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the Actuary INDIA

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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"

CHIEF EDITOR

Sunil Sharma

Email: sunil.sharma@kotak.com

EDITOR

Dinesh Khansili

Email: dineshkhansili111@gmail.com

COUNTRY REPORTERS

Nauman Cheema
Pakistan

Email: info@naumanassociates.com

Kedar Mulgund
Canada

Email: kedar.mulgund@sunlife.com

T Bruce Porteous
United Kingdom

Email: bruce_porteous@standardlife.com

Vijay Balgobin
Mauritius

Email: vijay.balgobin@sicom.intnet.mu

Rajesh S
Singapore

Email: prasannarajesh30198@yahoo.co.in

Devadeep Gupta
Hongkong

Email: devadeep.gupta@prudential.com.hk

John Smith
New Zealand

Email: johns@fidelitylife.co.nz

Frank Munro
Srilanka

Email: Frank.Munro@aia.com

Krishen Sukdev
South Africa

Email: krishen.sukdev@gpaa.gov.za

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The Actuary India - Editorial Policy

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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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Ver. 2.00/23rd Jan. 2011



Message From The President



The financial year 2017-18 has ended and a new financial year has begun. For many of us who are involved in year end statutory and other valuations and the regulatory reporting exercise, the peak season has commenced and it's high time to ensure that all the requirements of the actuarial professional standards besides the regulatory and other requirements are taken care of. It's also the time to refresh on the professional and other standards and we have a checklist ready.

In the area of General and Health insurance/ reinsurance, we have introduced recently the peer review of the appointed actuaries' year end statutory valuation work as per the requirements of the Actuarial Practice Standard (APS) 33. The Institute recognised the practical difficulties being faced by some of the peer reviewers and the appointed actuaries working in general and health insurance industry. Therefore, we have relaxed on the timelines for the finalization of the peer review work. The relevant announcement has been shared with the members and

is also available on our website.

There are four key accomplishments at the Institute office during the month of March 2018 - the successful completion of the March 18 diet examinations, Seminar on "Current Issues in Retirement Benefits (CIRB)" in Gurugram, Issuance/ renewal of over 100 CoPs, Seminar on the "Current Issues in Life Insurance (CILA)" at Mumbai.

The March examinations were held without any major issue reported so far. We are totally geared up and making all the efforts to ensure that the results are declared on time. I would suggest to the students that without waiting for the results, they may in between study for another subject(s). I also extend my good wishes to the students.

CIRB seminar was attended by over 60 delegates in Gurugram and was a good success. Despite it being held in the month of March, there was good participation and enthusiasm. Eight practitioners shared their approach on how they have planned for the compliance with APS 27. The seminar remained more relevant in wake of increased gratuity limit to ₹ 20 lacs.

Similarly CILA seminar was attended by over 100 participants, despite being in the last week of March. The six theme based sessions were spread over two days, 26th March and 27th March. There were two survey results presented and the same are being published in the Actuary India Magazine - One on with profit business and another on Best estimate assumptions. The other topical sessions were on early lapses, race for protection business, the role of actuary and

future actuaries. The increased use of technology through interactive application- "sli.do" for asking online questions and online on the spot audience poll used in seminar was much appreciated. We will continue to see more and more usage of the technology in upcoming seminars.

These two successful seminars held in month of March showed that IAI seminars/ programs are acceptable and has developed their brand. Members just don't attend programs for CPD requirements but also they believe that our programs have a good platform for learning and sharing the knowledge.

The Members who applied for CoPs were issued their CoPs with speed and much lesser hassles for the financial year 2018-19 compared to the previous years. The CPD hours were updated in IAI login of respective members. This is ongoing process and members support eased the work. The members got chance to apply for restrictive CoP with one or more practice areas opted.

On the students training front, the IAI is planning to publish a calendar for the next six months in few days, most of the training programs would be focussed to meet hands on experience for starters in various practice areas (Retirement benefits, Life, general and health insurance) as well as on R- software and basic/ advanced Excel. A survey has already been rolled out among student members in order to understand important pocket cities, leading to the training programs reaching out to them.

I wish our members all the professional successes.

8th Capacity Building Seminar in General Insurance

Organized by: Advisory Group on General Insurance (GI), IAI

Date: 22nd – 23rd February, 2018

Venue: Hotel Sea Princess, Mumbai

Day 1

Inaugural and Welcome Address:
Mr. Puneet Sudan, Secretary, GI
Advisory Group, IAI



In Inaugural Address, **Mr. Punnet Sudan** informed the gathering that with over 90 registrations, there was a great interest in the seminar. He said that the GI market is dynamic and there is a lot to learn given its fast pace.

Session: Some new-age and innovative products being launched around the world.

Speaker: Mr. Hitesh Kotak, CEO, Munich Re.



Mr. Hitesh shared some product constructs with the gathering in the

form of case studies to demonstrate that product innovation is the key to beat new age entities. He illustrated the changing times by quoting the example of the various efforts in attempting fuel conservation and the futility of it in the age of electric cars.

He went on to discuss attributes of the following four 'new age' products focussing on the real need of the customer:

- **Cyber buy back cover** - Most insurance policies exclude cyber and this cover provides the option to buy back. Such a cover may prove to be key for instance to Oil and Energy sector companies which may lose critical exploration/ drilling data in the event of an attack.
- **Green-Tech solutions** - such a cover may be key for instance to Solar Parks; he discussed how the gestation period for such a facility is 20-25 years and it is a huge investment. The risks involve modelling defects within the projection software, warranty failures on part of the providers and general losses caused by solar shortfall.
- **Non Damage Business Interruption** - perils within such a product could potentially be business interruption caused by pandemics for instance for hotels.
- **Inherent Defect Insurance** - A ten year construction cover for example which starts only once the construction is complete. A special feature discussed was

the observation that there are two peaks observed in the claims reporting, one around the 2-3 year mark and the second after about 7-8 years.

Session: Motor Insurance: Market overview and considerations in product design and underwriting

Speaker: Mr. Navneet Bhatt, Vice-President & Head - Auto & Actuarial Analytics, Tata AIG GIC Ltd.



In the session, Mr Navneet, spoke about the Motor Insurance market share at 43% and discussed various aspects of the catalysts for the motor insurance market viz. discount wars, smaller ticket size, shared mobility, 'pay as you drive' concept etc. He further emphasised on the major disruptors like

- Non-traditional players like Original Equipment Manufacturers, Telcos, Financial institutions and Tech Giants (Google/Facebook etc.) who own a lot of data
- Digitisation from the point of view of online buying experience and access to driver data/ connected cars

He also discussed partnering with the above disruptors for mutual gain as they have the data and we in the insurance industry have the expertise while also tapping into internally available information say from customer data available from other lines of business.

Session: Motor Insurance: Case study in pricing - complex and real life modelling challenges

Speaker: Mr. Sameer Kakrambe, Senior Manager, HDFC ERGO GIC Ltd.



Mr. Sameer took us through a presentation which was over two hours in length and talked us through various steps involved in performing a GLM exercise. A few takeaways were thinking about the model in detail beforehand, considering the suitability of data, length of the data bearing in mind the application of IBNR if very recent undeveloped data has been used. He also discussed the

applicability of Burning cost models versus Frequency / Severity type models by considering their pros and cons and therefore suitability of each for different purposes.

Session: Overview of the portfolio of products of a large GI company in India and its evolution over time

Speaker: Mr. Sanjay Datta, Chief Underwriting, Claims and Reinsurance, ICICI Lombard GIC Ltd.



Mr. Sanjay spoke about the evolution of the GI market in India and used his 'mutation' theory to provide an overview of the industry and the evolution of the products in the market. He discussed the impacting factors on the industry and evolving data sets while also shedding light on the way forward.

He described the journey of the industry moving from Tariff-based

pricing moving towards Risk-based pricing and the transition from erstwhile Insurance Products approach to a Risk Management Solutions approach. He also discussed the impacting factors like the use of add-ons to manage premiums and risk and regulatory impacts. Within the evolving data sets, Telematics and automatic claim settlements were discussed along with fraud triaging.

Vote of thanks and felicitation: Mr. J V Prasad, Member, GI Advisory Group, IAI



Mr. J V Prasad gave a vote of thanks at the close of the first day of the seminar and summarised the events of the day.

Day 2

Welcome Address: Mr. Biresh Giri, Chairperson, GI Advisory Group, IAI



The session was declared open by **Mr. Biresh Giri**. He spoke about the

importance of upskilling the GI resource within our country.

Session: Crop Insurance: Introduction, journey so far and current market overview

Speaker: Mr. Charles Asirvatham, Deputy General Manager, GIC Re.

Mr. Charles covered the salient features of the game changing government scheme Pradhan Mantri Fasal Bima Yojna (PMFBY). India now ranks as the third largest market for Crop Insurance in the world and the largest market in terms of the



premium ceded to reinsurers. The experience of the market has been challenging since 2013-14 though it is anticipated that 2016-17 was a good year for crop insurers. Crop insurance is split 55%-45% between the public and the private sectors in FY 2017-18. The total premium of INR 26,000

crores was split 51.5% GIC Re, 27.5% other reinsurers and 21% Cedents' retention.

The experience garnered from 33 seasons of the NAIS scheme suggested a loss cost of 11.86%. Highlighting the need for pricing discipline, Charles also showed that the national level premium charged under PMFBY in FY 2017-18 was 11.4%. In the same context, he also touched upon the proneness of our country to natural catastrophes like droughts as well as the heterogeneity that arises as a result of the difference in the granularity of the data available for pricing versus that at which the claims are settled. The crop insurance market is set to experience growth year on year with active involvement of both the central and state government.

Session: Crop insurance: Challenges and considerations in pricing and underwriting.

Speaker: Mr. Kolli N Rao, Senior Advisor, IRICBS



In presentation, Mr. Kolli built on the introduction provided by Charles to expand further on challenges and considerations in pricing and underwriting Crop Insurance in India. He explained that the premium rate is a summation of burn cost (based on yield data), Heterogeneity load (as described above), Non - parametric benefits (eg. Prevented sowing, localised calamities and post-harvest losses), special loads (catastrophe load/ miscellaneous load) and business cost/ margins. In his view, therefore the formula for derivation of 'actuarial price' for a tender

submission was straightforward given the guidance provided by GIC in the matter. He posed the question about how given the context above, the price submissions can be as varied as they are in practice. He then went on to discuss the various elements of challenges with respect to yield data and in particular the peculiar feature of the threshold yield used for pricing versus that used for settlement. Multi-year tenders, calamity years, multi picking crops and their distinctiveness were also discussed. This line of business, especially in the Indian context is also a classic example of a class where Political influence is a critical external variable.

Session: Crop Insurance - Challenge in reserving

Speaker: Ms. Megha Garg, Former Appointed Actuary, AIC of India



Ms. Megha covered the basics of Crop insurance with respect to the product life cycle, i.e. acquisition, risk exposure and settlement nuisances. The quick reporting pattern and subsequent settlement patterns suggested the importance of regular monitoring to respond to emerging experience. The nature of claims within this class means that loss ratio methods are most applicable to arrive at ultimate claims and IBNR calculations. Appropriate choice of ULR assumption given the huge premium volumes is therefore vital. This information may be further supplemented by additional information available from weather forecasts. Important questions

were also raised in the presentation around applicability and approach towards UPR/ PDR in the view of tenders being submitted in February (for Kharif crop) and finalised only post July. **ACTION for the GI advisory board** to issue further guidance as a result of the discussions around PDR/ UPR and a possibility of a claims equalisation reserve via a Crop Insurance Working Party.

Session: Presentation and Discussion on Peer Review (APS 33)

Speaker: Mr. Hiten Kothari, Appointed Actuary, HDFC ERGO GIC Ltd.



Mr. Hiten discussed some of the salient features of Actuarial Practice Standard for Peer Review. Hiten covered the objectives of the standard (effective 31st December 2017) being published and also highlighted the difference between this standard (issued by IAI and the possible Independent Actuarial Valuation related draft to be issued by IRDAI. He suggested that the former is mandatory for the year end 31st March 2018 and meant to cover a methodology and assumptions review not necessarily leading to estimates of reserves, however the exposure draft by IRDAI may have a wider scope. Questions were raised about the timing of the peer review and the impending delays it could cause to the statutory reporting. Companies facing such constraints were urged to request for extensions individually.

Session: Areas of data analytics and some case-studies in a General Insurance Company

Speaker: Mr. Chirag Bhojani, VP - Business Intelligence, ICICI Lombard GIC Ltd.



Mr. Chirag said that as dashboards move to predictive analysis, data moves towards intelligence and that people, structure and technology are key enablers of analytics. He spoke of investing in data as an asset. He went on to discuss case studies covering the following areas:

- Customer scoring - use of analytics for targeted sales
- Anomaly detection - fraud triaging
- Health claims - Implement deep learning methodology to automatically accept / reject / refer of high frequency claims with an acceptable level of confidence
- Impact of telematics on Motor Pricing

In his conclusion he suggested that the amount of data available will continue to grow data will continue to explode, new solutions will continue to emerge (currently Machine learning and Artificial Intelligence) and more and more players will embrace these new solutions to gain a competitive edge.

Session: Discussion on questions and ambiguities related to FCR preparation

Speaker: Mr. Neel Chheda, Appointed Actuary, TATA AIG General Insurance Co Ltd;

Mr. Puneet Sudan, Secretary, GI Advisory Group, IAI



This was an open forum whereby some participants submitted their FCR related queries in advance of the seminar and these were then deliberated upon by the gathering. Various ambiguities and their possible interpretations were discussed by the participants. Some examples of the issues discussed were ambiguities in the glossary section, definition of lines of business and common practices with respect to discounting liabilities for the ALM and the risk management section of the FCAR. A few areas of commonality discussed were in relation to the principle of correspondence and clearly documenting underlying assumptions and understanding for each of the judgement areas exercised. **ACTION for the GI advisory board** to issue further guidance on the ambiguous areas.



