. A few marquee speakers who have contributed to either sustainability or actuarial excellence should be immediately identified.

4. Recommendations

Given the nature of theme and its emphasis on sustainability and excellence we would recommend as follows:

- We can both approach and invite speakers for papers.
- To ensure excellent papers leading practitioners/ researchers in their fields should be approached.
- A couple of marquee speakers who have contributed to sustainability and actuarial excellence should be closed out by 15 November.
- There should be at least be 2 plenary sessions on environment/ climate change issues (there were 2 such sessions at the last GCA, both on day 1).
- There should be a preference for articles rather than slide presentations.
- The balance between plenary and concurrent sessions should be tilted towards plenary which while meaning fewer papers than on previous occasions should be more than compensated by the quality of such papers.
- As a symbolic gesture of 'sustainability', the conference should provide water-filled transparent glasses instead of plastic bottles.

Date: 17 – 19 February, 2020
Venue: Hotel Renaissance, Powai, Mumbai, India
Theme: Actuaries: Striving for excellence, creating sustainable future

The 21st GCA Organizing Group invites Expression of Interest (EOI) for papers/ presentations during the conference over two days: 18th and 19th February, 2020. The EOI has to be within the framework of recommendations of **The Heerak Basu Report,** hence it is advisable that this report is perused before submitting EOI.

Actuaries as well as other Professional can submit the EOI.

A: Introduction:

The GCA organized annually since 1999 is a signature three-day event attracting stakeholders in the Insurance and financial sector, with an evening being devoted to Actuarial Gala Function and Awards (AGFA). The AGFA as well as GCA are organized in partnership with the Insurance and Pensions Industry, Consulting Organizations and other stakeholders in the event, called Partners.

The 21st GCA will be held over 17th-19th February, 2020, where actuaries and non-actuaries assemble in a global ambience to share thoughts and debate matters that affect the financial services industry in general and insurance industry in particular. Glimpses from past GCA's are also available at
https://www.youtube.com/user/IAIMumbai/videos

The event starts on the evening of 17th February, 2020 with Actuarial Gala Function and Awards (AGFA) followed by the 21st GCA Welcome Reception and Dinner along with two days' of discussion and deliberation on various subjects of interest. It is a great opportunity to witness, partake and celebrate the recognition of young actuarial professionals and learn/contribute papers/presentations on subjects that impact the insurance, pensions and other financial services at the global level.

Theme: Actuaries: Striving for excellence, creating sustainable future

The Papers/Presentations around the above theme could be from anyone with knowledge and expertise in the subject of presentation.

The 21st GCA is expected to attract around 1,000 participants, the 20th GCA held in the year 2019 having crossed 750 participants.

B: The Papers/Presentations and Programmes:

Given the association of the word "Sustainable" with the environment we look to have several papers on the subject to the environment and climate change. This will largely be for Non-life Insurance.

Aside from the environment, we can also look at various subjects in other fields such as:

- Life/ General/ Health Insurance
  - Sustainability of premium rates,
  - Sustainability of guarantees,
  - Meeting changing customer needs,
  - Socially responsible investing,
  - Product design that influences policyholder behaviour which in turn contributes to a sustainable environment

- Social insurance schemes e.g. PMFBY, RSBY, PMJJBY, PMSBY.

- Climate Change: Protecting assets & livelihood
  - Understanding climate change, sustainability of assets: Insuring against vagaries of weather & catastrophe
  - Sustainability of livelihood: crop / weather insurance; Social / Community health insurance

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  - Proportional supervision with greater emphasis on systematically important insurers,
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  - Standardization / globalization of capital standards (similar to accounting standards),
  - Disclosures and customer education,
  - Market conduct supervision.

- Outsourced actuarial services
  - Core knowledge for sustenance of services
  - Data and intellectual property related compliance for excellence in services
  - Best ethical practices for sustainability
  - Excellence in communication

Given the idea of “striving” we can give preference to papers written in report style over those in PowerPoint so as to give credence to the effort expended by the authors. Also we can look for papers that have conducted experimental studies over a long period to reinforce the idea of “striving” which implies efforts over a period of time. The focus on 'experimental studies' and 'report-style writing' also means that the GCA will have more academic speakers than in the past.

Aside from the Papers/Presentations submitted for selection, we would be inviting Papers/ Presentations on specific subjects too from eminent persons in the specific subjects.

The Papers/Presentations may be based on Research work published or un-published but should not be an exact repeat of any presentation/s already done in any other forum or in earlier GCAs.

The Programme structure is not final yet, however the earlier Programmes can be viewed at; http://www.actuariesindia.org/subMenu.aspx?id=201&val=Global_Conference_of_Actuaries.

In case of any enquiry or clarification please contact us at marketing@actuariesindia.org.

Liyaquat Khan
Chair - 21st GCA & AGFA 2020 Organizing Group

C: Paper/Presentation Submission process & timelines

The presentations shall constitute property of the IAI though having personal (of the Author/presenter) responsibility for the content and views expressed will be published on the 21st GCA website at a later date. By submitting the slides to the 21st GCA, presenters will be deemed to have given permission to publish their presentations.

All submissions have to be made through Online Submission System.

