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INDIAN ACTUARIAL PROFESSION
Serving the Cause of Public Interest



**20th Global
Conference
of Actuaries**
5th & 6th March, 2019
Mumbai



Look inside

Actuaries Day on 21st August 2018 ~ Essay Competition Winners

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CONTENTS

"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"

FROM THE DESK OF PRESIDENT

Mr. Sunil Sharma 4

EVENT REPORT

12th Seminar on current issues in Health Insurance
Mr. Ankush Agarwal & Mr. Samey Chavan 5

Actuaries Day on 21 August 2018 -Essay Competition Winners 10

FEATURES

The Search for the "Causal How"
Mr. Srivathsan Karanai Margan & Mr. Suresh Aranala Krishnamurthy 14

Financial Health Parameters: A comparison of Scheduled Commercial Banks and NBFCs—with special focus on credit risk (2012-17)
Dr. R. Kannan 18

AG UPDATE

Advisory Group on Pensions, Other Employee Benefits & Social Security
Mr. Kulin Patel 22

STUDENT COLUMN

Crop Insurance 2017-18 at a Glance!!!
Mr. Sarthak Mahajan 23

COUNTRY REPORT

Hong Kong
Mr. Devadeep Gupta 26

CAREER CORNER

Met Life 2
Delhi Development Authority 17
National Insurance Company Limited 25

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I am pleased to connect with you again on the Actuary India forum. First and foremost I would like to congratulate all students who passed the examinations this session and wish all the best to students

appearing in December 2018 examinations.

During the last one month, I met many members of the profession, including Student members and Veterans of the Profession. Members are pretty enthusiastic and looking forwards to the development of the Profession in to newer Areas while strengthening the Core areas of Practices.

The dates for the 20th Global Conference of Actuaries have been decided. The event is scheduled to happen on 5th and 6th of March, 2019. While there is going to be a formal communication on event and theme, I am pleased to share with you that the theme of 20th GCA is "Expanding the Horizon- Strengthening the Core". The theme clearly spells out the priorities of the Institute of Actuaries of India over the next few years.

Initial discussion with the GCA Organising Group and GCA paper and Program Advisory group reveals that Institute is planning a Grand Memorable event on the evening of 4th March which will be exclusively for members. These two core groups will share the plan with members at right time. I must take opportunity to thank both these groups under the leadership of Shri Sanjeev Pujari and Shri Liyaquat Khan for the commendable progress made on planning for 20th GCA.

Focussing on students, a seminar titled Young Actuary Connect is being held at Bengaluru on 5th December 2018. It is of worth mention that organisations are coming forward to support the Profession in addition to actuarial professionals. Swiss Re Bengaluru has been partner for the event with

INR five lac partnership amount.

Other critical event which is scheduled in December is "Strategy Brainstorming Session". We expect around thirty five actuaries getting together to brainstorm key initiatives we need to take to achieve the Mission and Vision of IAI. I am looking forward to significant contribution from all participants with combined experience of over 400 years. We will share the outcome of the brainstorming sessions and impending priorities.

Insurance Regulatory and Development Authority of India (IRDAI) has set IFRS17, RBC and RBS as impending priorities for coming years. This will create lot of opportunities for the actuaries to support the initiatives to enhance the corporate governance and Risk management in the Insurance Industry.

The insurance business is very complex business for all stakeholders be it Regulator, Company Management, Board of Directors or Policyholders. Actuaries play a critical role in running of entire Life, General and Health Insurance Business. While Actuaries plays a crucial role in Life insurance in area of Business Planning, product development, Product Pricing, setting up the underwriting Norms, Setting up claims Norms, Filing Products, Experience Analysis, Risk management, Valuation of Liabilities, and company Valuation etc., the involvement of Actuaries need to be enhanced in General Insurance and Health insurance companies.

There are sufficient number of qualified actuaries, last count was 411 qualified actuaries, who can take up these responsibilities in Insurance companies and help ensure better corporate governance, risk management in the best interest of the Policyholders. I am confidence Actuarial profession shall be able to add more qualified actuaries to support the insurers and other Financial services companies in India and globally.

With this I would like to sign-off;

Know your President

A person behind the current web-site of IAI while working with GE Capital, serving the Council through various Committees recently the Chairperson, wider field committee, Chief Editor of the Actuary India, a person changing the perception of leadership team in his organization Kotak Life about Actuaries, thinking aloud about students' employment are a few to name which tells about his love for the Profession. The Profession has come a long way but many things would unfold for the betterment of the Profession under Sunil's president ship with the support of the members of the Profession.

All the best!

- Mr. Dinesh Chandra Khansifi

12th Seminar on current issues in Health Insurance

Organised by: Advisory Group on Health Care Insurance
Venue: Hotel Sea Princess, Mumbai **Date:** 14th November 2018



Mr. Vishwanath Mahendra, Chairperson of Advisory Group on Health Care Insurance made opening note underlining the high growth experienced by Indian Health Insurance market vs global experience thereby making it more lucrative. He then invited the IAI President **Mr. Sunil Sharma** for addressing the audience.

Session : Introductory session

Speaker: Mr. Sunil Sharma



Session : Introduction to Mental Illnesses and factors to consider for offering Insurance

Speaker: Dr. Jae Menon



Session Highlights

Mr. Sunil Sharma, President, IAI, in his inaugural address, welcomed everyone to the 12th Seminar on Current Issues in HealthCare Insurance. He cherished the journey of Actuarial profession in India so far and listed the key challenges faced by the profession today. Taking the attention of the audience to the Vision statement of Institute of Actuaries of India fundamental steps planned in the coming years to make progress in the right direction. Mainly to explore research potential in Actuarial area, gaining Global recognition, more involvement of Actuarial professionals in government policy making process. He emphasized mostly about the mission of promotion of research and advancement in Actuarial science, ethics and opportunities in the actuarial profession like in area of IFRS 17, Risk management, data science and analytics, etc.

Session Highlights

Ms. Raunak Jha introduced **Dr. Jae Menon** to the audience. The session kick started with a brief background about the recent changes in the regulation about the inclusion of mental illness. The discussion continued with an explanation about various mental problems and its growing incidences in India, described Schizophrenia and depression and challenges for Insurance companies.