About the Author



Ms. Sana Konnur



sana.konnur@pwc.com

“Ms. Sana Konnur is currently working as a Principal Consultant at PwC Actuarial Services in Mumbai.”

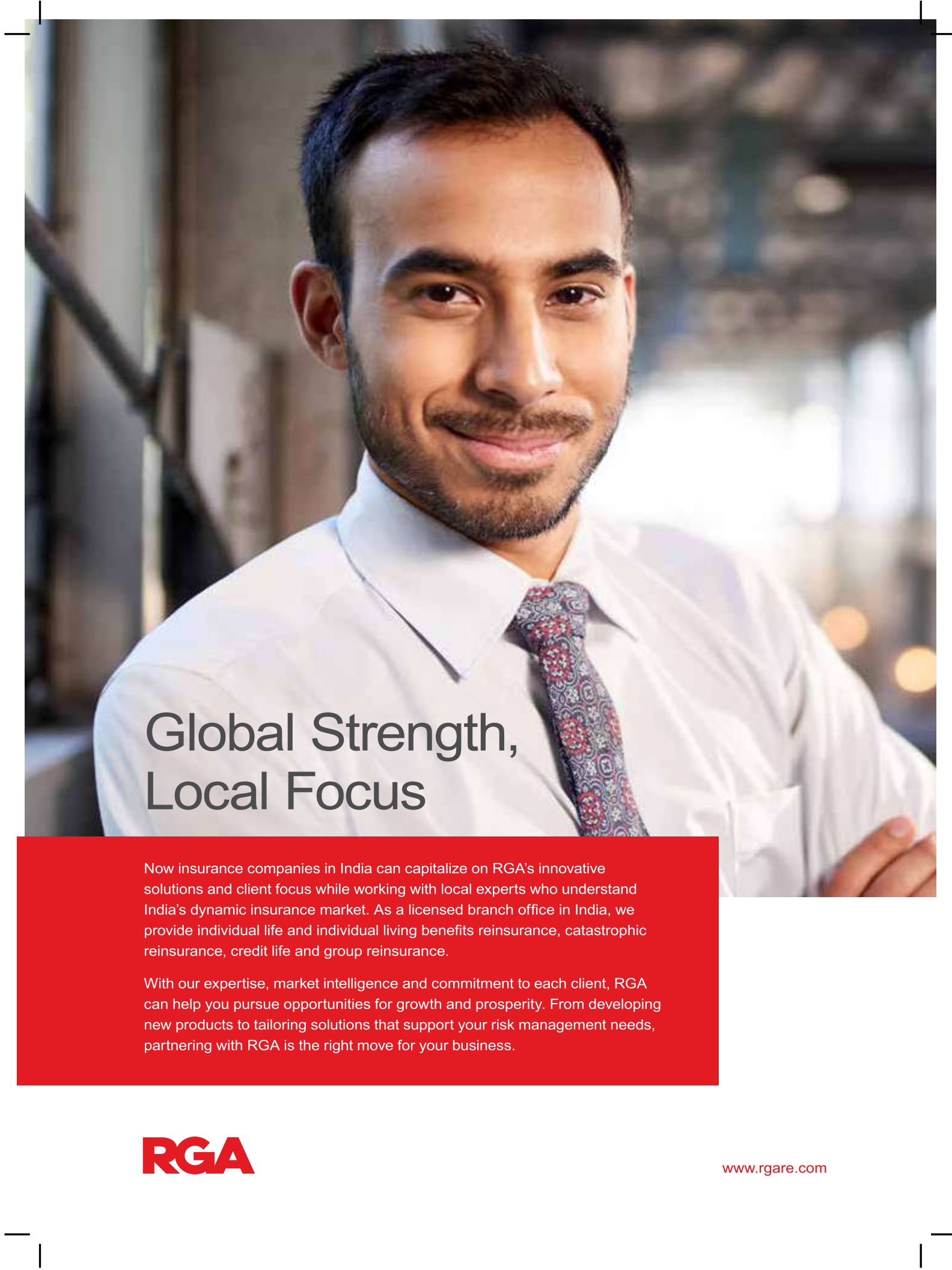
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It was fun &
great learning
experience.
Thank you

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session like the
one on Health
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Professionalism Ethics and Conduct Seminar

Organized by: Advisory Group on Professionalism, Ethics and Conduct (PEC), IAI

Date: 28th February, 2018 **Venue:** Hotel Sea Princess, Mumbai

"Professionalism: It's NOT the job you DO, it's HOW you DO the job"

What is Professionalism? For some, being professional might mean dressing smartly at work, or doing a good job. For others, being professional means having advanced degrees or other certifications. Professionalism encompasses some of these definitions. But, it also covers much more.

The Merriam-Webster dictionary defines professionalism as "the conduct, aims, or qualities that characterize or mark a profession or a professional person"; and it defines a profession as "a calling requiring specialized knowledge and often long and intensive academic preparation."

While no single definition covers the whole spectrum of attributes that professionalism encompasses, we can certainly mention some attributes that would make a person professional viz. specialized knowledge, situational awareness, competency, honesty and integrity, accountability and self-regulation etc. This seminar aimed to capture all the attributes of professionalism, ethics and conduct and throw light on how it applies to us while discharging our duties in the actuarial space.

The seminar started with the welcome speech by **Mr. Anil Kumar Singh, Chairperson, PEC Advisory Group**. He informed the audience that this is the first seminar for this kind on this subject and hoped that such seminars will continue to be conducted in future. He emphasized that though we all are professionals with many of us long experience in the industry then why we still need such session as such forums provide insight into professionalism by way of sharing our experience, our conscience which are our biggest guides.

Session: Actuaries and Professionalism

Speaker: Mr. Sanjeeb Kumar, President, Institute of Actuaries of India



Commencing the session with the definition of an Actuary, their roles and requisites for an actuary, **Mr. Sanjeeb Kumar** differentiated between necessary and sufficient conditions for providing actuarial

advice. He highlighted that although technical expertise is a necessary but not a sufficient condition for providing actuarial advice. Professional Attributes like experience, ethics, exercise of judgement and independence are equally important as technical skills and makes the sufficient condition for adding actuarial value/ rendering actuarial advice.

For actuarial profession, he quoted IAA in defining the professionalism as

- The application of specialist actuarial knowledge and expertise;
- The demonstration of ethical behavior, especially in doing actuarial work; and
- The actuary's accountability to the professional actuarial association or similar

professional oversight organization based on a code of conduct.

In this very elaborate session, he covered topics ranging from professional actuarial paradigms, professional conduct/misconduct to very detailed description of Professional Conduct Standards (PCS) which was insightful for the audience and acted as a refresher for them.

In nutshell, this entire spectrum of conduct expected from actuaries can be simply mentioned, as per IAA, in terms of:

Principles of professionalism:

- A. Knowledge and expertise
- B. Values and behavior
- C. Professional accountability

Session: Ethics and Conduct

Speaker: C.A. Sushil Solanki,
Partner, M/s TLC Legal & Principal
Commissioner of Service Tax (retd)



Having a long and illustrious career as Indian Revenue Services officer with the Govt of India, **Mr. Solanki** shared a deep insight into the functioning of government and regulatory bodies on direct and indirect taxation and how professionalism and ethics are essential to discharge duties in its functioning.

He started the session with mention of the ongoing controversies of banking scam and the role of auditors in detecting and preventing such events. He strongly emphasized that ethics are not only for the profession but we need to follow and practice them in our individual life also. He quoted Scottish economist Adam Smith who propounded the theory of Capitalism which advocated that if you pursue your rational self-interest, the society at large will automatically benefit out of it. He related this theory to professionalism that if I as an individual manage my conduct and demonstrate ethical behavior and professionalism then the entire community will benefit out of it.

Another concept he highlighted during the session was - Total Societal Impact - that corporates are increasingly following. In our context, whenever we discharge our duties as an Actuary and make an actuarial opinion, we need to take into account all the stakeholders like the regulator, policyholders, trustees, shareholders, management etc. whenever we perceive a conflict of interest. He cited numerous examples from industry where one judgement

against/favoring one organization impacted similar other industries.

Mr. Solanki brought about an important distinction between 'goals' and 'purpose' of life. Our goals can be in terms of position or money and we should pursue our goal with dedication. But at the same time, we should identify 'purpose' of our life like being happy, satisfied, working with the society etc. Then he linked it to professionalism that if we are able to harmonies 'goals' with 'purpose' of life then it will make it simple and easy for all the professionals like to discharge are duties in ethical manner.

Session: Video 1 & Video 2 - Professionalism

Speakers: Ms. Anuradha Lal,
Consultant and Co-founder and
Director, Arishta Soft PVT. Ltd.

Mr. Anil Kumar Singh, Chief
Actuarial Officer & Appointed
Actuary, Birla Sun Life Insurance.

Video 1: This session was about a case study shown through a video. The title of the video was - "Silver Bullet". As always, videos having a capability to engage audience, this session was interactive indeed.



The video was about an organization planning to acquire another one and the CEO of the acquiring company reaching out to the chief actuary for his opinion/report on the valuation of the target company. The challenging part was that the report was to be prepared on the same day and since it was highly confidential matter, the actuary could not take any external help or advice. So here starts the dilemma for the actuary!

and no external help available?

This case study triggered the professionalism present in the audience and many of the senior members cited practical problems like these in their day to day functioning. It was a delight to see majority of the members participating actively in the discussion and suggesting ways to handle such situations. Some of the possible solutions that came out were:

- Give a range of results rather than a single number with scenario/sensitivity testing
- Provide results with caveats if there is not appropriate experience/external help available
- If there is insufficiency of data - disclose it
- Refuse to accept the assignment or seek more time/external help
- Ensure that due diligence is done as ultimately you own the numbers
- Set realistic expectation and talk/communicate at appropriate level
- If there is a conflict of interest - disclose it.

While this list is not exhaustive and there can be more ways in which such situations can be handled but one

aspect that clearly came out that such situations demand highest degree of professionalism and one must act with clarity in communication and with integrity.

Video 2: This session again was a case study shown through a video. The title of the video was - "Lost in Transition". Like the previous session, this was again a very interactive session.

The video was about an insurer launching a new insurance product and a junior actuarial analyst was asked to prepare a report on the profitability of the product. After a lot of hard work, the analyst submits his almost 1,000-page report to the reviewer actuary before proceeding on a vacation. The report highlights certain scenarios and citing that in few of the scenarios, the product may not be profitable and may need capital infusion. The reviewer actuary finds this report too long and heavy and asks for an abridged version. Since the analyst had to leave for a vacation, an abridged version is prepared quickly. The reviewer actuary takes the abridged version to the chief actuary who in turn finds this report too bulky. He asks the reviewer actuary to further shorten it. So, another shorter version of the report is given to the chief actuary who submits it to the CEO. The CEO needs to submit this report to the Board of Directors in another city. The CEO forgets to carry the report to the Board meeting and she gets the information from the chief actuary on phone. Poor signals plus noise in the background, the conversation over phone was not effective and many erroneous figures get passed on showing this product as highly profitable. The results of the product eventually show that it is a highly unprofitable product.

This case study also generated a healthy discussion amongst the audience emphasizing that

- How a clear and appropriate communication is essential in our profession.
- An actuary should be able to communicate a brief or a precis with all the key points. Lay importance on all the critical points
- All the critical points - whether positives or negatives should reach and be understood by each level of audience

This session emphasized that how a clear and sufficient communication is critical in our profession to make appropriate business decisions.

Session: Actuarial Practice Standard of Institute of Actuaries of India

Speaker: Mr. Sanket Kawatkar, Principal & Consulting Actuary, Milliman



Mr. Sanket Kawatkar in this session highlighted all the Actuarial Practice Standards (APS) and Guidance Notes (GN) of IAI applicable to life and non-life actuaries. He also drew reference to Professional Conduct Standards (PCS). These topics acted as refresher for all the new and seasoned actuaries in the audience. Mr. Sanket supplemented many of these APS and GN with industry examples based on his vast experience.

Since each country has its own standards, Mr. Sanket urged actuaries working in different countries to join local forums and bodies to be in the know of local rules and standards.

Similar to the video sessions, this session had three case studies, again drawn from actual industry experience which generated a good amount of discussion amongst the audience.

The first case study was around a situation when two different actuaries working with the same consulting firm receive consulting

assignments from the acquiring and the target companies of a M&A deal and the discussion was around whether they should accept these assignments keeping in view the potential conflict of interest. Issues that came up were Chinese walls on data, staff, file folders etc. to be created to avoid potential conflict of interest again highlighting the need for high degree of professionalism in alignment with PCS.

The second case study was about accepting a peer review assignment where the Appointed Actuary is your friend. How to handle a situation when you observe certain gaps in the work done by the AA. The ensuing discussion highlighted important professional elements needed in line with APS4 of IAI to handle such situations and expectation of integrity, ethics and clear communication from an actuary.

The third case study was about the launch of IPO of an insurer. You are the AA of the company and you need to work with an external consultant acting as "Reporting Actuary" to develop the EV results. The following discussion highlighted requirements as per APS 10 which prescribes the methodology and setting assumptions for IPO.

Overall the program was a big success which began with imparting knowledge on professionalism and ethics, some industry insights with examples and later complemented by videos and case studies and ended with a vote of thanks and closing remarks from Mr. Anil Kumar Singh. We hope that such programs would be conducted on a regular basis to help our members maintain the highest professional standards that this profession demands.