Appendix I: Time lines

Expression of Interest	1st Nov, 2019 Friday- 29th Nov, 2019 Friday	**Submit the following online:** 1. Biography (Appendix II) 2. Summary outline of presentation (Appendix III) 3. Detailed outline of the presentation (either in traditional text format or in presentation format) (Appendix III) 4. Refer Guidelines for paper submission (if Any) (Appendix IV)
Paper acceptance	By 6th Dec, 2019 (Friday)	Accepted presenters will be notified and a presentation template will be provided
First draft submission	By 20th Dec, 2019 (Friday)	Draft presentation to be submitted for review in the prescribed format. Comments will be provided based on the review by Reviewers within 4 days' time from date of submission.
Final submission	By 15th Jan, 2020 (Tuesday)	Final presentation to be submitted in standard PPT format of 21st GCA
Meeting of Contributors	On 17th February, 2020 (Monday)	Accepted presenters will be required to attend a briefing meeting at the Renaissance Hotel, the Conference Venue.

Appendix II: Biography

Insert Photo	Full Name : Position held in your organization: Professional Title such as FIA, FIAI, FSA, FCA etc. Name of your Organisation: Current Country of Residence: Nationality: Actuarial Association (If member of any Institute):
Work Experience:	Outline of your background and relevant work experience (in maximum of 50 words).
Recent public presentation	Details of presentations made in conferences during the last say five years.
Contact Details	Email: Mobile:

Appendix III: Summary outline of presentation

Area	Presentation information
Title of presentation	Add the title of presentation.
Core discipline	Please specify the core discipline, this should be one of the Eleven Core Disciplines specified under Para B.
Summary of presentation	Brief outline of the topic including the linkage to the 21st GCA theme in not more than 50 words.
Detailed outline of presentation	Detailed outline of the presentation. This could be either in text format or presentation format which could be attached.
Time span of presentation	Typical presentation session will be 20-30 mts and there may be maximum one or two presenters in a session.
Co-speaker (if any)	The presentation can be by maximum of two persons, even though if there is paper, the same might have been written by more than two authors, The details of co presenter is to be submitted (Appendix II)

Appendix IV: Guidelines for paper submission (Attachment)

D: Note for the presenters

- EOI must be submitted in English, via the Online Submission System only. E-mail submission will NOT be accepted.
- EOI will be selected based on their merit, quality and appropriateness to the THEME of Conference.
- All the speakers selected/ through Call for papers needs to register for the Conference.

Last date to submit 15th January, 2020

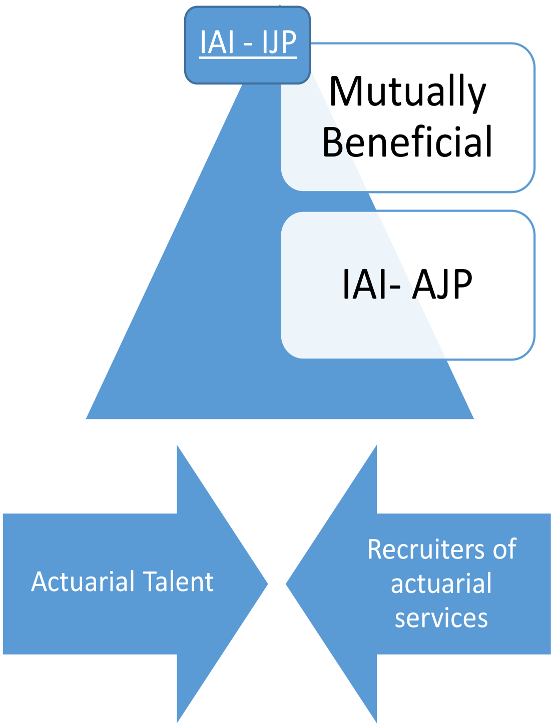
Vinay Dwivedi, is a student member of IAI and IFoA, currently working at IRDAI in Cyber Security domain. Prior to joining IRDAI in Feb-2018, he was working into Data Science areas with Juniper Networks, Bengaluru. Vinay have graduated from BITS Pilani in BE(Hons.) Electronics & Instrumentation and MSc(Hons.) Mathematics. Fascinated by Statistical Modelling and Applied Mathematics in Financial sector, he started the pursuit of Actuarial Science exams in Sep-2018 and have cleared three papers since then. He is passionate for research and a research paper was also published at IEEE (Institute of Electrical and Electronics Engineers). On extracurricular front, he is highly enthusiastic about badminton and have represented my State at All India National Tournaments.

ED's note on Actuarial Job Portal (AJP)

One important announcement made by the President, IAI, **Mr. Sunil Sharma** on the occasion of 2nd Actuaries' Day celebrated on 21st August 2019 was "the launch of Actuarial Job Portal (AJP) of the Institute of Actuaries of India". The AJP shall provide seamless connect between the employer hiring actuarial personnel services and the actuarial personnel. The AJP is expected to make recruitment much easier for users of actuarial services.

Actuarial talent is scarce and HR teams of companies put in their relentless efforts to hire such talent. In the hiring process, the companies spend lot of money and time however do not always get the desired outcome due to the absence of a unified platform showcasing actuarial profiles. Similarly, despite the actuarial jobs availability to suit the needs of all categories of actuarial personnel the reach to the employers was not easy.

To overcome these problems the AJP was launched. It is interesting to see the popularity of AJP that since its launch 1200+ CVs have been uploaded and nearly half a century employers have registered with IAI. The employers are from various areas, e.g Life, General and Health Insurers, consulting firms, individual employer, reinsurers, sales intermediaries, etc.