Dr. Jae Menon then presented the classification of mental illnesses into various classes of which Anxiety disorders and Depression forms a majority. She then presented some statistics on Risk population and common mental illnesses for Globe. For Indian scenario she referred to findings from National Mental Health Survey of India (NMHS) 2015-16 and Indian Journal of psychiatry. She mentioned statistics which shows that nearly 6.5% of India's population are suffering from mental illness and is projected to

increase to 20% by 2020. She mentioned that mental illness is like silent epidemic and is burdensome both economically and socially. She emphasized on the fact that yoga and meditation as a generalized solution for all mental illness without due regards to its particularity. She mentioned females, children, students and disabled are highly affected section of the society. Some most prominent illnesses are depression, anxiety, Bipolar adverse disorder (BAPD), PTSD and alcohol abuse. Further, she moved on to present the problems in India. She explained about the treatment gap, suicide risk and socio-economic impacts.

Further, she discussed the challenges Insurer will face while pricing such expensive mental risks. She emphasized on the fact that integrated approach to this is the key to success.

Session : Ayushman Bharat and Its impact on Insurer
Moderator: Ms. Pournima Gupte
Panellist: Mr. Rajagopal Rudraraju, Mr. Sanjay Datta, Mr. Anurag Rastogi



Session Highlights

Ms. Pournima warmly welcomed everyone to the discussion on Ayushman Bharat. Then, the session started with presentations on Ayushman Bharat by the three panellists.

Firstly, **Mr. Anurag** highlighted the fact that in India, only few peoples are covered under health care financing. He also presented some statistics that 86% of rural and 82% of urban population has no access to health financing. Further, he mentioned about some features of PMJAY - health cover up to 5 lacs per family per year, secondary and tertiary care hospitalization cover, no age limit, all pre-existing diseases will be covered, it is fully portable across country, cashless and paperless access to healthcare, etc. Then he spoke about some exclusions of PMJAY - dental treatment,

procedures related to fertility, illness due to drugs, vaccination and suicides.

Secondly, **Mr. Sanjay** presented on Impacts of Ayushman Bharat on healthcare quality, economics and stakeholders. He mentioned that Ayushman Bharat will improve government hospitals quality in India by implementing standardized treatment guidelines, standardized package rates, increased focus on health priority - OPD, etc. Further he presented his concern regarding the capacity of the government hospitals with respect to increasing number of patients.

Finally, **Mr. Rajagopal** spoke about the operational aspects of the PMJAY like simplified enrolment process and flexibility in implementation model such as trust model (trust of state health department), Insurance model (through open tendering process), and Hybrid model (choice to mix and match by states). Then he discussed on some ways of improving these aspects like improvement in infrastructure, package rate rationalization. He explained about the sharing of premiums between Centre and State Govt and how much premiums to be charged.

Along with the presentation, discussions happened around topics such as whether Ayushman Bharat should affect and concern the insurers, and the reason for high volatility in pricing among states. Analysis of Insurance model vs trust model where in the thoughts of panellist coincided over advantage of Insurers to bear risks and hence are expected to be more efficient in long run. Panellists also believed that Insurers also need to add more value than mere mechanical processing. The chair then directed the discussion towards Pricing and technical workings for premium computation. While Mr. Anurag Rastogi explained the costs workings in parallel to the health Insurance costs experienced by the Insurers, Mr. Sanjay Datta explained this as an experienced rated product and a need for developing morbidity tables in light of our experience. Mr. Rajagopal Rudraraju added that the stakeholders are awaiting a real price discovery through actual experience in these untested waters.

The outcome of the discussion was that the impact of Ayushman Bharat depends on the efficacy of the trust model. It was highlighted that the challenge for the insurance model was relative inefficacy in fraud management. Ayushman Bharat is expected to affect insurers in short term and in upper tier cities. It is expected to raise awareness about the need of health insurance because of which insurers will also get new business. And, the reason behind high volatile pricing is because of difference in incidences due to differences in efficacy of state-level healthcare

schemes and differences in package rates among states in different states.

Session : Embedding wellness in the Insurance model

Speaker: Ms. Anuradha Sriram



Session Highlights

The session highlighted the concepts, approach and emerging opportunities surrounding Healthcare and wellness. The discussion was initiated by explaining the spectrum of healthcare. The benefits of shifting from reactive care model to proactive care model were explained. Further the presenter elaborated the impact of wellness on actuary and underwriter.

The presentation emphasized on shifting from reactive care model to proactive care model by adding wellness.

Ms. Anuradha mentioned that prevalence of lifestyle-based diseases is increasing highly, so the idea of wellness is needed to mitigate the customer risk from outset. She explained about the chronic management program - designed to reduce the hospitalization due to chronic conditions. She also spoke about the impact of wellness on underwriter and actuary. She noted that the insurer has to use New Age data like number of steps walked, heart rate, calories burned, etc. for better pricing of healthcare schemes. Further she explained about the benefits of wellness to different stakeholders like insurer, customers.

She then explained how the insurance company will be benefited by keeping existing customers health as a trusted model for business growth compared to adding new younger customers. It is believed that it is like an opportunity to increase profits from better health condition.

Session : Ensuring Operational Efficiency in the emerging technology era

Speaker: Mr. Kamlesh Manuja



Session Highlights

The presenter started the session by explaining the challenges faced by insurance industry from operational aspects. Then he spoke about various solutions, future opportunities and insurance offerings. He emphasized on using real time data, preventive analytics and digitalization in industry.

Mr. Kamlesh introduces some major operational challenges faced by insurance industry like complex products, cumbersome processes, business quality, pollutions, terrorism, etc. He mentioned potential solutions to overcome these challenges. For example, to use customer friendly and digitalized process to solve complex products, to use technology and predictive analytics as a solution to business quality. The speaker highlighted that there are lot of future opportunities like increasing demands, pay-as-you-use retail products. He emphasized more on insurance companies to keep pace with the advancement in technology and to use technology in effective way. Further he explained this by presenting two case studies: 1) A company providing incentives to home insurance customers to install technological devices (CCTVs and sensors) as a way to contain operational, service and claim expenses. 2) A company providing OTC (Over the counter) Life insurance facilitating instant policy issuance as a way to contain new business, renewals expenses, commissions, etc. and also providing convenience to customers.