About the Author



Mr. Hemant Kumar



pahujahk@gmail.com

"Mr. Hemant Kumar is currently working as Principal Advisor with Principal Global Services, Pune leading the actuarial function in the area of US DB pension and US life insurance."

14th Seminar on Current Issues in Retirement Benefits (14th CIRB)

Organized by: Advisory Group on Pension, Other Employee Benefits and Social Security (PEBSS), IAI

Date: 10th March, 2018

Venue: The Plazzio hotel, Gurugram

Session: Welcome and Inaugural address

Speaker: Mr. A.D.Gupta, Chair, PEBSS Advisory Group



Mr. A D Gupta welcomed the participants and mentioned that APS 27 has come in to effect from 1.1.2018 and replaces a number of existing APSs/GNs. He mentioned that there are challenges in implementing the same and the actuaries have to take adequate steps to comply with the requirements.

Address by Mr Sanjeeb Kumar, President, Institute of Actuaries of India



Mr. Sanjeeb Kumar welcomed the participants and desired that there should be discussion so that the issues come on floor and could be resolved. He mentioned that it has taken 15

months to finalise APS 27 and is one of the best APS. He stressed common understanding, need for standardisation and that journey for improvement should continue.

Session: Practitioners talk on implementation of APS27

Various practitioners:

Mr. K.K.Wadhwa, Appointed Actuary, Aviva life, Eagle Insurance Shrilanka (Life) and IFFCO Tokio General Insurance.

Mr. Ritobrata Sarkar, Consulting Actuary, empaneled with Willis Towers Watson

Dr. K. Shriram, Consultant Actuary.

Ms. Preeti Chandrasekhar, India Business Leader - Retirement, Health and Benefits, Mercer.

Mr. Khuswant Pahwa, Founder and Consulting Actuary, KPAC (Actuaries and Consultants)



The speakers mentioned the challenges to be faced and the steps being taken at their end for complying with the provisions contained in APS27 particularly with regard to setting of actuarial assumptions and preparation of valuation report according to disclosure requirements of different accounting standards. It was informed that the points not covered in their existing reports have been identified at their end and it is proposed to incorporate the same in the revised format of reports and that a communication is proposed to be sent to the clients informing them that the setting of actuarial assumptions is the responsibility of the management of the entity and that the actuarial assumptions are the best estimate of the various parameters which affect the value of the liability and have to be decided as per the provisions contained in the accounting standards. It was

emphasized that the actuarial assumptions have to be unbiased and mutually compatible and should represent the expected experience of the entity on long term basis. It has to be ascertained that no discretionary benefits have been allowed in the past and there is no intention of allowing discretionary benefits in the future. It is

to be mentioned that if substantial amount of actuarial gain/loss is recurring on account of experience variance, there is a need to relook in to the actuarial assumptions unless caused due to changes in benefit structure/policy change.

It was proposed that we should analyze the past data of the companies available with us and study the company reports etc available in public domain and form our views about the best estimates of parameters required for setting of actuarial assumptions and discussions should be initiated with the organizations with a view to help them to finalize the actuarial assumptions.

There was a discussion whether the information provided by the entity regarding the assets should be accepted as such or questions should be raised about the value placed on various assets being fair value or not. Sensitivity analysis is not required as per AS15 but the same need to be provided as per APS27.

If spouse data information is not available we may have to make assumptions about the percentage of members married and about the age difference in the ages of the couple etc for the purpose of calculating liability under PRMB (Post Retirement Medical Benefit) and Pensions.

The impact of taking in to account the mortality improvement in the valuation of PRMB and Pension Schemes would be significant. As we are using the mortality tables prepared 10/15 years ago and we are required to take in to account the mortality improvement up to the date of payment of benefit, the guidance from the Institute would be required.

There was discussion as to how to proceed when the entity was giving the actuarial assumption of salary increase which was felt to be

unjustified. It was emphasized that it has to be ensured that the assumptions are reasonable.

There was discussion regarding the conflict with the company/ auditors regarding the setting of actuarial assumptions etc. It was emphasized that we should comply with APS 27.

Session: A walk through the checklist on APS27

Speaker: Ms. Preeti Chandrasekhar, India Business Leader - Retirement, Health and Benefits, Mercer.



The session was informed that the work of preparing a checklist was in progress and that the same has to be finalized and then it would be put up to the Institute for approval. The purpose of preparing the checklist is to assist the valuing actuaries in ensuring that all the necessary steps have been taken to scrutinise/validate the important inputs received from the entity being data, plan benefits and actuarial assumptions etc and the methodology adopted is appropriate for the purpose. Data containing the information about the members has to be complete and accurate. The information about the assets has to be obtained as per the requirements. It was emphasized that the key reason for differences in the valuation results would be due to the adoption of different sets of actuarial assumptions by the valuing actuaries. Sensitivity of results to the changes in major actuarial

assumptions may help in deciding as to what analysis/investigations are necessary. Regarding leave, the proportion which would be availed/encashed would be necessary as the financial effect would be different. As the valuing actuary would have limited information/resources, it may be necessary to discuss the setting of the assumptions with the entity so that the assumptions are reasonable.

The presentation covered plan provisions, definition of salary which is to be taken for the purpose of calculation of benefits and what would constitute the past service cost. It was mentioned that the provision for discretionary benefit, if applicable, would have to be considered and taken into account in the calculation. Impact of legislation, if applicable, would have to be considered. Contributions by employees, if applicable, would have to be taken in to account. For calculation of pension benefits, the cost of restoration of pension after a specified period due to availing of commuted value at the time of retirement would need to be taken in to account.

Session: Discussion on treatment of Past Service Cost under various standards (in view of proposed increase in limit to ₹ 20 lacs) -

- AS15.
- Ind AS19/ IAS 19.
- US GAAP.
- Transitioning from AS 15 to IND AS 19. (Discussed in context of private companies, PSUs and government organizations.)

Speaker: Mr. Suranjan Banerjee, Senior Consultant, Willis Towers Watson.

The session focused on the classification of past service cost and its treatment under different accounting standards. The matter of past service cost was being considered due to implementation of 7th Pay Commission report by the Central Government with effect



should be for the entire population or the population where Past Service Cost arises.

Session: Issues and challenges in complying with DPE guidelines

Speaker: Mr. Khuswant Pahwa, Founder and Consulting Actuary, KPAC (Actuaries and Consultants)

from January 2017 which provides for revision of gratuity limit from 10 lacs to 20 lacs for central government employees. On account of the above, the central government is bringing out a legislation and the proposed wording for change in gratuity limit is "From Rs. 10 lacs to such amount as may be notified by central government" which would mean that the central government would not be required to seek approval of parliament for future increases in gratuity limit and the notification in the gazette would suffice. It is further understood that there is a provision that an increase of 50% in Dearness Allowance would lead to increase of 25% in the limit of gratuity.

There was a discussion and there was a view that it may be appropriate to take in to account increases in gratuity limit over the future as it could be estimated as to when the future increases would occur on the basis of assumptions regarding the inflation and wage revision on account of future Pay Commissions. The other views were that we should take in to account only the gratuity limit as applicable at that time and that no limit should be applied on the gratuity benefit.

It was informed that that the treatment under AS 15 would depend on whether the benefit has vested or not. In case, the benefit has vested the full amount would be recognised immediately otherwise the straight line method would be used. Under Ind AS and IAS 19, the full amount has to be recognised immediately. Under US GAAP, the amount would have to be distributed over the working life period. There was a discussion whether the working life period

The session highlighted that a public sector organizations, as per Public Sector Superannuation Scheme 2006 effective from 1st January 2007, could have their own schemes of PRMB and Pension Benefit in addition to Employees Provident Fund (EPF) and Gratuity benefit subject to the condition that the total contribution towards all 4 schemes would not exceed 30% of cost of employees (Basic Pay+DA). It was mentioned that EPF had fixed contribution of 12% of basic salary plus DA. The contribution towards gratuity benefit was being charged in 3 different ways being the expenses as provided as per expenses included in AS 15, as a stable contribution rate as per funding valuation or simply charging 4.81% of salary which is arrived at by multiplying 8.33 by 15/26.

The matter of PRMB was discussed and it was observed that schemes of some units were extremely luxurious as those covered both outdoor and indoor hospitalization with high/no limits and sometimes even covered cost of spectacles etc. It was mentioned that if there was a limit of ₹15000 on OPD, then everybody would be claiming that amount. It was mentioned that in some cases relatives of retired employees including parents of the retirees and their spouses would also be covered for PMRB and in case of one unit the average number of dependents was 8 per retiree. Similarly for pension benefits, the eligibility and quantum of pension should be decided in such a way so that there that there was no or minimum subsidy from younger group to older group.

It was mentioned that the way forward was to create trusts and contributions should be calculated on funding basis using realistic assumptions. The Schemes should be managed as hybrid schemes covering the period up to 2006 and 2007 onwards separately and the fund as well as the interest should accrue to employees. The schemes should be formulated/restructured taking in to account long term view and there should be no/minimum cross subsidy.

Session: Issues and challenges in complying with DPE guidelines & preparing full disclosure report for Provident Fund valuations (AS15 and Ind AS19)

Speakers: Mr. K.K. Wadhwa, Appointed Actuary, Aviva life, Eagle Insurance Shrilanka (Life) & IFFCO Tokio General Insurance.

Mr. Khuswant Pahwa, Founder and Consulting Actuary, KPAC (Actuaries and Consultants).

If PF Fund is managed by an entity itself by creating a trust, the relevant contributions are paid by the employees and employer as applicable in the trust fund which is managed as a trust fund by the trustees. The entity bears the risk of interest guarantee as the shortfall in the interest earned by the fund against the statutory rate of interest would have to be made good by the entity.

If there is a surplus in the fund, the entity has no right on the surplus as the same could be distributed among members only but if there is deficiency in the fund the same would have to be removed immediately by transfer/making provision in the books of account of the company.

The matter regarding full disclosures as per accounting standards was discussed and the view was that as the arrangement was being considered a DB scheme and that the disclosures are being demanded by some auditors/

companies, it may be necessary to give full disclosures as applicable to a DB scheme. Current service cost would be the contributions paid by the entity and contributions paid by the employees would not be a part of it. During the discussion, it was also mentioned that any contribution by the employer above the prescribed rate would be treated as a perk in the hands of employees.

The session discussed sensitivity analysis of Interest Guarantee liability taking in to account change in yield and attrition rates and there was a view that review of APS 29 was necessary.

About the Author



Mr. K K Dharni



kkdharni@hotmail.com

“Mr. K. K. Dharni is fellow member of Institute of Actuaries of India. He is currently working as a Consultant Actuary with Postal Life Insurance in the area of employee benefits.”

FEEDBACK

Feedback of Current Issues in the Retirement Benefits (CIRB) Seminar

Not wider topics but now requirement is for practical examples (as text & theory everyone know)

Coverage required on AS27, APS9, DPE, Leave valuation

Given that a very large numbers of actuarial profession in India are working under off shoring industries. Institute should create some structure to engage and include such employees/ students. Students who are not working in Indian market usually finds it difficult to clear higher older exams due to mismatch in the type of practical knowledge which they have vs expected in exams.

There can be a capacity building seminar one have experience investigations of assumption need to be done

Investment related aspects concerning retirement benefits

This seminar was focussed on ASP27 and other key practice relevant concerns which are key appropriate

More capacity building sessions in RB

APS 9 states that some professional CPD hours will be allotted CPD hours are given as technically it is felt that every GCA has lecture by top dignitaries e.g: president IAI, senior IRDAI official Chairman/member which contains same professional element beyond any doubt, therefore same proportion of total CPD hours should be awarded as professional CPD hours

Feedback of Professionalism Ethics and Conduct (PEC) Seminar

Many such seminars on professionalism should be conducted, preferable at Mumbai on regular basis

Case studies must be discussed with solutions. Purpose of the case studies should be discussing everyday scenario but the focus must be to bring unity among the professionals rather than blaming each other.

Case studies can be more realistic closely resembling Indian scenarios

I thought the debate was very healthy & productive

It would be good to have GI case studies

Please include India specific case Studies

Advisory Group on General Insurance

Dear Members

I am pleased to present to you a brief update on the various activities which the Advisory Group on General Insurance (AGGI) completed recently and has been working on currently. As you may well be aware, the AGGI works in the area of General Insurance to advise the Institute on Actuarial Practice Standards (APS), Guidance Notes (GN), emerging market trends and professional issues; and to carry out activities related to Continuous Professional Development (CPD) programs and training.

I am happy to share that the AGGI has been actively working towards fulfilling the responsibilities given to it. The group meets in person or over a conference call on regular basis to discuss the matters which should be taken up and the progress on the projects in hand. Following are some of the activities which the group completed or which are in progress:

Actuarial Practice Standard 33

The Advisory group was reconstituted in September 2017. However, the previous group had, among other areas, worked upon drafting the APS for Peer Review of Appointed Actuary (AA)'s Work in General and Health Insurance. The APS 33 was duly reviewed and approved by the council and was rolled out on 9th September 2017. The APS makes it mandatory that annual valuation by the AA should be peer reviewed effective the 31st March 2018 valuations. This is a welcome step towards making the

annual valuation process more rigorous and ensures a maker-checker process at a senior level on the final reserve held by a company.

8th Capacity Building on General Insurance (CBGI) seminar

As part of its responsibility to hold CPD programs and provide training to GI actuaries, the group organized the 8th CBGI seminar in Mumbai on 22nd-23rd February 2018. The speakers invited were senior actuaries and professionals from the GI industry. The seminar was well attended and many interactive discussions among senior actuaries took place. Some action items emerged from the discussions which the AGGI has taken up in its activity plan for 2017-18.