IAI has made efforts to educate the employers and prospective student members seeking actuarial jobs. The guidelines to students consist updation - regarding education, experience, area of work, industry, skill sets, and other experience. They have been asked to ensure the accuracy of data, consistency in vital data entered, to keep the profile activated and updated, the synergy in CV and profile details.

The members may access the AJP by login using member ID and password and then click on profile under AJP tab and update the profile.

The features of AJP are numerous and could be of interest to registered organisations. These are;

- Direct access to profiles with contact details
- Database search using keywords
- Filter search based on experience, practice area, education, skill sets, exams passed etc
- Access to profiles of active job seekers
- 100% savings on hiring expenses
- Speedy hiring process
- Existing users can login using their credentials under employer login on the IAI website.

The students and employers may get technical support by writing or calling at it@actuariesindia.org; +91 22 6243 3353 respectively.

The entry into the actuarial profession and continuous pursuit of the actuarial qualification is primarily driven by the desire to satisfy the intellect. To keep oneself professionally and technically updated throughout the career and even thereafter, the continuous learning is of utmost importance. This could be through various ways; e.g. keeping abreast with print, visual, social media, attending seminars and webinars, etc. The APS9 mandates the minimum CPD hours. IAI conducts many seminars. By registering and attending these seminars one is eligible to have professional, and/or technical CPD hours. However it is observed that there are many who just don't attend seminars in order to comply with APS 9 requirement but also to satisfy the intellectual pursuit. This tendency is more in very senior actuaries.

Intellectual Pursuit	Self Reading	Seminars
Webinars	Print, Visual & Social Media	APS requirement

In financial year 2018-19 there were 19 seminars were held at various locations. In 2019-20 (till Sep-19), 11 seminars have been conducted. While IFS inculcates Professionalism in new and old members, the seminars were held across health, general insurance, pensions and other retirement benefits areas. IAI is also committed to have its presence in wider area. This is also one of B&B goals announced by the President, IAI, Mr. Sunil Sharma. IAI conducted one each seminar in data science, banking finance and investment and risk in and beyond insurance. IAI is keen to understand and help the actuarial students. In this endeavor IAI conducts seminar for young actuarial students. One such seminar was held at Bengaluru. Students were apprised there about examination skills, HR expectations and know-how about employment opportunities available in Actuarial area.

In total 1000+ members and non-members have participated in these seminar in this financial year till date. 70 speakers' services were obtained. This has also helped meeting the first Object of Institute under The objects of the Institute is- to promote, uphold and develop the standards of professional education, training, knowledge, practice and conduct amongst Actuaries.

IAI put its heart to serve the cause of public interest. The Government of India protects the interest of farmers and IAI helps in this endeavor. Rabi and Kharif produce have distinct environs in which they are cultivated. The effective use of cover through crop insurance may help farmers to protect their and their cattle lives. Product design, pricing, reserving of crop insurance, catastrophe modelling, claim management, reinsurance were topics discussed in a seminar organized by advisory group on sustainable development and micro insurance.

In CIRB seminar, labour reforms, social security with case studies were mainly attributed to serving the cause of public interest. Keeping in view the longevity risk, market structure and challenges for annuities in India and long term financial security from consumer perspective were the topics discussed. The secure investment with data privacy and liability driven investments culminated with economic scenario generators from pension fund perspective were topics hotly debated.

The General Insurance industry is coming up strongly and so IRDAI has increased focus on this area. The Member (Actuary) graced the occasion. CEO panel from three general insurers elaborately discussed the growth and distribution, technology and capital requirement coupled with Actuaries panel who focused on expectations and challenges in new emerging products and Underwriters panel on product standardization and underwriting in digital era were important discussion points and generated lot of interest. Keeping in mind the profession's motto of 'serving the public interest', changes in Motor Vehicle Act and its impact on third party liability was discussed. Actuaries role in general insurance is increasing and Panel review in general insurance is just establishing. The industry learnings of two years for later item was discussed and also learnings from IFRS 17 gap assessments. Insurtech is the new norm and hence was a topic for discussion so that members are apprised with newer items catching the scene in the industry.

In addition to General Insurance, Health Insurance is the area coming up. Ayushman Bharat was a topic discussed which cater the service to the public interest. Key findings from analysis of IIB data, impact of modern treatment methods and IFRS 17 from health insurance perspective were few other items which were debated and discussed at length.

The Actuaries Day celebration to commemorate the birth anniversary of India First Actuary late Sh LS Vaidyanathan Saheb also saw many announcements from IAI President. Inaugural of Job Portal, launch of Professional video and felicitation of senior actuaries are worth to mention.

Though IFRS 17 from point of view of health and general was a topic in respective seminars yet a full- fledged seminar on IFRS was held in month of May 2019 and another slated in November 2019 where vice Chair of IFRS foundation Ms Sue Lloyd would be speaking. The subject is evolving and so many enthusiast speakers and participants took active part. The practical approach for Linked, Par and Non-par and transitional approach fair value assessment were deliberated discussed and debated at length.

As said B& B goals of IAI are targeted to have reach in wider areas say- data science, BFI and risk beyond insurance. Hence in each area a seminar has been conducted so far. The interest in IAI activities is so much that one of IAI seminar on data science and analytics held at Bengaluru attracted IFoA President, Mr John Taylor as one of the speaker. The current topics as augmented intelligence, machine learning, and actuaries in gaming industry, role of actuaries in banking industry, econometric models- CCAR were some of the interesting topics discussed which were appreciated by the personnel working in banking area. This would pave the way for employment of actuarial personnel in banking area and data science area.