The session was concluded with the fact that preventive analytics and digital fulfilment with integrated backend systems will hold key to success for insurance companies.

Session : Health Protection Gap in Asia

Speaker: Mr. Karthik Raja



Session Highlights

Mr. Karthik started the session by explaining Health Protection Gap. He presented some surveys related to emerging and mature markets in Asia, percentage of household income used in covering the gaps. Further he mentioned about key trends of Health protection gap: overconfidence in own health, prevalence of chronic disease and emerging health and wellness behaviour.

Mr. Karthik explained the health protection gap as the amount of financial stress households face from unpredictable medical expenses. Then, he presented some surveys related to market trends in Asia which shows that USD 1.8 trillion Health Protection Gap in Asia and 11.4% percentage of income used in covering medical expenses. Also, he mentioned that around 40 million household did not undergo medical treatment to avoid financial stress. Then the speaker presented some key trends of Health protection gap. 1. Overconfidence about health status - due to which people don't exercise and do smoke which again contributes in gap. 2. Chronic disease - these are the key contributor of the gap and over 50% of the gap are due to managing these diseases. 3. Health & Wellness behavior - there is direct positive correlation between increasing health awareness and propensity to buy insurance.

Further he discussed on the opportunities for insurer. The session was concluded with the fact that, since health is beyond the hand of the insurance industry, we have to drive behavioral change by attracting healthy lives, promote retention of policyholder and help insureds maintain a healthy lifestyle.

Session : Panel Discussion on Insurtech

Moderator: Ms. Raunak Jha

Panellist: Mr. Vishal Gondal, Mr. Prayat Shah, Mr. Vinay Kumar, Mr. Nishant Jain



Session Highlights

The discussion with **Mr. Prayat** revolved around issues such as, challenges faced by diabetic patients, what more needs to be done in the health insurance space and how synergy can be achieved between health insurance and medical consultancy. The outcome of the discussion was that diabetic problem is becoming a chronic disease and it needs lifestyle changes rather than relying on medicines, health insurer should fill the gap by developing diabetic specific products and insurer should incentivizing medical to put structure to data to increase its utility.

The discussion with **Mr. Nishant** revolved around issues such as the challenges the Health insurers are facing and how Actuaries can contribute. The key points from the discussion were that there is low penetration of health insurance especially in the younger population segment, availability of limited data and lack of technological advancement. Actuaries can contribute by indulging more into the product space as they have better understanding of risks underlying the product and by utilizing the full potential of technological advancements.

The discussion with **Mr. Vishal** was related to how the IoT (Internet of Things) devices like smart band, etc. can help in getting real time data which can be then used to price insurance products more precisely. Key solutions proposed from this discussion were to capture series of data related to clinical, non-clinical and behavioral. He noted that such data are extremely helpful for doing dynamic pricing and can change the game significantly.

The session obtained key insights from **Mr. Vinay** on his experience on deep learning and how is it different from

machine learning and artificial intelligence and key aspects in incorporating deep learning in health domain and how will it impact. The outcome of this discussion was that deep learning mostly revolves around neural networks whereas machine learning aims to solve classic regression and classification problems. Key thing needed to incorporate deep learning is good data through market and business intelligence. And it will impact mostly the pricing, underwriting, claims and fraud management field.

Session : Understanding IFRS17 and an Ideal approach of IFRS 17 implementation

Speaker: Mr. Shrenik Baid



Session Highlights

Mr. Shrenik started the session by listing the key objectives of IFRS 17, which is to standardize Insurance accounting and IFRS is adopted to ensure that the users of IFRS statements are able to compare companies (even between Insurers and other companies), their past performance and their current financial position.

He explained some features of IFRS 17 - it reflects time value of money, deferring of expected profit and aggregating of insurance contracts in groups at initial stage. Further he explained the scope of IFRS and different measurement approaches. He then moved towards the implementation aspect of IFRS 17, explained the segmentation of portfolio into finer categories at each level at inception of contracts and by quality of business and time spread of contracts. He spoke about

the finer aspects of IFRS implementation, different models, reinsurance contracts, discount rate.

He concluded the session by explaining the IFRS transition journey and system infrastructure and assessment needed for this transition.

Vote of thanks



Ms Raunak Jha thanked the speakers for sharing their valuable time and thoughts for the event. She summarized the highlights of sessions and chalked out the key learnings from them. She expressed the need for the members to venture out in the new areas of Data Science and Risk Management for meeting out the challenges laid ahead for Actuaries.

Written by



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Mark Your Calendars

EVENTS



Upcoming Events scheduled in the month of January 2019

9th Capacity Building Seminar in General Insurance (GJ) on 11 January, 2019 in Hotel Sea Princess, Mumbai
14th Seminar on Current Issues in Life Assurance (CJLA) on 22 & 23 January, 2019 in Hotel Sea Princess, Mumbai



We had celebrated 1st **Actuaries Day** on 21st August, 2018 on the occasion of birth Anniversary of Late **Shri LS Vaidyanathan**, the first Actuary of India. The event was observed at 5 centres in Mumbai, Bengaluru, Chennai, and Hyderabad & Gurgaon. Along with various activities planned, an essay competition was floated for our members to participate, for which we received 31 entries.

Actuaries Day Essay Competition winners are active student members of IAI.

Rank	Sr. No.	Member ID	Name
1 st	14	28103	Pawan Kumar
2 nd	18	2733	Ritesh Jain
3 rd	24	22528	Somroop Mukherjee

History of the actuarial profession in India

A profession offers specialized educational training in order to supply objective counsel and service to others, for a direct and definite compensation, and wholly apart from expectation of other business gain.