Guidance Notes for Crop Insurance Pricing and Reserving

This was an action item which emerged from the discussions during the 8th CBGI seminar. It was felt that there is no study content available on Crop Insurance which can be used as a reference material while pricing or reserving. A team has been formed to prepare the guidance note which will work as a

reference material for actuaries working in this area. The group will soon come up with its note which we believe will be useful for GI actuaries.

CIGI and CBGI planned for the year

Two more seminars have been planned for 2018 calendar year. First will be a Current Issues in General Insurance (CIGI) in July and 9th CBGI seminar in November. Please schedule these in your calendars and do attend to benefit from the sessions and discussions during the seminar.

Research and Development Activities in General Insurance

The group also intends to take up some other research and development activities to prepare more relevant and up-to-date reference material on the GI industry in India. The group realizes that currently, there is a need to prepare study contents which helps GI actuaries and students in understanding of the Indian General Insurance industry environment - both from the perspective of business and actuarial profession. The content to be developed may be used as a repository of such information which the members of the profession may find useful.

Submitted by



Mr. Biresh Giri

“Chairperson, Advisory Group on General Insurance”

Machine Learning-Classification using Decision Trees

Introduction

In my previous article, I explained the machine learning algorithms which are broadly divided into supervised learning and unsupervised learning. Supervised learnings are used to construct predictive models.

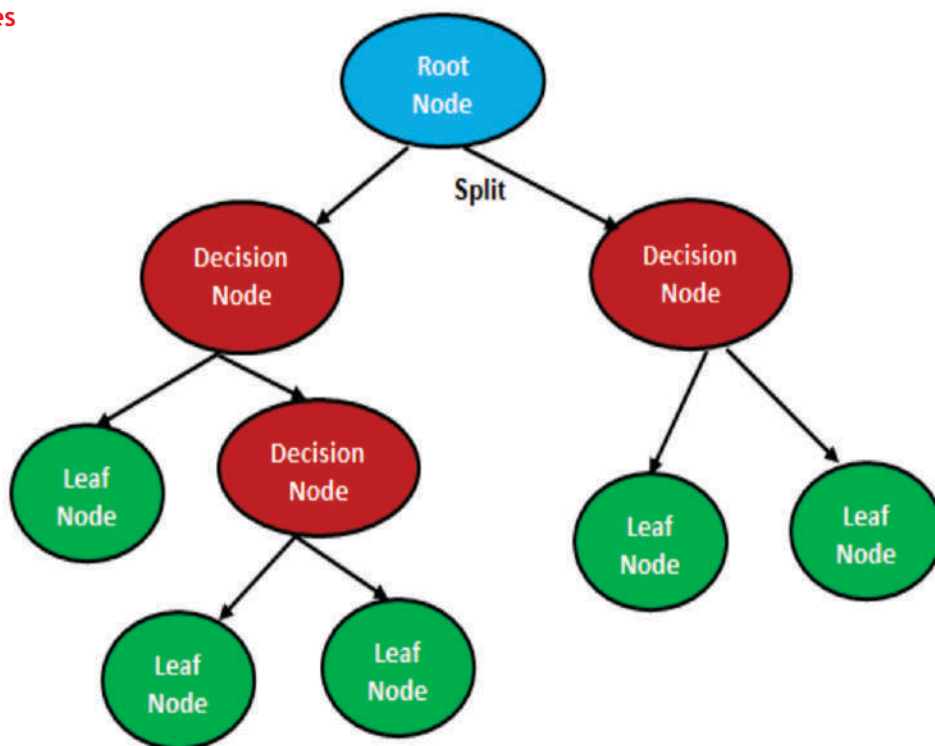
In this article, we are going to understand Tree based learning algorithms. These are mostly used as supervised learning methods. Tree based methods empower predictive models with high level of accuracy and infer the outcome with ease.

Here, we will see the structure and construction of decision trees with different types of measures to split the tree into various nodes and leaves. I have also covered major advantages and disadvantages of adopting the decision tree algorithm.

Decision Tree: Root, Nodes and Leaves

The decision tree model is constructed in the form of a tree structure. Now, let us first understand the different parts of decision tree.

- 1. Root Node:** It represents entire population or sample and this further gets divided into two or more homogeneous groups.
- 2. Split:** It is a process of dividing a node into two or more sub-nodes.
- 3. Decision Node:** When a sub-node splits into further sub-nodes, then it is called decision node.
- 4. Leaf Node:** Nodes do not split further is called Leaf nodes.



Advantages and Disadvantages of using a Decision Tree

Advantages	Disadvantages
Highly-automatic learning process can handle numeric or categorical variables	It can over fit or under fit the model
Decision tree is considered to be a non-parametric method.	Decision tree models can be biased toward splits on features
More efficient than other complex models	It may not be appropriate to fit for continuous variables
It can identify the most significant variables and relation between two or more variables which has power to predict target variable	

Application of Decision Trees in Insurance

There are many applications of decision tree algorithm in various wider domains. Here, I have narrowly focused on insurance domain and highlighted few examples in insurance where decision tree algorithms can be used to predict the outcome. We actuaries are interested to find the solution to the following questions we encounter in our day to day work.

1. Whether a person will survive above age 90?
(Life Insurance)
2. Whether the motor insurance claim will be made by the policyholder in a coming year?
(Non-Life Insurance)
3. Whether the claim made by policyholder is a fraudulent claim or genuine claim?
(Life/Non-Life/Health Insurance)
4. Whether any epidemic will strike next year?
(Life/Non-Life/Health Insurance)
5. Whether the policyholder will continue or renew the policy by paying renewal premium?
(Life/Non-Life/Health Insurance)
6. Whether the driver is a good driver or a bad driver and whether the risk premium can be derived based on this trait?
(Non-Life Insurance)
7. Whether the life selected for insurance cover is a standard life or sub-standard life?
(Life/Health Insurance)
8. Whether in the next year, a policyholder will suffer from heart related diseases or not?
(Life/Health Insurance)

Now let us understand the general approach to solve such types of problems using decision tree algorithm.

General Approach to solving a problem using a Decision Tree Algorithm

At the outset, we need to randomly split our available data into two parts-Training Dataset and Test Dataset.

Generally around 70%-90% data are used as Training Data set and remaining data set is used as Test Dataset.

First of all, we need to have a Training Dataset consisting of records whose class labels (outcome) are known to us. **Training dataset** is used to build a decision tree model which is applied on **Test Dataset** and the predicted outcome from the model is compared with the actual outcome in the dataset. If a desired level of prediction accuracy from the model is attained on the test dataset then it can be used to predict the claims for the actual data.

Let us take one simple example to understand this approach.

Example: First of all, let us consider a dataset having three variables:

1. 'Car Type'
2. Driver's 'Gender'
3. Whether claim is made in the previous year.

Here, for simplicity purpose, we have considered only two parameters 'Car Type' and 'Gender'. In reality we can consider many parameters affecting the claim status.

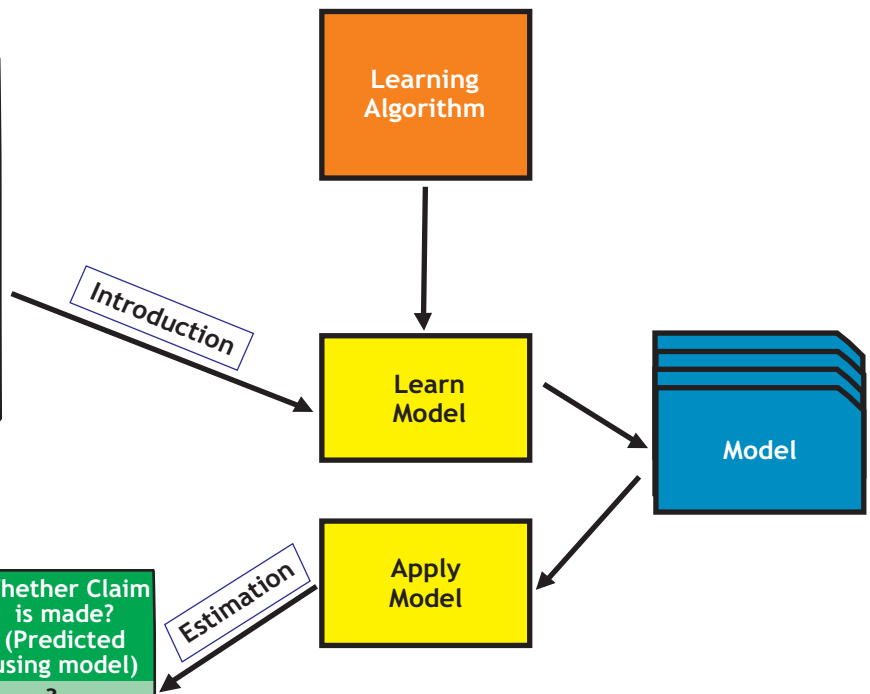
Now based on this available dataset, let us predict whether a policyholder will make a motor insurance claim in the coming year.

Training set

Sr No	Car Type	Driver's Gender	Whether Standard Premium?
1	Family	Male	No
2	Family	Female	Yes
3	Family	Female	No
4	Sport	Male	No
5	Family	Male	Yes
6	Sport	Female	Yes
7	Family	Female	No
8	Family	Male	Yes

Test set

Sr No	Car Type	Driver's Gender	Whether Claim is made? (Actual)	Whether Claim is made? (Predicted using model)
1	Family	Female	No	?
2	Sport	Male	Yes	?
3	Family	Female	No	?



Choosing the Best Split

The first challenge that a decision tree will face is to identify which feature to split upon. Here, how do we split the data? Is data be split first by 'Car Type' first and then by 'Gender' or vice versa.

Actually, we need to split the data based on homogeneity of the data features.

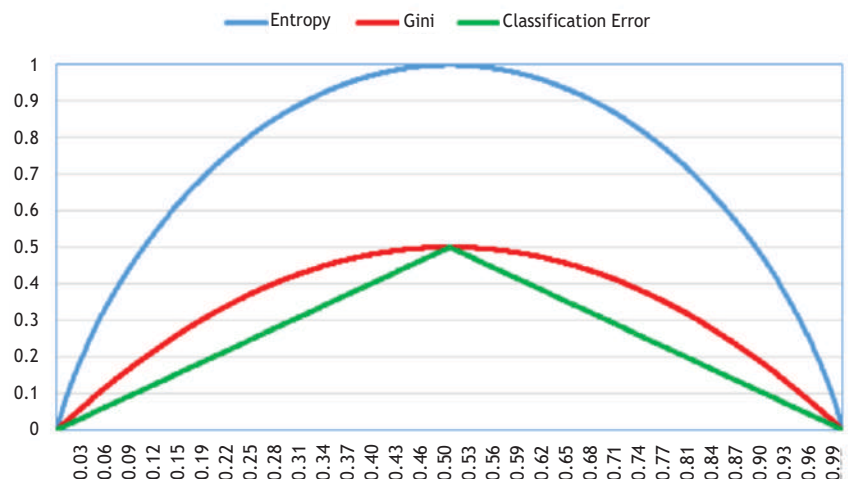
If the segments of data contain only a single class, they are considered to be pure

There are many different measures of purity for identifying splitting criteria.

Let us first understand these measures of purity. Once we understand these measures, we will be able to split data based on purity criteria.

1. Entropy (t) = $-\sum_j P(j|t) \log_2 P(j|t)$
2. Gini (t) = $1 - \sum_j [P(j|t)]^2$
3. Classification Error (t) = $1 - \text{Max}[P(j|t)]$

Where P_j is the proportion of data in class j



From the above diagram, observe that all 3 measures of purity attain their maximum values when the class distribution is uniform i.e. $p=0.5$. Minimum values of measures are attained when all the records belong to the same class i.e. $p=0$ or $p=1$

Hence for split purpose, we need to choose the class which has **Minimum measures** of Entropy, Gini and Classification Error.

Let us compute purity measures with our previous example

Car Type	No. of records	Measures
Family	6	Entropy=0.811
Sport	2	Gini=0.375
		Classification Error =0.25

Gender	No. of records	Measures
Male	4	Entropy=1
Female	4	Gini=0.5
		Classification Error =0.5

Here all the three measures of purity are the lowest by Car Type and hence first split will be on Car Type followed by Gender.

Based on this tree, model can estimate the outcome for the test data (whether claim will be made in the next year or not) and then compare the estimated outcome with the actual outcome available in the records of test data.

Confusion Matrix

Evaluation of performance of model is based on counts of test records correctly and incorrectly predicted by the model. These counts are tabulated in a table called as 'Confusion Matrix'.

A confusion matrix is a table that categorizes predictions according to whether they match the actual value in the data. One of the table's dimensions indicates the possible categories of predicted values while the other dimension indicates the same for actual values.

Let us assume that we have a dataset of 10,000 records and out of which we have used say 9000 records for training and 1000 records for test purpose. Also let us assume that based on the decision tree algorithm we have recorded the following outcome using test dataset with 1000 records.

Confusion Matrix:

		Predicted Claims		Total
		Yes	No	
	Actual Claims	Yes	No	
	Yes	800	14	814
	No	6	180	186
		Total		1000

Here, look at the confusion matrix as depicted. In it, out of 1000 records, this model has correctly predicted $(800+180)=980$ (accuracy is 98%) records (say) and incorrectly predicted 20 records (i.e. 2% error)

If the error rate is high then we need to scan the training data carefully (as this data is used for modelling purpose) to understand whether there are any outliers or unusual features and further refinement algorithms such as Boosting Algorithm can be applied.

Conclusion

There are lot of applications of decision tree theory in the insurance and risk domain. Moreover, this technique can be implemented automatically in the system through the algorithm, provided that data is accurately and completely captured in the system for modelling and prediction purpose.