Block Chain – Making Inroads In Micro Insurance

Today there is a greater need for personalized insurance covers that can meet the unique needs of customers. Traditional insurance industry faces the threat from emerging start-ups that are offering flexible covers through the use of automation and smart contracts.

Micro insurance is that insurance vertical that offers protection to low-income people against specific perils. The covers are offered at nominal premiums that are proportionate to the likelihood and cost of the risks involved.

Like other branches of insurance, micro insurance is sold and never bought. Western experts are scoffing at the narrow definition of micro insurance rather preferring a more inclusive definition of Micro insurance – products that are sold in the new sharing economy and those that offer solutions for challenges encountered in the sale and distribution of insurance. But the problem is that once these products are offered to all the strata of population, the distinction enjoyed by micro insurance ceases to exist. For developing economies, it is better to have micro insurance as a vertical dedicated exclusively for the marginalized sections of society.

In India, micro insurance is plagued with challenges like poor distribution ecosystem, lack of trust by insured and inordinate delays in processing claims. The trust deficit is the main reason why block chain technologies are making inroads in micro insurance – though these are early days in India. Micro insurance is a low premium – high volume sales business – so a conventional mindset of making profits through premiums may not be possible. Rather the need is to cross subsidize micro insurance through revenues generated from other insurance business models. Despite the fact that India has a huge marginalized population, volumes of micro insurance policies sold are meagre – as said earlier, trust deficit is the main reason. Either people have no faith that they will be paid the claims or claims are delayed much beyond the period of loss.

Micro insurance has to be event driven and simple. It has to be viewed with a different kind of lens. In fact, it should be viewed more as a social responsibility.

Insurance contracts are complex and the poorest of the poor have no recourse or inclination to read through such documentation. The process of selling and distributing micro insurance needs to be simplified. Traditional insurance processes will need circumvention to cut short the cycle time so that the process of collecting premium and disbursing claims is as smooth and seamless as possible.

Penetration of mobile phones in the Indian market is wide and immense. Using technology to improve the customer journey is what is needed. This is how smart contracts, artificial intelligence, and block chain technologies can demonstrate their disruptive power and reduce the complexities associated with traditional insurance buying and selling.

Thanks to the very nature of the insurance business where the value chain is splintered among different stakeholders – insurers, brokers, agents, third party administrators – no one seems to have a clear picture of the pain points of customers. As the focus keeps shifting to financial performance, reduction of overheads, product-based metrics and keeping the claims low – the insurance sector's focus towards customers ends up being a mere rhetoric. Service marketing is now skewed towards "customer experience management" and insurance services must come to terms with this reality.

Better data management, customer engagement and innovative pricing – all these can be achieved through automation.

Pay-as-you-go insurance is becoming popular in the West. Artificial intelligence can help in simulating real time weather data to make accurate predictions. Claims can be paid out when there is a triggering event even without claim intimation from the insured. Block chain technologies have the potential to revolutionize the insurance sector in the medium to long term provided insurers invest efforts in sufficient due diligence to understand the intricacies involved in such technologies.

Even in motor insurance, questions are being raised about the premium charged on a flat basis without considering the usage of the vehicle. Similarly, we need to understand that micro insurance needs to become more transactional to achieve a modicum of success. Provide cover when it is needed and ensure that claims are paid on time. The more transparent the claims process, greater is the propensity for reducing the intensity of trust deficit that the poor have about insurance claims. There is an urgent need to introduce parametric covers for micro insurance.

Insurance companies have to eschew their fragmented legacy systems to stay relevant to the marginalized sections of the society. Block chain can engender greater trust among the insured. Considering the fact that experimentation has been an anathema for the insurance sector so far, the implementation of a disruptive technology like block chain has to be carried out in an incremental fashion.

Besides micro insurance, pilot testing/ field trial of block chain can be done in health insurance and life insurance. When it comes to implementation of technology, it has to be emphasized that the implementation has to be in a consistent and compatible manner. Scaling up can be done gradually.

As of now, insurance companies lack the wherewithal to derive greater value from block chain. This necessitates a greater need for collaboration of insurers with other stakeholders – startups, insurtech firms, technology solution providers. India also needs a regulatory check on the long term impact of such technologies on the industry.

The insurance industry in West has been experimenting with strategic alliances. Aon, Etherisc and Oxfam in Sri Lanka have collaborated to provide block chain enabled micro insurance to small holder farmers in Sri Lanka. The premiums are affordable for the paddy field rice farmers. The alliance has believed in empowering farmers.

The success of block chain technologies will eventually pave the path for innovative covers in micro insurance and other branches of insurance. A block chain start up called Strataumn has entered into a strategic alliance with Deloitte. They have used block chain to allow users to submit insurance claims through Facebook messenger.

As block chain technology keeps evolving, the insurance sector's learning curve will pay rich dividends in the long run. Strategy is going to be the buzzword for the insurance sector in the near future. Let us wait and watch!

Written by

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"Mr. Venkatesh Ganapathy is currently associated with Presidency Business School as a faculty member."

The Actuary India wishes many more years of healthy life to the Associate & Fellow members (above 60) whose Birthday falls in November 2019

M G Diwan
Sankaran M R Nair
K J Pradhan

Dynamic and Calibration of Interest Rate Models: Ho-Lee and Hull & White Model

Disclaimer: The views and opinions expressed in this article are those of the authors.