The actuarial profession in India can be traced back to 1944 when a small collection of individuals, qualified from the Institute of Actuaries started the Actuarial Society of India (ASI). The ASI started with just 21 fellow members. The ASI was a part of the UK actuarial profession for education and professional purposes until 1989, when it started its own examinations for Indian fellowship FASI.

A characteristic of a profession is that it serves a public purpose. Since history of the Indian actuarial profession is the subject matter of discussion, it must consider public purposes served by actuaries in the real world.

The First Indian Actuary

When Late **Mr LS Vaidyanathan** became the first Indian actuary, he helped to establish the actuarial profession in India which ultimately helped Indian Insurance Industry after its nationalization in the 1950s.

Mr Vaidyanathan's landmark research on behalf of the actuarial profession was conducted in 1931 when the Government of India entrusted him to conduct an investigation into the mortality of the Indian population based on the census data. The findings were worthy enough to be included as an annexure to the Report on the Census of India 1931.

Straight delivery and genuine conduct of knowledge and enthusiasm led to this incredible feat, which met with widespread acceptance.

The Income Tax Act too benefited from Mr Vaidyanathan's inputs and counsel. Mr. Vaidyanathan had long held the view that the

system then in vogue in India of taxing life assurance companies on the entire surplus disclosed by the actuarial valuation was extremely unfair. He played a lead role in getting the Income Tax Act amended to usher in a method of taxation which was balanced and fair. As a first step, exemption from taxation was given in respect of half the surplus reserved for the benefit of the policyholders, but, as the position was still unsatisfactory, he continued to press the point. Ultimately in 1952, the law was once again changed to exempt from income tax a higher quantum of the surplus reserved for the benefit of policyholders - a position which continues today.

The Institute of Actuaries of India

On 28 August 2006, the Actuarial Society of India (ASI) gave way to the Institute of Actuaries of India (IAI) under the auspices of the Actuaries Act, 2006. As the scope of actuarial practice broadened, the society's views on the attributes of a profession also changed.

The practice of a profession rests on a systematic body of knowledge, substantial intellectual content and development of personal skill in the application of the knowledge to specific cases. For actuaries, the scope of the financial security and systems that they design and manage keep changing but the body of knowledge has always contained elements of the mathematical sciences, economics, law, and business management.

It is interesting to note that before the nationalization of insurance companies expatriate actuaries served in India. It was only after nationalization that actuarial science came out of hibernation and became one of the most sought out profession it is today.

The journey of actuarial science from traditional roles to non-traditional ones is exciting. Actuaries have worked in insurance and associated areas because, wherever there is risk—and a

desire to manage it—there is opportunity for actuaries to apply analytical skills and business knowledge to solve problems.

Up until a few years back the example of actuarial work was limited to Valuation, Pricing, Pension, Reinsurance and Health insurance. But with “Data becoming the new oil” and an advancement in the portmanteau of Fintech and Bancassurance, there has been a rapid rise in non-traditional areas of Business Analytics, Enterprise Risk Management, Banking and Financial Services, Environmental Finance, and Wealth Management, among others. The prospect of actuarial work continues to expand everywhere.

The golden history of actuarial science is indeed a glorious achievement. This is because actuarial science is the only global profession which combines elements of multiple bodies of knowledge at a level that enables an actuary to adapt to any kind of environment, giving the actuary an ability to apply statistical and modeling skills to many problems in different

environments.

The threshold for becoming an actuary in India is at the highest level, in par with the international counterparts. This is because of the fact that Actuaries are not only supposed to be good at modeling and at analyzing data but should also hold in high regard the Professional Conduct Standards and Actuarial Practice Standards. The knowledge of professional guidance and practice is not only a requirement to qualify as an actuary but are also an integral part of the foundation of Institute of Actuaries of India.

An aspect that all IAI members need to bear in mind is that the history of Actuarial profession in India is not only a symbol of glory but also a legacy given to us by intellectual giants like the Late Mr L S Vaidyanathan. It is our responsibility and privilege as a member of the actuarial profession to safeguard its interests, work in the cause of public interest, and promote it in India and away with utmost diligence and professional standards.



Congratulations

Mr. Pawan Kumar is a student member of IAI and IFoA since 2014, having cleared three exams CT-1, CT-3 and CT-9. He is appearing for CT-4, CT-5, & CT-6 in December 2018. He has graduated from Bharati Vidyapeeth Institute of Management & Research with a Bachelors in Business Administration with a major in Finance and is also pursuing M.A. in Economics from IGNOU along with my Actuarial exams.

He is currently interning at Capgemini doing Data Segregation for Microsoft. His favourite actuaries are Mr. Mahidhara Davangere and Mr. Khushwant Pahwa whose work in the field is exemplary. In his spare time he likes to read and enjoy doing programming.

History of the actuarial profession in India

Though the background work seems started long back (e.g. Christian Huygens publishes the probability theory in 1657), the formalization of actuarial science - as far as the wider world was concerned - dates to 1693, when Edmond Halley, the famous mathematician, published a paper on the subject in the Royal Society's “Philosophical Transactions.”

It is worth mentioning that Halley's primary expertise was in a totally different field - astronomy! So it is remarkable that he was able to produce the paper, which laid the foundation for the actuarial sciences. The profession of actuaries developed in various parts of the world starting with the United Kingdom.

A profession defined

Gordon and Howell, the pair of economists, list the criterion for a profession. First, the practice of a profession must rest on a systematic body of knowledge of substantial intellectual content and on the development of personal skill in the application of this knowledge to specific cases. Second, exist standards of professional conduct must exist, which take precedence over the goal of personal gain, governing the professional man's relations with his clients and his fellow practitioners.

The actuarial profession in the United Kingdom, and in those countries with historical ties to the United Kingdom, broadly satisfies the Gordon and Howell definition. Consider the

developments in India. The Actuarial Society of India (ASI) was founded in 1945. The stated objectives of the new organization were centred on the first element of the Gordon and Howell definition. The ASI started as a collection of individuals qualified from the Institute of Actuaries in London and of the Faculty of Actuaries in Scotland. ASI's growth did not take gather pace until 2000 when private firms were authorized to again enter the life insurance business. The regulations for the new industry required each company to designate an appointed actuary. The responsibilities of the appointed actuary were to safeguard defined public interests in insurance operations. This was modelled on a regulatory device introduced earlier in the United Kingdom. The Institute of Actuaries of India is the sole professional body of actuaries in India formed by the conversion of the Actuarial Society of India into a body corporate by the Actuaries Act, 2006.