I believe that Actuaries have good insight in understanding data features, can able to infer the outcome from the model and also able to communicate the results to all relevant stakeholder.

There are various economic, social, emotional and other qualitative factors which are difficult to predict and it affects the actual outcome. And hence predicted outcome of these algorithms can be used carefully keeping in mind these limitations which are generally not factored while designing the model.

These techniques should be seen as an aid to an actuary who has been using various traditional actuarial tools in his/her work.

About the Author



Mr. Suresh Sindhi



sindhin@rediffmail.com

“Suresh Sindhi is a Fellow member of Institute of Actuaries of India and Institute of Actuaries, UK. Currently, he is a consulting actuary providing actuarial consulting advice to various insurance companies and also involved in consulting in the area of pension & retirement benefit schemes to various corporate clients.”



Risk Based Capital – General Insurance

What is Risk Based Capital?

Risk-Based Capital (RBC) is a method of measuring the minimum amount of capital appropriate for a reporting entity to support its overall business operations in consideration of its size and risk profile. RBC essentially represents the capital sources required to enable an institution to absorb the risk from unexpected losses and shocks and remain solvent over a certain time horizon usually one year and with a specified probability. RBC could limit the risk a company can take. RBC is intended to be a minimum regulatory capital standard and not necessarily the full amount of capital that an insurer would want to hold to meet its safety and competitive objectives. RBC will enable to better understand the risk a financial institution is exposed to and thereby provide a consistent measuring method for the specific regulatory framework by:

- (i) Allowing greater flexibility for an insurer to operate at different risk levels in line with its business strategies, so long as it holds commensurate capital and observes any prudential safeguards
- (ii) Explicit quantification of the prudential buffer with the aim of improving transparency;
- (iii) Providing incentives for insurers to put in place an appropriate risk management infrastructure and adopt prudent practices;
- (iv) Promoting convergence with international practices so as to enhance comparability across

jurisdictions and reduce opportunities for regulatory arbitrage within the financial sector; and

- (v) Providing an early warning signal on the deterioration in capital adequacy level, hence allowing prompt and pre-emptive supervisory actions to be taken

Background and Evolution of RBC

RBC concepts first emerged in the banking industry in the 1960's in European countries and started being adopted in the late 80's. Traditionally a simple formula was used to determine minimum capital based on the percentage of premium or claims as mandated by the insurance regulators. Due to the varying risk characteristics of the insurers, the regulators in some countries started to debate if this captured the true risk profile of the insurers. Finland was experimenting with a variation of the risk based capital (RBC) approach as early as the mid-1950's. Canada modernized statutory financial reporting in 1978 by introducing the valuation actuary concept and adopted risk-based minimum capital requirement in 1989. Although some discussions on RBC were happening in the 1970's in the United States of America (USA); prior to the 1980s, not many people in USA discussed capital from the view point of solvency. In the 1990's, the USA system of insurance and regulation was criticised and numerous changes were proposed to that system. In response to the criticism, drafting RBC commenced in 1990.

The early advocates of RBC clearly acknowledged that it was a minimum standard monitoring tool and not a method for companies to establish “optimal” levels of capital for comfortable business operation. Since RBC was done via a formula, its limitations were frequently debated. Since the initial RBC formula in USA was partially a political compromise, it is understandable that it had some shortcomings. However, its credentials as a more progressive mechanism than simpler formula-based minimal capital standards became accepted by the late 1990's as more insurance markets started to evaluate or implement RBC measures and solvency frameworks. Now, it is clearly understood that no solvency monitoring mechanism is perfect, and all such efforts should be viewed as continuous and ever evolving. Improved versions of RBC are emerging, as insurance regulators start to learn from markets where the RBC solvency regimes have already been implemented. A worldwide trend to more rigorously regulate and govern insurers' solvency is gaining momentum. Due to the global nature of insurance, the pressures leading to insurance solvency modernization are being felt worldwide, with developments occurring in many markets.

Here we would like to illustrate the timeline of acceptance of RBC in countries across the globe that are still continuing with RBC or an improved version of RBC, or are adopting RBC soon and not shifting to a Solvency II or alike framework in the near future.

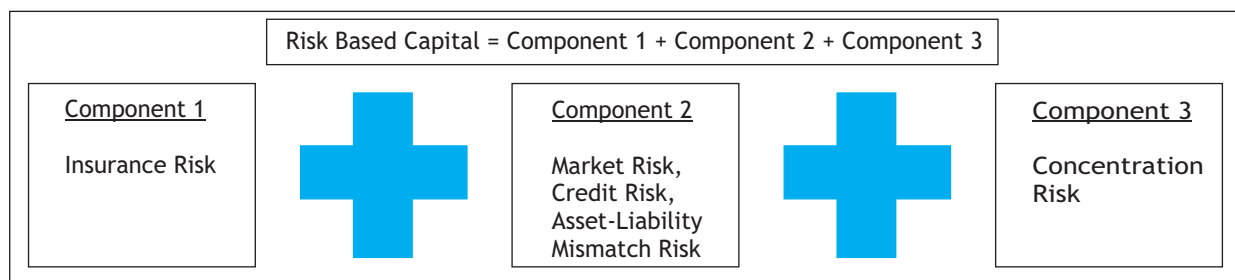


Any RBC Framework essentially sets out the requirements applicable to each insurer to determine the adequacy of the capital available in its insurance and shareholders' funds to support the 'Total Capital Required' (TCR). This serves as a key indicator of the insurer's financial resilience, and is generally used as an input to determine supervisory interventions. Hence, to achieve this regulators and companies employ various approaches to calculate the capital requirements suitable for the specific insurance market and economic conditions of the country. Multiple approaches can be used to determine capital requirements. These approaches can be used in isolation or combination. There are two basic approaches: deterministic and stochastic.

Examples of the Deterministic Approach

- Factor based approach:** Under a factor-based approach, the calculation of the capital requirement for a particular or a number of risks is determined by applying factors to specific exposure measures. If all risks are measured using this approach, the overall capital requirement is then calculated by aggregating these separate sub-capital requirements. Factors applied to exposure measures may be determined pre- or post-diversification. Where factors are determined pre-diversification, the aggregation of the sub-capital requirement may allow for diversification by means of correlation matrices or other methodologies.

Example 1: Where formula does not consider diversification



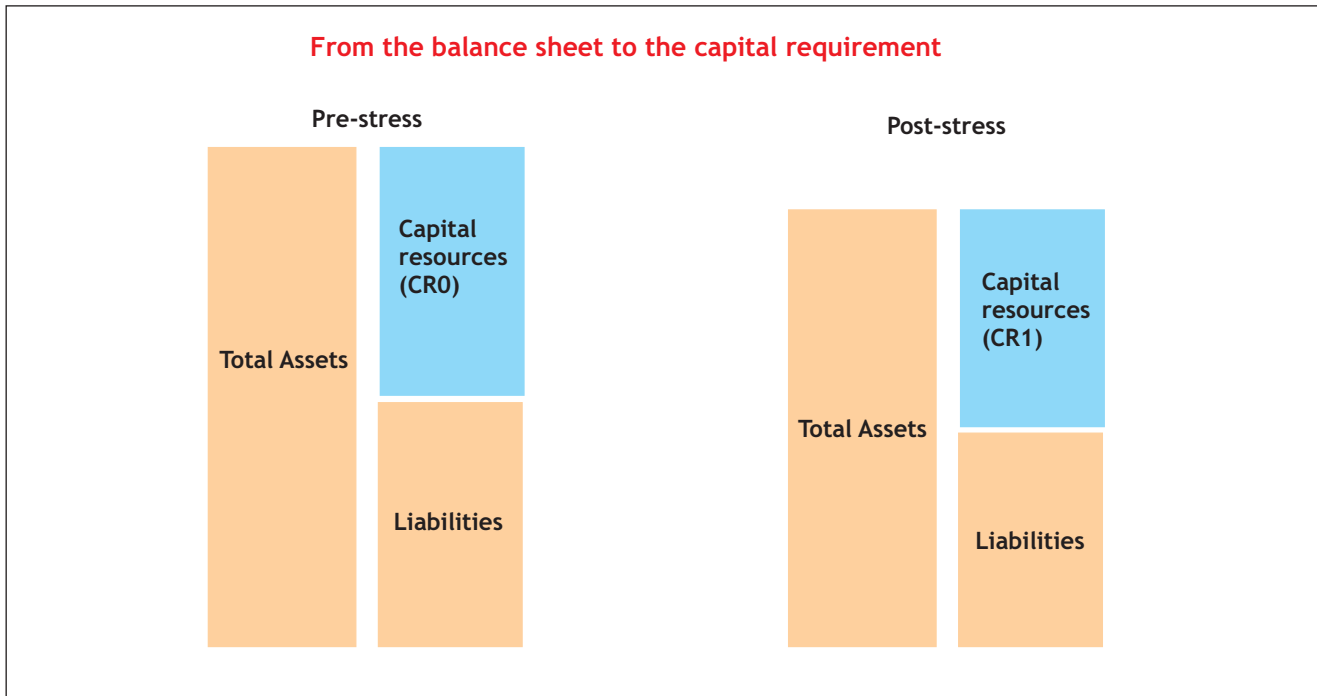
Example 2: Where formula considers diversification

Total RBC after covariance = $x * (R_0 + \text{Square Root } (R_1^2 + R_2^2 + R_3^2 + R_4^2 + R_5^2 + R_{cat}^2))$

R_0 = Insurance affiliates, Off balance-sheet Risk
 R_1 = Fixed Income Risk, Asset Concentration Adjustment (for Fixed income items)
 R_2 = Equity Risk, Real estate, Other invested assets, Aggregate write-ins, Asset Concentration Adjustment (for equity items)
 R_3 = 50% of Credit Risk,
 R_4 = Underwriting Reserve Risk, Off balance-sheet Risk (Reserve growth risk), 50% of Credit Risk
 R_5 = Underwriting Premium Risk, Off balance-sheet Risk (Premium growth risk)
 R_{cat} = Catastrophe Risk (Earthquake and Hurricane)

A factor "x" is multiplied with the formula and is subject to change by the regulator, if required.

- **Stress based approach:** In the stress approach, the calculation of the capital requirement for a particular or a number of risks would follow a dynamic approach looking at the balance sheet at two points in time: the company's current balance sheet pre-stress and the company's balance sheet post-stress. The capital requirement for each individual risk is determined as the decrease between the amount of capital resources on the unstressed balance sheet (CR0) and the amount of capital resources on the stressed balance sheet (CR1). Stresses can be applied with individual stressed balance sheets determined on a per risk basis (CR0 - CR1) to determine the capital requirement with respect to each stress. If all risks are measured using this approach, the overall capital requirement is then calculated by combining these separate capital requirements, allowing for diversification by means of correlation matrices or other methodologies.



Examples of the Stochastic Approach:

- **Stochastic modelling approach:** Under stochastic modelling, the calculation of the capital requirement for a particular or number of risks is determined using stochastic processes giving scenarios for the possible outcomes of each risk factor. Through aggregation of these risks the distribution for the change in the capital requirement over time can be obtained. The distribution may be obtained in various ways with varying degrees of reliability. Usually the distribution is estimated in some way (commonly some form of Monte Carlo simulation, in which many sample paths chosen from inputs, which are typically also driven by distribution themselves, are

evaluated), but in some cases may be determined in a closed mathematical form. Having a distribution of results implies that statistical tools may be applied, including seeking percentiles and other properties. Such tools are not directly available when deterministic approaches are used.

- **Structural modelling approach:** Structural models are built on causal relations specified a priori using a combination of statistical data and qualitative causal assumptions. The causal assumptions embedded in the structural models often have implications which can be tested against observations. One example of a structural model is the credit risk model based on the Merton approach.

For example, under this approach the stochastic behaviour of the value of a company's assets is modelled and if the value becomes lower than a threshold, usually a proportion of the company's debt value, the company is considered to be in default. The minimum level of capital resources required is therefore determined to yield a maximum acceptable cumulative probability of default. In general, a structural model analysis goes through the steps of model specification, data collection, model estimation, model evaluation, and (possibly) model modification.

In one sense, a properly implemented stochastic approach could be considered to be self-calibrating (for example a specified

percentile may be required, but the value for that percentile emerges directly from the distribution), but a deterministic approach needs to be externally calibrated and when the calculation is completed there is no direct indication available as to whether the desired target criteria has been achieved or not. A trade-off between simplicity and ease of application on the one hand, and complexity and richer information on the other hand, needs to be made when choosing between deterministic and stochastic approaches. These approaches are not necessarily mutually exclusive and so hybrid approaches may also be viable. It is to be noted though that the factor based approach is the most widely used to calculate minimum capital requirements but it is perceived that others approaches could be used more extensively in the future with advancements in the field of insurance and expertise available to build, test and run such models.

Let us now look at which economies currently have a RBC supervision framework. Many countries have already moved towards further risk management systems such as Solvency II and many countries are yet to adopt the RBC framework. Here we will discuss the salient features of the framework that have been suitably adopted in various economies to suit their needs.

United States of America (USA)

The National Association of Insurance Commissioners (NAIC's) RBC regime began in the early 1990s as an early warning system for USA insurance regulators. RBC was then finally introduced in the USA in the year 1994. It had two main components: The risk-based capital formula and the risk based capital model law. This formula is primarily factor based which includes asset risk, underwriting risk, credit risk and catastrophe risk. The catastrophe risk charge was a new addition calculated via catastrophe models included in the year 2017. It

is stipulated that regulatory action would not be required if the RBC ratio is above 200% and mandatory control is required if it falls below 70%.