We continue our learning curve by moving on to next level of interest rate modeling concept, one factor non-homogenous models. In this type of model one or more parameters of the model are time dependent which allows fitting the observed market yield curve. As model yield curve matches the observed market yield curve such model are also called No-arbitrage free. So far we had seen Equilibrium model i.e. Vasicek and CIR where current term structure is output of the model. But in No-arbitrage model currently observed interest rate structure in the market are used as input to the model hence also referred as endogenous model.

Need for fitting observed market yield curve:

If the fitted yield curve deviates from the market yield curve then the model may not replicate the traded price of simple bond instruments like Zero coupon bonds. As complex interest rate derivatives are hedged using simple bond instruments then this model may not price complex product correctly as well and model may not be arbitrage free. Further we fail to capture the market dynamic in the pricing of complex product and price so computed are not consistent with market.

Time-dependent model:

The market yield curve is continuous function of time represented by infinite number of tenor points and hence one factor model is not sufficient to match the market yield curve. But by making one or more parameter of the interest rate diffusion process as time dependent function, we can replicate the observed yield curve in the market. In this way, Ho-Lee and subsequent models can be calibrated to market data, meaning that it can exactly return the price of bonds comprising the yield curve.

Ho-Lee is the simplest of this type which would be our first step in understanding no-arbitrage models. Further all equilibrium models can be extended to no-arbitrage models by redefining the parameters of the model as function of time. Expressing the parameter as function of time is equivalent to have infinite number of parameters.

Ho-Lee model:

It's a simplified version of HJM model which we would see in the upcoming article under this series. The interest rate process under Ho-Lee model is given by,

$$dr_t = \eta(t)dt + \sigma dW_t \qquad \text{------ 4.1}$$

Here the drift rate η is time dependent and the volatility of diffusion process is constant and assumed same for all maturity.

It is non-mean reversion model which may not be suitable for modeling long term interest rate given the mean reversion property of interest rate.

Distribution of the model:

The spot rate distribution under the model follows a normal distribution and hence negative rates are also generated by this model.

Zero coupon bond price:

Ho-Lee is an affine type model and hence the bond price for different tenor based on the spot rate can expressed as,

$$Z(r,t) = e^{(A(t,T) - r(T-t))} \qquad \text{------ 4.2}$$

$$A(t,T) = -\int_t^T \eta(s)\,(T-s)\,ds + \frac{1}{6}c^2\,(T-t)^3 \qquad \text{------ 4.3}$$

Choosing function for drift $\eta(t)$:

In the above equation the drift function $\eta(t)$ need to be defined such a way that it result in matching of the computed zero coupon bond price with the market price. With the current time t^*, spot rate r^* and bond price $Z_M(t^*,T)$ we solve the relation,

$$Z_M(t^*,T) = e^{(A(t^*,T) - r(T-t^*))}$$

Substituting the value of A and taking log on both side of the equation,

$$\int_t^T \eta^*(s)(T-s)ds = -\ln(Z_M(t^*,T)) - r^*(T-t^*) + \frac{1}{6}c^2\,(T-t^*)^3 \qquad \text{------ 4.4}$$

Differentiating the above equation twice we get,

$$\eta^*(t) = c^2\,(t-t^*) - \frac{\partial^2}{\partial t^2}\ln(Z_M(t^*,t))$$

Is the drift term for bond with maturity *"t"* as on current time, t^* and we get a continuous value of drift term which changes with time "t".

In practice we do not have a differentiable yield curve; instead we have a finite number of bond prices. This means practically the drift function cannot be continuous and we may have to use deterministic function.

Calibration of drift $\eta(t)$:

The drift function would be sensitive to set of input market bond price. The deterministic function can be piece wise constant or piece wise linear or polynomial.

To simplify the calculation we assume piecewise constant. We collect set of zero coupon bond prices from the market and for each time interval in the set we assume the drift term is constant and the equation 4.4 can be simplified by taking starting time as zero, $t^*=0$.

$$\int_0^T \eta^*(s)(T-s)ds = -\ln(Z_M(0,T)) - r^*(T) + \frac{1}{6}c^2(T)^3$$

Starting with the first time interval from 0 to T_1 with constant η_1 we get,

$$\int_0^{T_1} \eta_1(T_1-s)ds = -\ln(Z_M(T_1)) - r^*(T_1) + \frac{1}{6}c^2(T_1)^3$$

Solving the integral we get the drift term,

$$\eta_1 = \frac{2}{T_1^2}\left[-\ln(Z_M(T_1)) - r^*(T_1) + \frac{1}{6}c^2(T_1)^3\right]$$

As we know the terms on the RHS has the market price of zero coupon bond with maturity T_1, we get the constant drift term applicable for the interval $(0, T_1)$.

We now determine the drift term applicable for the interval (T_1, T_2) using the integral equation 4.4,

$$\int_0^{T_1} \eta_1(T_1-s)ds + \int_{T_1}^{T_2} \eta_2(T_2-s)ds = -\ln(Z_M(T_2)) - r^*(T_2) + \frac{1}{6}c^2(T_2)^3$$

$$\eta_2 = \frac{2}{(T_2-T_1)^2}\left[-\ln(Z_M(T_2)) - r^*(T_2) + \frac{1}{6}c^2(T_2)^3 - \frac{\eta_1}{2}\left[T_2^2 - (T_2-T_1)^2\right]\right]$$

We can generalize the drift computation for any interval as,

$$\eta_k = \frac{2}{(T_k-T_{k-1})^2}\left[-\ln(Z_M(T_k)) - r^*(T_k) + \frac{1}{6}c^2(T_k)^3 - \frac{1}{2}\sum_{i=1}^{k-1}\eta_i\left((T_k-T_{i-1})^2 - (T_k-T_i)^2\right)\right] \quad \text{------ 4.5}$$

Calibration of volatility:

We should first calibrate the volatility term, C which would help us in computation of above drift function. This can simply be taken as the standard deviation of the spot rate observed in the market rather than computing both the drift and volatility parameter together which keeps things simple.