From the nineteenth century

The insurance industry started in India in the nineteenth century. It was dominated by a few British insurance companies which operated mainly in the large urban centres. Oriental Life Insurance Company was the first life insurance company in 1818. However, it only insured the lives of Britishers living in India. Later, when it was introduced for Indians it was only at the cost of extra premiums up to 20%. This was only changed in 1871 by the Bombay Mutual who introduced “fair value” policies for Indians. Property and

Casualty (P&C) insurance or General Insurance was introduced in India in 1850 with Triton Insurance Ltd., owned and operated by its British shareholders. The first indigenous P & C insurance company was set up in 1907. The market grew quickly and by 1938, there were 176 companies operating, 154 Indian companies, 16 non-Indian companies and 75 provident societies.

After the Indian independence

After 1947 i.e. after the independence, the market drastically changed. Life companies were first to be nationalised in 1956 and thereafter the general insurance companies followed suit in 1972. Foreign insurers were not allowed back into the market until 2000. Then they were allowed only as joint ventures with local companies with a maximum ownership of 26%. The Indian actuarial profession witnessed a downward trend during the years of nationalization of the Indian insurance industry. This led to reduced actuarial inputs to Life Insurance and General Insurance managements. Other areas like pensions, regulations and academics also suffered from a dearth of actuarial inputs. The downward trend resulted in a reduction of number of students taking actuarial exams during this prolonged period - a trend that quickly reversed after the privatisation of the Indian insurance industry.

In December 1999 the Insurance Regulatory and Development Authority (IRDA) Act was enacted. The main features of this with respect to the actuaries states:

- Separate licences for life, general (non-life) and

reinsurance business

- The “Appointed Actuary” mandated by IRDA regulations for life as well as non-life insurers has to be a Fellow of the Actuarial Society of India (ASI)
- The Appointed Actuary is responsible for reporting to the IRDA

In the new millennium

This led to the fast-paced promotion of the Indian actuarial profession. The start of the new millennium saw a complete revamping of the Indian actuarial education system with a close alignment to that of the UK while yet retaining the Indian flavour. The companies set up shop in India used to employ expatriates before they could find the local qualified actuarial talent. There has been a change since in the approach of the companies - many are now ready to hire an inexperienced but qualified actuary.

Currently there are over 9000 members of the Institute of Actuaries of India. Of these, a mere 379 are fellows as of March 2018. A report assessing the need to actuaries in India remarks that for the 300+ insurance products sold, there are only 375 fully qualified actuaries. With a tough criterion to clear 15 examinations, these individuals are responsible for the most crucial aspect of insurance, which is product pricing. There is a large gap between the demand for and supply of actuaries. The standard of qualifying examinations is high and thereby the quality is ensured.



Mr. Ritesh Jain, B.E. (Mech) has been working as Sr. Software Consultant with an experience in software development of more than eighteen years. Prior to that he worked in a leading yarn producer and a heavy engineering Navratna. Having keen interest in the higher mathematical skills he has been voluntarily teaching advance mathematical skills to the students, solving complex problems. So an inclination towards actuarial methods came naturally to him. He has provided voluntary consultancy to individuals and also published papers in the actuary arena.

Congratulations

History of the actuarial profession in India

Actuary: a profession with a public purpose

The actuarial profession was established to serve a public purpose. In 1762, the “Society for Equitable Assurances on Lives and Survivorships” was formed as a mutual company in London which embodied the public purpose. Policyholders owned the mutual insurance company and shared the profits through dividends on their policies. The public goal was fulfilment of mutual insurance contracts. It became clear that the calculation of premiums, policy dividends etc. required knowledge of probability and statistics, and the application of probability and statistics also required deep understanding of the prevailing macro-economic conditions and business environment which were necessary for pricing contracts. Perhaps the most important aim was a commitment to have equity in the terms and conditions of the insurance contracts. Thus, since inception, public purpose has been the foundation

of the actuarial profession.

Pre-independence India

In India, the insurance industry started in the nineteenth century. However, its presence was restricted only to large towns and served by a few British insurance companies. In 1818, India got her first life insurance company - Oriental Life Insurance which only insured lives of Europeans living in India. When life insurance for Indians was introduced later on, Indians had to pay a mark up as high as 20% when compared with their European counterparts. Famously, this changed in 1871 when Bombay Mutual introduced “fair value” policies for Indians. Triton Insurance Ltd., owned and operated by the British was the first general insurance company in India which started operations in 1850. The first Indian general insurance company was set up in 1907.

Independence and Nationalisation

After 1947, the insurance market changed dramatically because the Indian government - motivated by a socialistic philosophy - nationalised both life and general insurance companies. Banks were also nationalised. Life insurance companies were first to be nationalised in 1956 followed by general insurance companies in 1972. The erstwhile Actuarial Society of India (ASI) was founded in 1944. The growth of the Society was severely inhibited by the nationalization of Indian life insurance in 1956. The ASI was initially started as a non-examining body; actuaries got qualified from the Institute of Actuaries, London. The actuarial profession in India saw a downward trend in the early years of nationalization of the Indian insurance industry. It resulted in a reduction of the number of students taking actuarial exams.

Nationalisation was justified by the government mainly due to three reasons:

- ❖ Perception that private companies would not promote insurance in rural areas. This is somewhat true if we look at the pre-independence experience as insurance was concentrated in urban centres.
- ❖ The Government would be in a better position to channel resources for savings and investment.
- ❖ Some life insurance companies filed for bankruptcy which was a cause for concern.

Privatisation and the actuarial profession

As a continuation of the liberalization, privatization and globalization (LPG) reforms aimed to break the shackles of the economy from very slow growth (called the “Hindu rate of growth” in the western world), the Indian Government constituted the Malhotra Committee in 1993 to study the opening of the insurance industry to the private sector. The Committee recommended establishment of an independent insurance regulatory authority concurrent with the opening up of the insurance industry.