USA has also implemented ORSA (Own Risk and Solvency Assessment) in the year 2015, a significant new addition to the USA insurance regulation. An ORSA will require insurance companies to issue their own assessment of their current and future risk through an internal risk self-assessment process and it will allow regulators to form an enhanced view of an insurer's ability to withstand financial stress.

Japan

The Financial Services Agency (FSA) introduced a risk-based capital regime in Japan in 1996. In 2012, the risk-based capital assessment was updated to increase the underlying confidence level used from 90% to 95%. The amount of required risk-based capital is calculated at individual and at group level, using a factor-based approach and a one-year VaR. The requirements are set to specific confidence levels for each risk category: A 95% VaR is applied for general underwriting and investment related risks, 99% for other underwriting risks such as general personal insurance (health, accident), 99.5% for natural catastrophe risk from earthquakes and 98.7% for natural catastrophe risk from flood and storm. The total amount of risk is calculated taking into account insurance risks, assumed interest rate risks, asset management risks, business management risks and catastrophe risks. Minimum regulatory requirement of solvency margin ratio in Japan is 200% and if it falls below that, it triggers various prompt corrective actions.

Japan has also introduced ORSA in year 2015 whereby the Financial Services Agency (FSA) has conducted field tests covering all

insurance companies, with a view to introducing an economic value-based solvency regime in future.

Taiwan

Financial Supervisory Commission (FSC) implemented RBC in Taiwan during the year 2003 after a long period of consultation, requiring insurance companies to report their solvency ratio annually. The regulatory supervision includes the implementation of a factor based model in the framework. This includes asset risks, credit risks, underwriting risks, asset-liability matching risks and other risks. Minimum regulatory requirement of solvency margin ratio is 200% and if it falls below that, it triggers various prompt corrective actions in staggered slabs of 150% - 200%, 50% - 150% and below 50%.

Taiwan is expected to come up with a regulation that will require insurers to do an Own Risk and Solvency Assessment (ORSA). Likewise, there have been discussions on the possible development of an economic capital model for the domestic insurance industry.

Canada

The Office of the Superintendent of Financial Institutions (OSFI) implemented RBC in year 2003 whereby a factor based model was used for the framework. Under the Minimum Capital Test (MCT), regulatory capital requirements for various risks are set directly at a predetermined target confidence level. OSFI has elected 99% of the expected shortfall (conditional tail expectation or CTE 99%) over a one-year time horizon as a target confidence level.

The minimum capital requirements are calculated taking into account insurance risk (including catastrophe), market risk, credit risk and operational risk. Federally regulated insurers are required, at a minimum, to maintain an MCT ratio of 100%. OSFI has established

an industry-wide supervisory target capital ratio (supervisory target) of 150% that provides a cushion above the minimum requirement and facilitates OSFI's early intervention process. The supervisory target provides additional capacity to absorb unexpected losses and addresses capital needs through ongoing market access. Dynamic Capital Adequacy Testing (DCAT) has been implemented whereby a number of stress/scenario testing processes that would fit within the insurer's overall risk management framework have been checked/calculated. ORSA was also introduced in year 2014.

Singapore

The Monetary Authority of Singapore (MAS) implemented RBC in year 2004 via a factor-based approach for calculation of risk based capital.

The RBC framework requires insurers to hold capital against their risk exposures i.e. the Total Risk Requirements (TRR). TRR is the sum of requirements related to insurance risks, asset concentration risks, risks inherent in an insurer's asset portfolio, such as market risk, credit risk and asset-liability mismatch. The amount of capital available to meet the TRR is referred to as "financial resources" ("FR") under the RBC framework. FR comprises of three components, namely Tier 1 resources, Tier 2 resources and the provision for non-guaranteed benefits.

Currently, under the Insurance (Valuation and Capital) Regulations 2004, insurers have to maintain a minimum Capital Adequacy Ratio ("CAR") of 100%. Registered insurers are also required to notify Monetary Authority of Singapore (MAS) about the occurrence or potential occurrence of any event that would result in the financial resources of the insurer being less than 120%, also known as the financial resources warning event. In practice, insurers are expected to have capital management plans in place and hold

a target CAR of more than 120%.

Singapore adopted ORSA in year 2014 for Tier 1 - general insurers and in year 2015 for Non Tier 1 - general insurers. After nine years of using its existing RBC framework, Singapore is now working on updating it to reflect the developments in regulations globally and changes in market practices. It released last year its third Consultation Paper on RBC 2, which aims to improve the comprehensiveness of the risk coverage and the risk sensitivity of the framework. It also aims to define more specifically the Monetary Authority of Singapore's (MAS) supervisory approach to the solvency intervention levels.

Philippines

Insurance Commission (IC) implemented RBC in Philippines in the year 2006. A Factor-based approach is used for the calculation of risk based capital. Although the internationally accepted standard for solvency frameworks is at the 99.5th percentile level of confidence, the Commission addressed industry concerns by staggering the transition to 99.5 by imposing 95% in 2017, 97.5% in 2018, before 99.5% in 2019. Factors and shock rates to be applied are thus increasing from 2017 to 2019 and thereafter would remain the same thereafter. The components of the RBC model are credit risk, insurance risk, market risk, operational risk and catastrophe risk. Total Available Capital (TAC) is the aggregate of Tier 1 and Tier 2 capital after deductions, subject to applicable limits and determinations. The minimum RBC ratio is set at 100% which is to be maintained by all insurance companies.

Philippines is now working on an amended risk-based capital (RBC2) framework. They have currently implemented Pillar 1 on quantitative requirements, while they are in the process of

developing Pillars 2 (on governance and risk management requirements) and Pillars 3 (on disclosure requirements).

Malaysia

Bank Negara Malaysia (BNM) implemented a risk-based capital (RBC) framework for conventional insurers and Takaful Operators in 2009 and 2014 respectively, with the aim of better aligning the regulatory capital requirements with the underlying risk exposure of insurers, improving the transparency of prudential buffers, and giving insurers greater flexibility to operate at different risk levels. A factor-based approach for calculation of risk based capital is used. Total Capital Required (TCR) is the sum of credit risk capital charges, market risk capital charges, insurance liability risk capital charges and operational risk capital charges. The Capital Adequacy Ratio (CAR) is used to assess the financial strength with, the regulator, BNM imposing a minimum supervisory target capital level of 130%.

In 2012, BNM issued new Internal Capital Adequacy Assessment Process (ICAAP) guidelines for insurers, aimed at clarifying expectations for individual target capital levels and plans for capital management. Insurers have carried out gap analyses and updated their risk and capital management frameworks in compliance with the guidelines.

Papua New Guinea

Office of Insurance Commissioner (OIC) implemented RBC in year 2010 modelled on the Australian Prudential Supervisory Authority's risk based capital using a Factor-based approach.

Minimum Capital Requirement = Liability Risk Charge + Asset Risk Capital Charge + Excessive Exposure Risk Capital Charge

Where the Liability Risk Capital

Charge is determined by applying fixed factors to an insurer's estimates of its insurance liabilities which comprise outstanding claims liability (including incurred but not reported claims provision) and premiums liability and Asset Risk Capital Charge is determined by applying fixed factors to the market values of an insurer's assets and the Excessive Risk Capital Charge is determined based on a company's exposure to any single risk.

It has been stipulated that every insurer shall maintain a solvency ratio of a minimum of 150%.

Thailand

The Office of Insurance Commission (OIC) implemented a risk-based capital (RBC) framework in Thailand in 2011 within which a factor-based approach is used for calculation of risk based capital. The Office of Insurance Commission (OIC) raised earlier this year the solvency capital margin on the existing RBC framework. From setting a capital adequacy ratio (CAR) at 125% back in 2011, it has increased it to 140% in January 2013.

Total Capital required is made up of insurance risk capital charge, market risk capital charge which includes equity, property, interest rate, currency, commodity and collective investment i.e. unit trust risks, credit risk capital charge and concentration risk capital charges.

Thailand is now working on an amended risk-based capital (RBC2) framework which was released in April 2016 to be adopted in the future.

Republic of Korea

The Financial Supervisory Service (FSS) introduced risk-based capital requirements in 2011 after two years of parallel testing alongside the previous solvency regime. A factor-based approach is used for calculation of risk based capital wherein the capital for each risk is defined as the value at risk (VaR) at

99% confidence level. An insurance company must maintain a solvency margin that is at least equal to the solvency margin standard, i.e. 100 per cent.

The solvency margin standard is intended to be a reflection of the risk borne by an insurance company: insurance risk, interest rate risk, credit risk, market risk and operational risk. If the solvency margin ratio drops below 100 per cent then the FSC may intervene.

Republic of Korea's Financial Services Commission (FSC) has developed a Risk Assessment and Application System (RAAS) and indicates a move towards ORSA along with liberalisation in setting of insurance premium rates. As things stood before this change, insurers were allowed to deviate from their filed rates by a maximum of +/-25% to take account of individual risk factors. The +/-25% cap has now been abolished for all classes except medical expenses where liberalization will be phased in over a period of years to avoid sudden premium increases. For medical expenses, the deviation range will be increased to +/-30% in 2016 and to +/-35% in 2017. The FSC will consider abolishing the cap completely in 2018.

Indonesia

Financial Services Authority of Indonesia (Indonesian: Otoritas Jasa Keuangan or OJK) implemented RBC in year 2013 which uses factor based approach. Minimum Risk Based Capital (MRBC) is calculated as the sum of the risk charges under five specified risk categories: credit risk, liquidity risk, market risk, insurance risk and operational risk.

A targeted 120% solvency margin level is to be set at not less than 120% of their risk based minimum capital, which is subjected to increase as requested by the

Minister of Finance, taking into consideration the possible risks arising from a change in business strategy and/or business development plan. If the insurer is unable to maintain the target rate of solvency it will be required to change its business plan appropriately.

Currently, it seems that OJK is concentrating its efforts in streamlining the reinsurance business in the country as the government combined two state-owned reinsurance companies, Reasuransi Umum Indonesia and Reasuransi Indonesia Utama, as it moves to create a big national reinsurer which will be globally competitive. The merged company, named Indonesia-Re, aims to stem reinsurance business flowing out of the country. The next phase scheduled in 2017 is to merge Nasional Indonesia Reasuransi into Indonesia-Re.

Brazil

Superintendência de Seguros Privados (SUSEP), the national regulatory agency for private insurance implemented RBC in Brazil in the year 2013, wherein a factor-based approach is used for calculation of risk based capital. SUSEP started implementing the Insurance Regulatory Framework step by step from late 2008 and in 2015, the Brazilian regime obtained provisional equivalence to Solvency II, with regard to solvency assessment. The solvency capital regime in Brazil stipulates specific capital requirements for underwriting risk, credit risk, operational risk and market risk. The capital requirements for insurers are calculated by standard models established by the supervisor, applying a factor-based formula that is calibrated at a confidence level of above 95 per cent (value at risk /one-year horizon).

SUSEP's agenda in the next few years is consistent with Solvency II.

The regulator, under a new leadership, is taking important steps to implement RBC standards in Brazil. These are consistent with Europe's regulation, and the market has high expectations for this paradigm shift. The agreement with EIOPA for a Solvency II equivalence will be a major milestone for risk-based supervision.

Sri Lanka

Following a period of consultation and testing, Insurance Board of Sri Lanka (IBSL) issued the final risk based capital framework for insurers in October 2013 which took effect since 2016 wherein a factor-based approach is used for calculation of risk based capital. Risk Capital Required (RCR) is calculated taking into account the credit risk, concentration risk, reinsurance risk, market risk, liability risk and operational risk. Total Available Capital (TAC) is the total of Tier 1 and Tier 2 capital of an insurer with appropriate deductions. The Capital Adequacy Ratio (CAR) should exceed the Required Capital Adequacy Ratio (RCAR) of 120%.

The technical provisions are a total of Best Estimate calculations and a Risk Margin ensuring that there is a higher level of confidence that the provisions shall ultimately be sufficient. The target level of confidence is 75%.

IBSL is looking to adopt an amended risk-based capital (RBC2) framework along the lines of Singapore and the same is expected to come into effect in the next few years.

Benefits of the Risk Based Capital Framework:

- Holistic approach to risk measurement
- Net risk exposure computations
- Diversification benefits allowed for interactions between risks
- Incentives for effective risk management practices

Drawbacks of the Risk Based Capital Framework:

- Complex Workings when moving from deterministic to stochastic approaches
- Prone to misuse - If internal models are too complex and too much reliance is placed on them.

Prospect of adopting RBC for supervision in India by 2021

The Insurance Regulatory and Development Authority (IRDA) of India had formed a 10 member steering committee to facilitate implementation of a new risk-based capital regime by March 2021.

A shift in regime is felt because the current solvency-based rules do not help in assessing whether the capital held is adequate for the risks inherent in insurance businesses. Currently, the solvency capital is fixed based on the reserves and the sum at risk for the insurer.

RBC with greater transparency on risks, will facilitate comparisons across insurance companies, providing information such as the financial strength of the insurers. This will also help the regulators to intervene early, if necessary. The panel has submitted its report and recommendations wherein it has recommended a "Twin Peak" approach whereby the current reporting structure would continue with the new system operating in parallel. Insurance companies hope to implement this arrangement for at least two years. The panel puts the timeframe for full implementation of RBC at "a minimum of three years".

Conclusion

RBC is an attempt (but only an attempt) at a better, objective measure of the capital an insurance company needs, taking account of its own unique set of circumstances, to maintain a fair

and adequate security margin for companies across the insurance industry. RBC standards can provide insurance industry regulators with an early warning of problems ahead for insurance companies, and provide trigger points for various levels of action by the regulators. RBC, therefore, could provide a public measure of strength for the insurance industry. RBC should be designed to encourage good behaviour and discourage bad behaviour among insurance company management. The introduction of RBC standards may (or may not) increase the overall amount of capital required in the industry, but, almost certainly, there will be a re-distribution of capital.