Input data for model calibration:

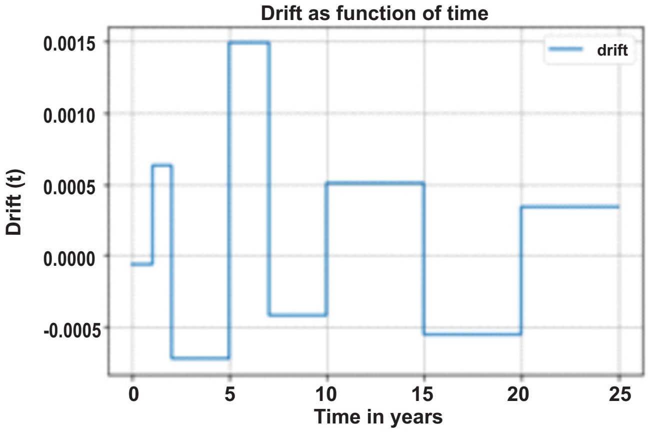
For Ho-Lee model we need series of zero coupon bond prices from time 0 to 25 years at discrete interval. This information is difficult to get from market given zero coupon government bonds are not issued at multiple maturity time. Hence for demonstration of the calibration process we extract the interest levels from the rate curve published by BoE at (1, 2, 5, 7, 10, 15, 20, 25) maturity years and calculate the corresponding zero coupon bond price with face value of 100.

The results for Cob 18-Sep-19 are given below.

Years	Interest Rate (%)	Zero Coupon Bond price
1	0.7681	99.24
2	0.7825	98.45
5	0.7447	96.36
7	0.7492	94.91
10	0.7786	92.54
15	0.8228	88.43
20	0.8418	84.56
25	0.8422	81.08

Fitting model to market data:

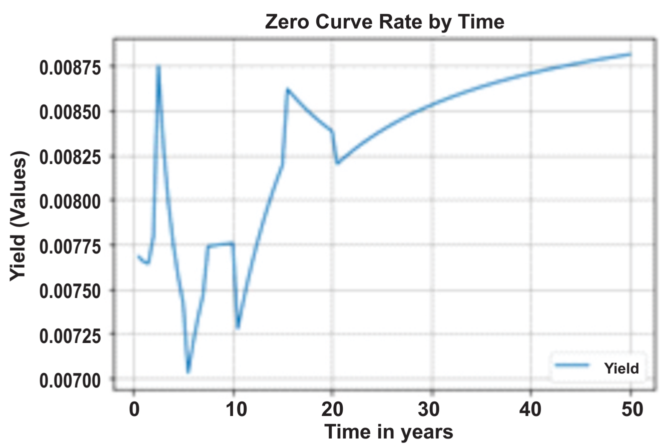
We consume the above zero coupon bond price and use the generalized drift equation 4.5 to calibrate the drift function as given below. The volatility term C is computed using the last one year standard deviation of daily spot rate change, we get C= 0.00814%. The step function of drift computed is shown below.



The drift component represents the average path taken by the short rate in the future in a no-arbitrage model. If the curve is steeply upward sloping then for maturities between T1 and T2 the drift would be positive and negative for downward sloping. We see both this trend in our fitted drift function.

Zero Curve generated by Ho-Lee model:

Using fitted step function of drift and equation *4.2* and *4.3* we first derive the function for A(t) and then the zero bond price is computed for term from 0.5 to 50 years in a step of half year. From the ZCB price we extract the yield curve which is plotted below.



Shapes generated by the model:

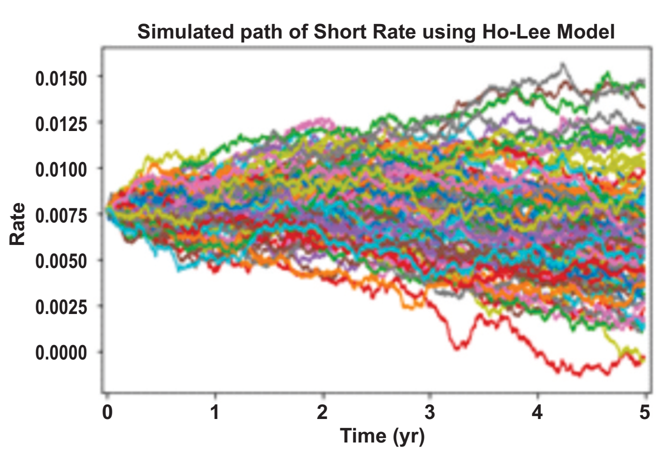
It can produce any set of shape which is depicted by the markets as we had seen in the fitted zero curves. But the Zero Curve may not be smooth as it needs to pass through all the observed market price.