In December, 1999 the Insurance Regulatory and Development Authority (IRDA) Act was passed. The IRDA is an independent insurance regulator. The IRDA Act also withdrew the monopoly of the LIC and GIC (and its subsidiaries) and thereby opened up the insurance sector for private sector participation. The main features of the IRDA Act relating to actuaries were:

- ❖ The “Appointed Actuary” for life as well as non-life companies mandated by IRDA regulations had to be a Fellow of the erstwhile Actuarial Society of India (ASI). This regulation led to an exponential growth in the profession.
- ❖ The Appointed Actuary has to report to the IRDA. The responsibilities of the appointed actuary were to safeguard

defined public interests in insurance operations.

Today the actuarial workspace in India has expanded by leaps and bounds and can be classified into two main categories:

- a) Domestic: Insurance companies (life and non-life), Consulting roles (in MNCs and Indian consultancies) and Re-insurance companies.
- b) Off-shore: Mainly concentrated in the domain of Pensions, Life and General insurance.

The Actuarial Profession in modern finance

Just as the medical profession and human biology are distinct from each other, so is actuarial profession and statistics. The actuarial profession assimilates knowledge from mathematics, statistics, economics, finance etc. and develops personal skill in the application of knowledge to specific cases. This establishes the fundamental difference between the basic subjects on which a profession is based, and the professional application of the subjects.

In an ever changing world, the systematic body of knowledge has to be continuously updated. The significant development in the evolution of the profession has been the remarkable growth of the theory of financial economics. Starting with Markowitz's portfolio theory proposed in 1952, the very rapid application of the theory to managing financial risk has had a profound impact on actuarial practice. Perhaps, even more significant has been the use of derivatives and behavioural finance in risk management and pricing approaches. Such has been the advent of financial economics that today the actuarial profession offers a specialization in Finance with dedicated higher level subjects. Also, these new ideas have been able to attract a significant number of talented people into the field of financial risk management.

The transition from ASI to IAI

The Institute of Actuaries of India (IAI) is a statutory body established under the Actuaries Act, 2006 for regulating the Indian actuarial profession. As a consequence, the erstwhile ASI was dissolved and all the Assets and Liabilities were transferred and vested in the IAI. Since 1979 the ASI has been a Full Member of International Actuarial Association (an umbrella organization for all actuarial bodies across the world). In 1982, the ASI was registered under the Societies Act XXI of 1860 and also under Bombay Public Charitable Trust Act, 1950. In 1989, the ASI started examinations up to the Associate level, and in 1991, started conducting the Fellowship level examinations leading to professional qualification of an actuary.



Congratulations

Mr. Somroop Mukherjee has first class in his Masters in Economics from Delhi School of Economics and first class with distinction in CAIIB. He has qualified 4 core technical papers of the Institute of Actuaries of India. Previously, He has worked in SBI as Probationary Officer, in HSBC as an Analyst and in the Economic Policy & Research Department of National Stock Exchange, Mumbai as Manager. He is currently working at IMT Ghaziabad as an Assistant Professor in the Finance Department. His hobbies include traveling, football and listening to Shyama Sangeet. He is thrilled by the beauty of the Himalayas and visit it often. He enjoys trekking in the Western Ghats too. He came third in the Quiz organised at the Kolkata Book Fair in 2009. He has a penchant for writing. His 'Letter to the Editor' has been published in leading English newspapers like 'The Hindu' and 'Times of India.'

The Search for the “Causal How”

A long pursuit in motor insurance

Introduction

The insurance industry has been slow in adopting new technologies due to product complexities, dependence on legacy systems, regulatory complications and heavy reliance on intermediated sales and service. Nevertheless, emergent technologies such as internet-of-things, mobility and cloud, along with the personalization needs of the customers, are enforcing an epochal change in the way insurers define, assess and price risk. Motor insurers are spearheading this axis-shift with the adoption of telematics-driven usage-based insurance (UBI) programs to track the real-time driving behavior of policyholders for charging actuarially fair premiums.

The motor liability coverage has traditionally depended on a wide range of direct and indirect variables to estimate the risk exposed by the customers. While some of these variables have a direct causal relationship to risk, others serve as proxies to the true risk indicators in finding answers for the what, who, where and when questions pertaining to quantifying the risk exposure. Insurers did not have the means to track the real critical conditions associated with the insured activity. They had to depend on the answers they received for who, what, when and where, as proxies to conjecture answers for the “how” question on driver behavior, thus resulting in an accuracy gap.

Telematics driven UBI is now bridging the gap and facilitating insurers to capture the elusive answers to the “how” question in real-time. With the new capability, insurers can know the “how” by tracking and analyzing driving parameters such as speeding, driving smoothness, acceleration, cornering, braking and swerving patterns that will directly indicate safe or unsafe driving. They can move away from assessing and pricing risk they are exposed to with “proxy how” to accurate “causal how”.

This article briefs about the journey of motor insurers in search of the “causal how”, way in which telematics is helping them to capture it, and the new-catch is being refined with the help of machine learning algorithms. It also suggests what the industry needs to do so that the customers are not unfairly discriminated against.

Discovering the Causal How

Insurers obtain extensive details with respect to insurable object and critical conditions to assess the risk exposed by a customer to charge an actuarially fair premium that is proportional to the risk transferred. In motor insurance, *a priori* information such as age, gender, location, type of vehicle and usage of the vehicle as well as *a posteriori* information such as annual mileage, claim frequency,

claim severity, traffic violation are obtained for categorizing the risk of a customer. The data considered covers objective variables to answer the - what (type of the vehicle, vehicle condition), who (age, gender, marital status, education, occupation, credit score, driving experience, residence location and type, accident and claims history), where (exposure of the vehicle, location of driving), and when (time of driving) questions regarding the risk assessment.