RBC should ideally help focus management on risks and the possibilities and limitations of their actions to control risks. The application of the RBC approach to the question of capital allocation should assist insurance company management to obtain a fuller appreciation of the financial dynamics of the business.

An important issue for regulators is to provide a 'level playing field' and to ensure that poorly performing insurers can, and do, cease trading appropriately, and maintain an orderly run-off, which should then reduce the costs of insolvency by limiting the impact of bankruptcies on guarantee funds.

Regulators are also interested in providing fair competition on price and enabling policyholders' reasonable expectations to be met. It is in the interests of the insurance industry that this should happen, as such factors should bring credit to the industry, whereas insolvencies bring discredit.

Is a Bad Formula better than no Formula at all?

No RBC formulae can be perfect. They are definitely not substitutes for good management and controls.

However, despite the drawbacks of a complicated formula, one should never be simple, standard or static.

Certain RBC formulae are aimed at providing a reasonable degree of approximate justice between competing companies. It sets levels of intervention, and, within those levels, provides a degree of discretion to regulators, who can use their judgement in marginal cases to consider the individual facts of each company.

One study in the USA has concluded that, by and large, companies that failed the RBC test are those that should have failed. In a sense, therefore, RBC adds nothing new. Indeed, other studies have concluded that RBC is a relatively poor predictor of company failure compared with other means of examining companies, such as considering rating agencies' ratings and diagnostic ratios.

However, one of the main benefits of a RBC formula is that it concentrates the mind of management on risk. It forces companies to measure risk, which is a precondition for being able to control risks.

The RBC formula is generally reasonable, although no formula can

be ideal in all circumstances. Further measures could be appropriate, such as requiring companies to carry out dynamic financial analysis and to obtain professional opinions on their financial strength and key areas of sensitivity.

It is hoped that insurance regulators can learn some lessons from the insurance industry's experience of RBC and from the experiences of the banking industry. Given a formula-based regulatory system the main issues could be:

- What factors should be included or excluded from any formula?
- How are the relationships between risk factors to be dealt with?
- How public should the results be made?
- What role, if any, is there for insurance companies' internal models of risk?

Alternative or complementary approaches of non-life insurers would also be worth considering. These could include dynamic solvency testing and statutory

professional opinions on financial strength. In addition, new concepts and theories, such as the Economic Capital model (EC) that features risk simulations specific to each company, are also emerging. These evolutions are the result of experience and enhanced dialogue. The underlying concepts continue to evolve and the process of determining the most appropriate mechanism for defining capital adequacy is an ongoing process.

Absence of finality is the hallmark of Regulations. Nothing is perfect. Technologies are fast changing and we too are struggling to adopt and cope up. To give two examples, how will driverless cars and artificial intelligence or new researches in medicines and emergence of new diseases impact the capital requirements? General Insurance by its nature is with uncertain consequences and it is difficult to circumscribe it with any formula. Ruin - once in 200 years, OK, but when that year strikes what. Can we guard against this contingency? It is a race between uncertainty and human intelligence with no clear winner. Let us await Solvency III, IV, ...



About the Author

Ms. Niyati Pandit



niyati@ka-pandit.com

Ms. Rashmi Manek



rashi@ka-pandit.com

Mr. Santosh Kumar Yadav



gi@ka-pandit.com

“The authors work in the field of Non-Life Insurance for M/s. K. A. Pandit Consultants & Actuaries.”



Digital Marketing - Behavioral Targeting Is The Key To Success

How would businesses feel if they knew exactly who is interested in their products or services and when they are most likely to buy them? LIC is known to introduce a slew of new products but these are all mass-marketed (generally). Behavioral targeting can help LIC to address its new products to customers who are ready to buy life insurance covers.

Behavioral targeting involves use of sophisticated set of software tools and analytics. Web ads can be tailored based on online behavior of consumers - websites they view, the products they research, how close they are to making a purchase. This leads to better sales leads and ads that are more relevant to specific customers.

Behavioral targeting relies on capturing website and landing page visitor data and using that information to provide these visitors with advertisements that are relevant to their needs and interests.

Consumers can become apprehensive and angry about websites, smart phones and search engines tracking their every move. Google has been accused of interfering with the privacy of individuals. Surely spammers must be getting their source of data (e-mail addresses, mobile numbers) from somewhere. A user backlash can slow widespread adoption of behavioral tracking.

The Mechanism

Ad networks are technology companies that partner with websites for access to information about visitor traffic. Websites drop cookies or small pieces of data onto consumer's hard drives to keep track of user preferences, contents of their e-shopping carts, their searches and clicks.

Websites also collect visitors' IP addresses — the numerical code that identifies each computer connected to the Web and its geographic location. With this raw data, an advertising network can use software and analytics to identify consumers with like interests and Web surfing habits. The networks then sell advertisers access to these niche audiences.

Consumers are becoming averse to online clutter. Behaviorally targeted ads are a cost-effective way of honing in on potential customers who have demonstrated some level of interest.

Pepsi's behavioral targeting efforts

According to the Wall Street Journal, Pepsi worked with ad network Tacoda in early 2007 to serve behaviorally targeted ads for the launch of Aquafina Alive, Pepsi's vitamin-enhanced water. The campaign targeted "health-conscious" consumers, and then served them ads wherever they traveled within Tacoda's network of 4,000 sites. Compared with other kinds of Pepsi Web-based campaigns, Aquafina Alive attracted three times the number of consumers who clicked on the targeted ads.

Other examples of behavioral targeting

If someone is a frequent traveler which can be observed just by noticing that he or she often comes in through [geographically] different IP addresses, then using that IP information, plus cookie data, an advertiser could obtain a very detailed picture of a traveler's habits —where she goes, how often she travels, the length of her trips, where she prefers to stay, which airline she prefers to fly on,

and more.

Yahoo purchased Blue Lithium, an ad network company in 2007. Revenue Science is an ad network that analyses website's traffic data and provides access to specific consumer audiences.

How is data collected?

Privacy concerns continue to dog the attempts at behavioral targeting. Websites collect visitor data including pages visited, amount of time on a page, links that are clicked on, and searches that are performed. All of this data creates a "profile" of the visitor that links to their web browser.

Based on this data, visitors are put into an audience segment. When web users from a particular audience segment return to that website or another website that is part of the same network and are using the same browser, the audience segment information is used for advertisers to show an online ad that is relevant to that user. It is assumed that based on previous behavior, that there is a greater level of interest and intent for a particular product or service that is being offered and that the ad is more likely to be clicked on. Because these ads are targeted based on previous behavior, publishers can sell these ads for a higher price.

Behavioral Targeting: Six Behaviors to Track

1. **Maker.** These customers publish content, create conversations and can create enough buzz for prospects.
2. **Critic.** SEO (search engine optimization) strategies should track critics who post and share ratings, reviews and comments. Google is particular about

reviews now. Yelp or Rotten Tomatoes are a few websites.

3. Collector. These customers create lists and add tags to websites, use RSS feeds to ensure that your content strategy meets the desired goals.

RSS (Rich Site Summary; often called **Really Simple Syndication**) is a type of web feed which allows users to access updates to online content in a standardized, computer-readable format. These feeds can, for example, allow a user to keep track of many different websites in a single news aggregator. The news aggregator will automatically check the RSS

feed for new content, allowing the content to be automatically passed from website to website or from website to user. This passing of content is called web syndication.

4. Joiner. These customers energize core audiences into action. They are active on social sites and maintain profiles.

5. Spectator. These are customers who watch, read and follow yet they can silently aid connecting with others.

6. Promoter. Customers who actively share information with friends and family. They become your brand ambassadors by choice.

It is important to engage target consumers with great content and creative offerings that are aligned with the core brand messages. Despite a section of the population taking umbrage to the fact that so much data is being collected by the marketers, the truth is that if data is used intelligently it can exert a positive influence on customers. If correct messages are delivered to the customers, it will lead to wins for the business.

It is high time the insurance sector gave a thought to behavioral targeting using digital means. This is the right time.

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About the Author



Prof. Venkatesh Ganapathy



gvenkatesh69@gmail.com

“Mr. Venkatesh is working as - Associate Professor at Presidency Business School, Bangalore.”

**The Actuary India wishes
many more years of healthy
life to the fellow members
whose Birthday fall in
April 2018**

**A BALASUBRAMANIAN
SAMPAD N BHATTACHARYA
SAMBASIWA I RAO
M U UPADHYAYA**





Life Insurance Insights

Top 10 – news, views and trends

While IDBI Federal Life and IndiaFirst Life are considering stake sale options, Max Financial Services is looking to raise capital to fund its life insurance business' growth. Following the listings of ICICI Prudential Life, SBI Life and HDFC Life on stock exchanges, PNB MetLife is also considering an Initial Public Offer.

The Regulatory committee on the review of product regulations has submitted its findings and has called for a transition towards 'Outcome based' regime, amongst various other recommendations. The IRDAI has invited expression of interest for implementation of the Risk-based Capital (RBC) regime.

The life insurance industry registered a healthy growth in weighted new business premium collections of 17.6% in the first nine months of FY2017-18, as private insurers collectively recorded an impressive growth of 23.6% to capture a majority market share. Non-linked products continue to remain favourites, as well as more health and Point of Sale (PoS) offerings made their way into the market, based on the product launches witnessed during the reporting period. Following is a summary of the top ten key trends and developments that shaped the life insurance market in India for the period December 2017 to February 2018."

10

The Authority releases guidelines for Private Equity Funds to invest in insurance companies

The Insurance Regulatory and Development Authority of India (IRDAI, Authority) has released the IRDAI (Investment by Private Equity Fund or Alternate Investment Fund in Indian Insurance Companies) Guidelines, 2017 stating the criteria to be met by Private Equity Funds for investing in insurance companies as an investor and as a promoter. Private equity funds may directly invest in the company in the capacity of an investor subject to a ceiling of 10% of the paid up equity capital. As a promoter, such funds may only invest through a Special Purpose Vehicle subject to holding a minimum of 50% of the paid up capital and a minimum lock-in of five years, amongst other guidelines. The guidelines further provide details on the compliance requirements for a fund to act as an investor or promoter to the insurance company.

9

New business premium collection: Life insurers post a healthy growth of 17.6% in new business collections in the first nine months of FY2017-18

As per statistics released by the IRDAI,

weighted new business premium (measured as 100% of regular premium and 10% of single premium) collections for the life insurance industry amounted to INR531.8 billion during April to December 2017, representing a year-on-year growth of 17.6%. Private sector companies outperformed Life Insurance Corporation (LIC) registering an impressive growth in new business premium of 23.6% compared to LIC's modest growth of 12.0%. Consequently, the private sector's market share jumped from 48.0% in FY2016-17 to 50.4% in FY2017-18, over the same time period. Among the private players, ICICI Prudential retained its top position by writing weighted new business premium of INR58.5 billion and capturing an industry market share of 11.0%.

8

Paytm enters insurance business as a corporate agent

Paytm, a company owned by One97 Communications, has received a corporate agency license from the insurance regulator to sell life as well as general insurance products. Reportedly, as per filing with the Registrar of Companies, Paytm has registered two new entities namely Paytm Life insurance and Paytm General Insurance, however it is yet to obtain license to offer its own insurance schemes as the same needs

to undergo regulatory approval process. The said owner has also floated Paytm Financial Services to offer financial products and Paytm Money for wealth management, in addition to its e-commerce and payments bank ventures.

7

Positive profits reported by 16 private life insurers for YTD Q3 FY2017-18

As per the financial results disclosed by 23 private insurers, 16 have reported profit as at the end of third quarter of FY2017-18, compared to 15 out of 23 insurers making such disclosure in corresponding period in the previous fiscal. Amongst the 16 insurers to have reported profit, 13 have recorded a positive year-on-year growth compared to the profit figures reported for Q3 FY2016-17. The total profit after tax for private life insurers making such disclosure has increased by 7.9% from INR34.59 billion to INR37.31 billion, year-on-year.

6

Non-linked, non-participating products remain dominant, PoS and health products gain popularity

Life insurance industry has witnessed launch of 15 new products during the period of December 2017 to February

2018. Non-linked products continued to dominate the insurers' proposition with 12 out of 15 products launched in this category. Reportedly, insurers are also focusing on providing term insurance plans. Point of Sale (PoS) products have also gained popularity among insurers with Max Life and Birla SunLife having launched PoS products during the said period. In another innovative offering, Vodafone and Aviva Life partnered to launch a mobile plan integrated with life insurance cover, currently limited to its enterprise customers. Further, health and critical illness products continue to gain ground among insurers with players like Future Generali and SBI Life launching health related products during this period.

5

The Authority has extended deadline of the Working Group Report on IFRS17 and calls for an expression of interest on RBC implementation

Considering the significance of IFRS17 implementation and the magnitude of preparatory work involved, the Authority has extended the deadline for the Working Group, set-up to furnish recommendations on the new standards equivalent to IFRS17 to June 2018. The new standards, which are exhaustive and complex in nature, will require further detailed examinations than anticipated. The Authority has also called for an Expression of Interest (Eoi) from various consultancies for the implementation of the Risk-based Capital (RBC) regime which is tailored to the Indian insurance industry.

4

Increase in the number of bancassurance tie-ups by insurers

Bajaj Allianz Life has entered into a three year corporate agency agreement with NKSGB Co-operative Bank. Adopting the open architecture system, Bank of Maharashtra has entered into a bancassurance arrangement with Aviva Life and Reliance Nippon Life. Both the insurers are seeking to harness the bank's vast network of 1863 branches across the

country to ensure a farther customer reach. Shriram Life has partnered with Sure Buddy to offer free insurance cover up to INR50,000 to users of the Sure Buddy mobile application. The users of this mobile application will get advertisements on their mobile and will have to keep their life insurance cover in force.