Spot rate simulation under Ho-Lee model:

The spot rate simulation is done by using the diffusion process,

$$dr_t = \eta(t)dt + \sigma dW_t \qquad \text{---- 4.1}$$

Till now in all model when we did simulation the parameters were constant. But here at end of each step



of simulation for a path we need to map the correct drift value from the step function, as it is a function of time. Below shows 100 simulation path generated for term from o to 5 years in step of one days. As the distribution is normal we see negative rates in the longer tenors as expected.

Converting Equilibrium model to Arbitrage free:

Hull & White model:

It is possible to convert all Equilibrium spot models to arbitrage free model by just redefining one or more parameters of the model as function of time. Taking the Vasicek model covered in our earlier series,

$$dr_t = \gamma(\theta - r_t)dt + \sigma dW_t \qquad \text{------2.2.1}$$

If we modify the long term mean, theta as function of time we get the well know Hull and white model as given below,

$$dr_t = \gamma(\theta(t) - r_t)dt + \sigma dW_t \qquad \text{---- 4.6}$$

This is also called extended Vasicek model and if the mean reversion rate is zero it reduce to Ho Lee model. If the volatility is also made as time depended model then extended Vasicek model becomes.

$$dr_t = \gamma(\theta(t) - r_t)dt + \sigma(t)dW_t \qquad \text{---- 4.7}$$

So by making the volatility as function of time we can fit both the term structure of the interest rate and volatility observed in the market. For fitting the volatility surface we would require trades Interest rate options. But it would be complex and not much accurate if the options are not liquid which the case in the market generally.

In the similar fashion if we make the theta as function of time in the CIR model we get the Hull and White type II model.

$$dr_t = \gamma(\theta(t) - r_t)dt + \sigma\sqrt{r}\, dW_t \qquad \text{---- 4.8}$$

Zero coupon Bond price in Hull White model:

We derive the drift function by equating the derived bond price with the market price. Hull White model is an affine model with bond price,

$$Z(r,t) = e^{(A(t,T) - rB(t,T))} \qquad \text{---- 4.9}$$

$$A(t,T) = -\int_t^T \eta(s)\, B(s,T)\, ds + \frac{c^2}{2\gamma^2}\left[T - t + \frac{2}{\gamma} e^{-\gamma(T-t)} - \frac{1}{2\gamma} e^{-2\gamma(T-t)} - \frac{3}{2\gamma} \right] \qquad \text{---- 4.10}$$

$$B(t,T) = \frac{1}{\gamma}\left[1 - e^{-\gamma(T-t)}\right] \qquad \text{---- 4.11}$$

Drift function in Hull White model:

To fit the yield curve observed in the market at current time t^*, spot rate r^* and bond price $Z_M(t^*,T)$ we solve the relation,

$$- \int_{t^*}^{T} \eta^*(s)\, B(s,T)\, ds + \frac{c^2}{2\gamma^2} \left[T - t^* + \frac{2}{\gamma} e^{-\gamma(T-t^*)} - \frac{1}{2\gamma} e^{-2\gamma(T-t^*)} - \frac{3}{2\gamma} \right] = \ln(Z_M(t^*,T)) + r^* B(t^*,T)$$

Differentiating the above equation twice we get,

$$\eta^*(t) = \frac{\partial^2}{\partial t^2} \ln(Z_M(t^*,t)) - \gamma \frac{\partial}{\partial t} \ln(Z_M(t^*,t)) + \frac{c^2}{2\gamma^2} \left[1 - e^{-2\gamma(t-t^*)} \right] \qquad \text{------ } 4.12$$

Rest of the calibration process is similar, as we did in Ho-Lee model by defining a step function for drift rather than continuous. Hence we would not repeat those processes again for Hull White model.

In this series we covered one factor endogenous model along with the calibration process with worked example. Ho-Lee model was simplest model to understand the concepts but has limited practical application as it is not mean reverting. This can be overcome by converting the equilibrium model to arbitrage free model like Hull White model. Even thought we had addressed one of the concerns of fitting the yield curve but still we have issue of using perfect correlation across tenors of yield curve. This limitation of one factor model can be overcome by having multi factor model which would be focus of our next deep diving exercise in this series of Interest rate models.

"Success is not a Markov Process"
Keep the momentums going!!!

Written by

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"Mr. Chinnaraja Pandian is a member of The Working Group on Wider Areas of Actuarial Application."

New Zealand

Life Insurance consolidation

The integration of Sovereign into AIA[(1)] and OnePath into Cigna[(2)] has begun. Meanwhile, AMP Life has been placed into run-off, pending a transfer to Resolution Life expected next year[(3)].

At their request, the licence issued to SCOR Global Life SE was cancelled on 1 May 2019.

Regulation

On 29 January 2019 the Financial Markets Authority and Reserve Bank of New Zealand released the findings from their joint review of conduct and culture in New Zealand life insurers[(4)].

Recommendations included:

- Boards articulating expectations and ensuring management identify and manage conduct and culture matters;
- Greater oversight and comprehensive training on conduct expectations for intermediaries;
- New products should be designed to provide good customer outcomes;
- Clear policies, processes and training for staff dealing with vulnerable customers;
- Training staff to deal with complaints and establishing formal remediation frameworks;
- Reviewing commission and incentives to support good customer outcomes and mitigate conflicts of interest.

There is ongoing work in this area for many life insurers. The emphasis is on individual rights, rather than the collective security of the insurance pool.

The Ministry of Business, Innovation and Employment released options papers in April 2019 on Insurance Contract Law Review[(5)] and Conduct of Financial Institutions[(6)].