For a new customer, self-declared data and the details of traffic ticket fines and penalties, wherever it is available, is used to assess the initial driver risk. At the time of contract renewal, the claim history of the customer is factored to refine the initial risk classification. Insurers have traditionally considered the point-in-time data available at the time of initial contracting or subsequent renewals and surmised continuation of the same risk levels for the oncoming contract period. They have remained oblivious to the behavior of a customer pre- and post-contracting or post-termination of risk, thus paving way for ex-ante and ex-post moral hazards, and resulting in an accuracy gap in their loss predictions.

The need to consider all critical conditions, including the driver behavior, to calculate premium that reflected the actual risk exposure was posited by Paul Dorweiler in the year 1929. However, insurers were not supported by adequate technologies to track, record and interpret the most important subjective causal factor - driver behavior, which could demystify the “causal how”. Actuaries relied on the law of large numbers to mitigate the shortcomings by creating homogenous customer groups and using demography-based values pertaining to the groups for what, who, where and when, as proxies to conjecture the answers for “how”. These statistical risk groups with aggregated historical data helped them to calculate an “average premium” corresponding to the “average customer” who represented an “average risk probability”. This method was inherently unfair and flawed, and led to accuracy gap as only directional proxy-how representatives of the driver behavior were considered. To quote an example, high-risk drivers who were never convicted in the past for a driving offense or filed a claim, would continue to pay lower premiums that are not actuarially fair to the level of risk they actually pose to the insurer.

In an attempt to narrow down the accuracy gap, insurers continued to increase the number of the proxies considered, such as the age of driver, gender, marital status, educational qualification, residence type, residence location and credit score. Driver risk

classification was based on hypotheses that those who are young, men, unmarried, uneducated, rented residents or have a low credit score were riskier than those who are old, women, educated, homeowners or have a high credit score. Some of these are mere confounds and surrogates that are controversial and exhort unfair discrimination. The quest to achieve accuracy in the homogenous group formation made insurers to start classifying customers into categories based on the annual mileage. With the relationship between the duration a vehicle is exposed and the probability of risk is well established, customers with an annual mileage of less than 12,000 or 15,000 miles in a year were provided premium discounts for low mileage. These Pay-As-You-Drive (PAYD) insurance models initially depended on self-declared values and later evolved into the values being verified from the odometer readings. Another model Pay-At-The-Pump (PATP) was explored by insurers, which associated the actual condition of a vehicle, its exposure and driving pattern to the fuel consumption. With PATP, customers paid at the pump, a surcharge on every gallon of fuel to buy a portion of their insurance premium.

Catching the Causal How

Over the past 2 decades, data sourcing and transmitting technologies such as internet-of-things, smartphones and networks are enabling uninterrupted last-mile connection with the end customers, and technologies for storage and analysis, such as cloud, big data and data science are enabling a never-before-possible continuous risk monitoring prowess. The first advanced telematics systems for cars was launched by General Motors in 1996. This armed insurers with the means to monitor and measure the on-road driving behavior, thereby changing the way in which insurers could assess, rate and price risk. Progressive, was the first insurer to leverage this for insurance with the introduction of Snapshot, a voluntary telematics-based program in 2008. In this program causal-data such as miles driven, time of the day and hard braking were considered to assess the driver behavior of the individual customer. The Pay-How-You-Drive (PHYD) model was born with which insurers could arrive at a reasonably accurate estimate of the driver risk.

Since then, many insurers have launched different versions of UBI by including additional driving parameters such as speeding, driving smoothness, harsh acceleration, harsh cornering, swerving pattern, and contextual information regarding when and where the vehicle is driven to ascertain the actual risk posed by the customer. Currently, insurers offer UBI with the help of four different types of devices such as onboard diagnostics dongles, black boxes, embedded systems and smartphones. These devices vary in their capabilities and hence, the data element captured by them and the accuracy levels differ. An indicative list of the data elements captured are time, longitude, latitude, speed, altitude, journey start and finish times, three-dimensional position data, engine RPM, sharp brakes, sharp acceleration, steering angles, cornering, seat-belt use, total mileage, total number of

journeys made, fuel consumption, speed in freeway and local, journey duration, and idle time. There are two ways in which these data elements are monitored and captured: one in which the occurrence of specific events during a trip that exceeds preset limits is tracked and the other in which the entire journey is monitored.

The loss cost models built by insurers vary based on whether event-data or entire-journey-data are considered. Even within the event-based models, variances exist based on which of the parameters - mileage, braking, cornering, acceleration, and swerving, are considered, and how they are considered. Models are also differentiated based on the level of granularity and weight accorded to a data element. Analyzing the treatment of just one variable - speed, there are three different calculation methods in which it is considered. In one model the speed allowed for a trip is treated as a constant and any outlier irrespective of road-type beyond a threshold is penalized with malus points. In the second model, two separate constant speed limits are set for highways and non-highways and the outliers are penalized. In the third model, the distinctive speed limits for each road is obtained from third-party sources against which the actuals are measured for scoring. Though the score calculated from the event-based model has a greater causal association to risk than the proxy-how variables, the accuracy is limited due to the assumption that a few harsh braking, acceleration or cornering events constitute the universe of variables to predict loss costs. As against this, the entire-journey-based model is sophisticated as the granular data regarding the vehicle use on a second-by-second basis is considered to predict the loss costs.

Currently, the models implemented by insurers for scoring the risk behavior of a driver are mostly event-based. In these rule-based statistical models, for each completed trip, scores are calculated for each tracked parameter. A trip level score is then calculated by giving differential weight to each parameter. At the end of the day, a day level score is calculated by according different weight to each trip made during the day based on the driving pattern and context. This score gets further aggregated at week, month and policy levels. The scoring logic also varies based on whether the insurer follows absolute or relative scores. In the absolute model, the score depends only on the driving behavior of the individual driver on a predefined scale, whereas in the relative model the score depends on the driving behavior of the individual driver in comparison to the behavior of the whole population of drivers subscribed to the UBI program. Depending on the policy level score, a driver is subdivided into a risk decile or percentile ranks, which is used for quantifying premium discounts.