3

Committee set up to review the Product Regulations has released its report

In its review of the IRDA (Linked Insurance Products) and IRDA (Non-Linked Insurance Products) Regulations, 2013, the Committee setup by the regulator has recommended a move from Prescriptive to an Outcome based regulatory regime, suggested approaches for enhancing the surrender values and improving product approval process, amongst other recommendations. In order to improve the market penetration, proposals for revamping the pension business and allowing life insurers to become distributors of all types of financial and non-financial products have also been put forward. The Committee has also proposed amendments towards relaxing the investment norms for insurers to improve competitiveness; and proposed certain measures to ensure better persistency in the industry.

2

PNB MetLife considers Initial Public Offer (IPO)

Reports suggest that the Board of PNB MetLife has approved to consider

listing on stock exchange through an IPO, following the likes of ICICI Prudential Life, SBI Life and HDFC Life who have undertaken this route previously from the life insurance industry. The insurer is a joint-venture of Punjab National Bank, Metlife with 30% and 26% stake respectively; while Elpro International, M Pallonji & Co and Jammu & Kashmir Bank are other stakeholders in the insurer. Details about the timing and other particulars of the potential IPO have not been reported at the moment.

1

Merger and acquisition update: IDBI Federal Life and IndiaFirst Life consider stake sale options; Max Financial Services to raise capital

Media reports suggest that various companies have been shortlisted to buy a potential stake sale by IDBI Federal Life, a joint venture of IDBI Bank holding 48% stake and Federal Bank and Ageas NV holding 26% each, where the structure of the deal are not clear at the moment. It has also been reported that Legal & General Group is planning to sell its 26% stake in IndiaFirst Life. Various private equity firms have shown interest in acquiring the stake. In a major capital boost attempt, majority stakeholder in Max Life - Max Financial Services has approved to raise additional capital of up to INR50 billion to fund the growth of its life insurance business. It is said that the company is pondering inorganic growth routes as well and may consider raising capital through debt. The decision approved by its Board of Directors is subject to regulatory and shareholder approvals, as per press reports.

About the Author



Mr. Vivek Jalan



vivek.jalan@willistowerswatson.com

“Mr. Vivek Jalan is a Director & Practice Leader of Insurance Consulting and Technology, Willis Towers Watson India.”



Breaking the myths around Actuarial Profession

At the outset, we would like to express our gratitude to Institute of Actuaries of India for giving us an opportunity to write this article. We feel delighted to be a part of this noble profession.

To begin with, there are certain myths that revolve around Actuarial profession among students at initial level, who are misguided in terms of scope of profession, salary expectations, number of exams required for an entry level job, risk of overqualification, etc.

Through this article we aim to provide a realistic picture of our profession to help students understand it better.



How much does an Actuarial student earn?

Myth:

Actuarial Science is a highly paid profession and students earn handsome salaries at joining level.

Reality:

No doubt, the Actuarial Science is a rewarding profession and students are attracted to this profession because of great pay scales. However, most students hold a false perception regarding the entry level pay package of Actuaries.

In our opinion, a company's internal pay structure and student's understanding of Actuarial concepts and skillset determine the pay package of a candidate. Although, initial salaries may not be high, however, it is rewarding when one

progresses with exams and gains a credible work experience.

What are the basic skills required to get an actuarial job?

Myth:

Two or more papers are sufficient to get a job.

Reality:

In addition to Actuarial papers, it is important to have good communication skills. Nowadays, companies also look for students who possess basic software skills such as Excel & VBA. Further, possessing skills like SQL, PowerPoint, R, MS Access, etc help students stand apart in resume selection. This has become more important due to increase competition over past few years

Which industries do Actuaries work in?

Myth:

Many students believe that an actuary's work is confined to insurance industry.

Reality:

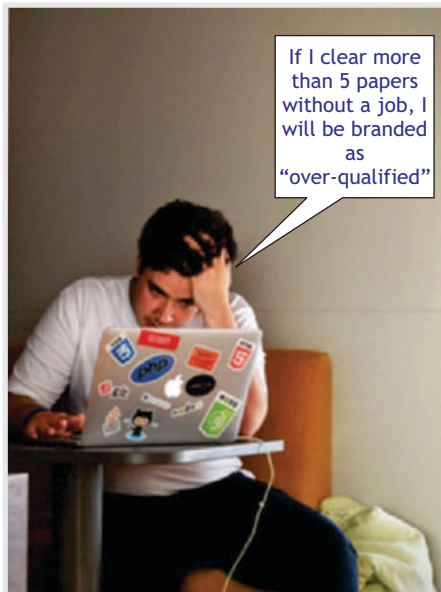
In our opinion, actuaries are meant to work in any field that involves risk, working of statistics, analytics, modelling, predictions etc.

In Indian market, Actuaries can work in consultancies and KPOs in addition to insurance industry. However (as quoted on IFoA website), globally Actuaries are also involved in following fields:

- Actuaries can work for the government in managing its programs and ensuring

compliance with regulatory laws.

- As an investment risk advisor for companies as well as individuals, actuaries help in portfolio management and investment analysis.
- With the rising tie-ups between banking organizations and insurance companies, we can expect the increasing demand for Actuaries.
- They provide merger and acquisition support which add value to their businesses.



Are there limited opportunities available for Actuaries in India?

Myth:

There are 55 insurance companies in India and if one company (on average) recruits 10 people in Actuarial team, then the whole industry requires only 550 Actuaries.

Reality:

In addition to insurance firms, there is a vast scope for actuaries in Actuarial consultancy and shared services firms in India. Additionally, there are quite countries in the Middle East and South-East Asia who have more demand for Actuaries than supply. Indian Actuaries are attractive to these countries due to high quality and lower cost. Companies from countries such as UK and US have also hired Indian Actuaries especially through their shared services offices in India.

Do students become overqualified on clearing more than 4 papers if they are not working in the Actuarial domain?

Myth:

There is a wide perception that a student with more than 4 Actuarial papers is branded as overqualified. As a consequence, they opt to sit idle and search for jobs. This hinders their learning curve.

Reality:

It is not true that people are labelled “overqualified”, however, students do not get jobs beyond 4 to 5 papers because they join firms with an expectation of getting higher packages & positions due to higher number of papers compared to others in the firm. Companies find it difficult to manage expectations of such students and this impacts their performance. Students should go to companies with a zeal to learn and grow. Once they start working, their appraisals are mainly on the basis of their performance and exam results.

What are the minimum no of exams required to secure an entry level job?

Myth:

One can get job on clearing one or two exams.

Reality:

Generally, insurance companies in India hire in the fields of General Insurance, Health Insurance, Life

Insurance and Employee Benefits. CT1 and CT3 are the prerequisites to secure an entry level job. Apart from these 2 papers, CT6 is the most sought Actuarial exam in the non-life insurance industry where the students should possess a good conceptual knowledge of run-off triangles, ruin theory etc. In the life insurance industry and employee benefits, CT5 holds a great importance among all other CT subjects. Further, CT4 gives an insight on how to carry out a modelling exercise and experience analysis.

Additional points to note:

Interviewers also expect students to have some practical knowledge of topics studied in CT exams rather than only definition. Students should try and understand the insurance products available in the market and relate them with their CT subjects' knowledge. Students should also research a company's background and products suite before an interview.

Further, IAI is also taking several initiatives to inform the people pursuing Actuarial Science. To mention a few:

- Student Support Scheme (SSS) to help economically disadvantaged students to pursue Actuarial science.
- Skill development trainings and other class room sessions
- Implementation of various educational programs

About the Authors



Ms. Nikita Bagaria



nikitabagaria@aarconsultants.in

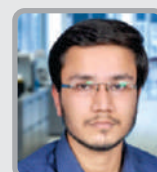
“Nikita Bagaria is a student member of Institute of Actuaries of India. She is currently working in Employee Benefits Valuation Team at Actuarial Analytics and Risk Consultants (AARC).”

Mr. Sanyam Tayal



sanyamtayal@aarconsultants.in

“Sanyam Tayal is a student member of Institute of Actuaries of India. He is currently working in Life Insurance Advisory Team at Actuarial Analytics and Risk Consultants (AARC).”





Hong Kong

Updates on insurance industry performance in 2017

The Insurance Authority (“IA”) released provisional statistics of the Hong Kong insurance industry for the first three quarters of 2017 in November 2017. Total gross premiums of the Hong Kong insurance industry in the first three quarters of 2017 amounted to \$363.2 billion, an increase of 11% over the corresponding period in 2016.

For long-term business, the revenue premiums of in-force business increased by 11.6% year-on-year during this period. However, new office premiums decreased by 12%, due to lower new office premiums for Individual Life and Annuity Non-linked business, and also a declining trend of new office premiums from policies issued to Mainland China visitors.

The IA had earlier requested insurers to provide more detailed statistics on policies issued to Mainland visitors for period starting from year 2016. About 95% of the policies issued to Mainland visitors were medical or protective in nature, such as critical illness, medical, whole life, term life and annuity products, and 99% policies paid regular premiums. The IA made the following statement on this: “In general, consumers who take out medical or protective types of policies and pay premiums at regular intervals are looking for long-term protection instead of seeking short-term investment returns”.

For general insurance business, gross and net premiums increased by 5.8% and 5.1% year-on-year compared to the same period in 2016. Overall underwriting performance recorded a loss of \$193 million due to a combination of Typhoon Hato related loss reported under Property Damage

business as well as underwriting loss reported under Employees’ Compensation and Motor Vehicle businesses.

Local Actuarial Examination in Hong Kong

Since 2016, a Curriculum Taskforce has been formed by the Actuarial Society of Hong Kong (“ASHK”) to develop a syllabus and a set of study aids for the Hong Kong Practical Education Module. The ASHK has now made the curriculum available to its members. The curriculum covers areas of regulation and industry practice that affect the working environment of most actuaries in Hong Kong. All ASHK members working in insurance, pensions and other investment sectors should be aware of the areas in scope, and be familiar with the content which relates to their field. It is the ASHK’s intention to introduce an examination in 2018/2019, passing which will become a required step for acceptance as a Fellow of the ASHK. This examination is viewed by the ASHK Council as a necessary step on the path towards statutory recognition. In view of the examination and its importance to the ASHK’s agenda, the curriculum materials have been set out with several major fields of study: (i) Generic (focusing on an overview of the industry and regulations); (ii) Life Insurance; (iii) Pensions; (iv) General Insurance, and (v) Investment.

Moreover, Society of Actuaries (US) & ASHK jointly produced and co-branded an e-learning module on Regulation and Taxation (as well as a professional development e-course) focusing on Hong Kong. The module and e-course have been implemented and officially

launched since October 2016.

RBC QIS 1

The new RBC framework will have a significant impact on the insurance market in Hong Kong, including the types and affordability of products that will be offered in the future. The specifications and templates for QIS 1 were developed and released to the market in July 2017. Insurance companies in Hong Kong provided their First Quantitative Impact Study (QIS1) submissions in December 2017.

According to the Insurance Authority, the key objectives of QIS 1 were, among others:

- (a) Collecting data which are appropriate and necessary for further analysis by the Insurance Authority (IA);
- (b) Collecting data on economic balance sheet basis and assessing the impact of the change from the current regulatory basis to the economic basis for each individual participant, and for the industry as a whole;
- (c) Identifying the key insurance and financial risks and sub-risks to which the industry is exposed and understanding the sensitivity of each risk and sub-risk towards the economic balance sheet; and
- (d) Collecting data to formulate our policy decisions on the RBC regime.

Subsequent QIS exercises are expected to occur in due course.

IFRS 17

The new insurance contracts standard, IFRS 17, released by IASB in May 2017, is expected to bring fundamental and yet complex changes to insurance accounting in

Hong Kong and globally. Insurers will need to review the financial statements and underlying actuarial models, financial reporting processes and systems.

Once issued, Hong Kong's version of IFRS 17, HKFRS 17, will supersede HKFRS 4 Insurance Contracts, equivalent of IFRS 4 of the same title, and is effective for annual periods beginning on or after 1 January 2021. If an entity applies HKFRS 17 earlier, it is required to disclose that fact. Early application is permitted for entities that apply HKFRS 9 Financial Instruments and HKFRS 15 Revenue from Contracts with Customers on or before the date of initial application of HKFRS 17.

New Initiatives to facilitate "Insurtech" in Hong Kong

The Insurance Authority launched two pilot initiatives in September 2017, namely InsurTech Sandbox and

Fast Track, to promote the development and application of new technologies in the insurance sector of Hong Kong.

Insurtech Sandbox helps authorized insurers experiment with new Insurtech and other technology applications without the need to achieve full compliance with the IA's usual regulatory requirements. Under the Sandbox initiative, pilot trials of Insurtech applications will be conducted in a controlled environment with sufficient safeguards for policyholders.

The Fast Track initiative is a pilot scheme with a dedicated queue for new authorization applications from insurers using solely digital distribution channels. Fast Track will expedite the authorization process by giving the IA an opportunity to review proposed digital distribution channels at an early stage. Insurers that apply under Fast Track must have an innovative and robust model using digital distribution to provide benefits to policyholders in product development, delivery, customer service and cost efficiency.

About the Author



Mr. Devadeep Gupta



devadeepgupta313@gmail.com

“Devadeep Gupta FIA FIAI CERA is working as a Financial Reporting Actuary at Prudential Hong Kong. Currently he is leading the IFRS17 implementation for Prudential Hong Kong.”



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- * Analytical support for various business segments

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Interested candidates may email their CV by 10th May 2018 to
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