Areas of concern include:

- Sales are often prioritised over good customer outcomes. Sales incentives can create a conflict of interest for intermediaries and in-house staff.
- Exclusions aren't always prominent, explicit or fair. Some claims are declined for non-disclosure of stale information that is irrelevant to the actual claim event.
- There is limited enforcement action to prevent customers being subject to unfair contract terms. There is no legal obligation on insurers to pay promptly or treat claimants transparently.
- Industry self-regulation could give rise to a conflict of interest (outside conflicted remuneration for advisers who should put the interests of customers first).
- The maximum award and scope of complaints adjudicated by disputes resolution schemes can restrict access to justice for customers who have suffered a big loss and can't afford the cost and delay of going to court.

The Financial Services Legislation Amendment Act[(7)] was enacted in April 2019 with the new licencing requirement for advisers taking effect from June 2020[(8)].

Appointed Actuary thematic review

RBNZ are conducting a thematic review[(9)] on the role of the Appointed Actuary. This is described on their website as follows:

Appointed actuaries have an important statutory role in the New Zealand prudential supervision regime for insurers, with a connection to all three pillars of supervision.

The appointed actuary's independent advice to boards on the financial condition and solvency of insurers assists the self-discipline pillar.

The appointed actuary's section 78 report that is required to be attached to annual financial statements assists the market discipline pillar.

The appointed actuary's sign-off of solvency reporting, annual financial condition report, and whistle-blowing requirements assists the regulatory discipline pillar.

Over the past few years the Reserve Bank has stated its intention to undertake a thematic review of the appointed actuary regime. The review is now in progress. The objectives are to:

1. better understand how the appointed actuary role works in practice for insurers, actuaries and supervisors; and
2. identify potential areas for improvement (e.g. policy changes or guidance) to make the role and regime more effective for insurers, actuaries and the Reserve Bank. Note any policy changes will require consultation.

We received much constructive and useful feedback on the draft plans for the review from insurers, actuaries, and other stakeholders. Some aspects of feedback have been incorporated into the finalised plans, while other feedback will assist our ongoing supervision and the IPSA review.

A report is expected in March 2020 with generalised findings, good practices and possible changes to the appointed actuary regime. There will be consultation for any policy changes.

Indications are that almost all insurers are happy with the Appointed Actuary regime and place great reliance of the Financial Condition Report.

There is a range of practices on having an external or internal Appointed Actuary. For internal appointments, smaller insurers combine the role with the Chief Actuary whilst larger insurers have are independent of the actuarial function. Reporting lines also vary. Each insurer likes the way they do it, with no one size fits all.

Review of supervision of CBL

On 3 July 2019, RBNZ released an independent review of its supervision of CBL Insurance liquidation[10].

CBL was a general insurer that received a significant volume of inward reinsurance of French building warranty business. RBNZ had serious concerns about the adequacy of CBL's claim reserving dating back to 2013. However, the internal legal advice at RBNZ was that the amount certified by the Appointed Actuary could not be challenged by the regulator. Meanwhile, the French regulator had standard reserving tables that were considerably more onerous than the reserves held by CBL.

Due to the long-tail risk, the Appointed Actuary had recommended in the 2013 FCR that there was a need for careful monitoring of claims development patterns and that the target solvency ratio should be at least 150% rising to 200%. The Appointed Actuary subsequently resigned because claim data was not provided. Unfortunately, RBNZ did not ask the former Appointed Actuary about his departure.

In mid-2017, the Gibraltar regulator of Elite (a ceding company that acted as an intermediary between the French market and CBL) notified RBNZ of their concerns on under-reserving.

RBNZ then took decisive action by appointing two firms of actuarial experts who together with the new Appointed Actuary all agreed that claims reserves needed to be strengthened substantially.

Ultimately, CBL was placed into liquidation.

The review's key recommendations are that the Bank:

- Act decisively, making full use of the powers available to it when in doubt about a company's financial soundness;
- Strengthen the governance obligations of insurers through greater scrutiny and accountability of boards, management and appointed actuaries;
- Increase resources to the supervisory team and the policy team to a level consistent with the Bank's goals, priorities and risk appetite;
- Modify the Solvency Standard and, if necessary, seek to modify the Insurance (Prudential Supervision) Act 2010 to strengthen the capital management and solvency framework for licensed insurers.

New Zealand Society of Actuaries

The Richard Bruynel Research Prize for the most original and innovative paper presented at last year's conference was awarded to Jeremy Holmes, Marcella Lau and Aaron Park for their paper on modelling vehicle injuries and fatalities[11]. This was presented along with other awards at the NZSA winter dinners on 14 and 15 August[12].

The Financial Servics Forum will be held in Wellington on 28 November 2019[13].

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Institute of Actuaries of India

The Actuary India – Editorial Policy

Version 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;

a. Disseminating information,
b. Communicating developments affecting the Institute members in particular and the actuarial profession in general,
c. Articulating issues of contemporary concern to the members of the profession.
d. Cementing and developing relationships across membership by promoting discussion and dialogue on professional issues.
e. Discussing and debating issues particularly of public interest, which could be served by the actuarial profession,
f. 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;

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

a. Members of other international actuarial associations across the globe
b. Regulators and government officials
c. Professionals from allied professions such as banking and other financial services
d. Academia
e. Professionals from other disciplines whose views are of interest to the actuarial profession
f. 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 programs 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 content 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.

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