Taming the Causal How

As of now, telematics-enabled UBI is still an opt-in feature and not mandated by insurance regulators. Due to this reason, insurers are mostly enticing customers by

incentivizing them with premium discounts for enrolling in their telematics programs and/or for scoring good driving behavior points. The current discrimination is in the form of preferential treatment in premium for customers who opt-in and no difference for those who do not. Though some insurers are claiming that bad driver behaviors could be penalized with an increase in the premium, it is not yet a widely followed practice. As UBI is still not launched by all insurers and opted by all customers, insurers are offering UBI programs alongside traditional products. Consequently, insurers have not yet explored the use of the new “causal how” inferences to build motor insurance risk models that are entirely new. For the customers who opt-in for the UBI programs, the new insights are retroactively applied to the traditional risk models to fine tune them. While the base premium rates are still arrived depending on the traditional *a priori* and *a posteriori* information, the “causal how” information from telematics is used to calculate the quantum of premium discount that is applied on the base premium.

With only a limited set of data elements being considered for calculating the driver behavior score, insurers are mostly banking on the traditional generalized linear modeling techniques (GLM) such as linear regression. GLMs have high accuracy levels when the structure of the

data is well known and they are used to find the relationship between a target variable and one or more predictor variables. GLM could accurately reveal the impact of specific variables such as age or mileage on risk frequency or severity, but they are ineffective for modeling all the variables together and identifying implicit patterns. Insurers can extract vast troves of data from telematics, which they could use to assess the “causal how” accurately, refine the answers for who drives, when and where questions and also get an intricate understanding of the vehicle. The extensive augmentation of granular and variable data from telematics and the environment could be used to build contextual and prescriptive models.

However, for analyzing the nonlinear dependencies within the causal variables and their complex interactions more flexible models are needed. Insurers are starting to explore the use of machine learning algorithms as a supplementary to the linear, statistical and parametric models. These models are currently experimented as a supplementary to unearth new risk patterns and insights such as identifying the individual driving style and signature, and for predicting abnormal, aggressive and distracted driving patterns.

Purpose	Machine learning model being explored
Driving style	Fuzzy logic inference systems, Hidden Markov models, Support Vector Machines, K-means
Driver signature	Random forest
Abnormal driving (weaving, swerving, side slipping, fast U-turn, turning with a wide radius, sudden braking)	Support vector machine, Neuron networks
Aggressive driving (value of time to lane crossing)	Random forest
Distracted driving	Decision tree, Multilayer perception

With the driving signature, the distinctive driving behaviors of several named and unnamed drivers in an insurance policy could be identified and instead of a flat excess premium, additions commensurate to the additional driver could be charged. Besides this, insurers would be able to unravel use of a vehicle by undisclosed additional drivers. In case of abnormal, aggressive and distracted driving patterns proactive risk prevention intervention could be initiated. The advantage of the machine learning algorithms is that they assume no hypothesis of the data, learn from the data and discover important features and predict without any preconditions.

The need for machine learning models become indispensable when insurers want to club contextual information regarding the road conditions such as potholes, bumps, traffic density, etc., environmental conditions such as weather, and connected health details from the wearables, to the telematics and vehicular data for unearthing new patterns associated with driving behavioral risk. This has the potential to transform the

business models of insurers and helps them to engage with customers with the introduction of Manage-How-You-Drive (MHYD) programs that are focused on effecting betterment in the driving behavior and driver safety. Several insurers are leveraging machine learning algorithms for providing support to customers during accident scenarios, initiation and processing of claims, fraud detection and prevention.

Conclusion

Currently, even for the rule-based statistical models, there are no industry standards for sourcing, transmitting, processing, analysis of data, scoring and rating driver behavior, and pricing insurance premiums. Insurers are treating the scoring and rating algorithms as proprietary and hence no clarity is provided on how the values pertaining to the parameters of their driving are converted into driver behavior score and discount on premium. So far UBI is in a no-conflict zone with customers, as the outcome of the program is either discount or no-discount situation. The need for transparency and explainability are very vital when the

insurers start taking penal action for what they consider as a bad driving behavior. It is essential that regulators set the standards for telematics methods, data elements considered, their granularity, statistical or machine learning models applied, risky behavioral pattern benchmarks, scoring and rating standards. It may be appropriate to have an industry standard for calculating driver behavior scores similar to the one prevalent for financial credit scores. This will help to weed out unfair bias in the scores and enable portability of insurance policies.

The growth of advanced driver-assistance systems and autonomous vehicles will reduce accidents caused by driver behavior. However, due to technical and environmental challenges the launch of a fully autonomous vehicle may be away by a few decades. Besides this, the complete elimination of driver behavior would materialize only when all the vehicles on-road are replaced by fully autonomous vehicles. Till that stage is achieved, driver behavior would remain to be an important cause of loss and insurers across the world would continue to leverage the newly being conquered “causal how” as a critical rating factor.

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DDA intends to engage a practicing firm of Actuaries for rendering actuarial valuation services in respect of DDA's four retirement benefit funds, namely, DDA Pension Fund Trust, DDA Gratuity Fund Trust, DDA Leave Encashment Fund and DDA Post-Retirement Medical Fund. The complete tender document containing the eligibility criteria, technical evaluation criteria and other terms and conditions may be accessed by visiting the website of DDA, i.e. dda.org.in in the e-Tender/Public Notice tab. The technical and financial bid may be submitted in separate sealed envelopes addresses to the Chief Accounts Officer, Room No. B-205, Delhi Development Authority, Vikas Sadan, INA, Delhi-110023 latest by 15.12.2018.

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The Financial map of India consists of banks, non-banking financial companies, mutual funds, money market mutual funds, call money market and long-term financial institutions including insurance companies and pension funds. Of these banks account for a substantial portion. We do not have enough pension funds and the presence of wide spread insurance companies is only from early 2000s. The long-term financial institutions comprise of Export-Import Bank of India (EXIM), National Bank for Agriculture and Rural Development (NABARD), National Housing Board (NHB) and Small Industries Development Bank of India (SIDBI). They, in general, meet the credit requirement of long term developmental needs. The NBFCs are mostly private sector institutions. Their presence could be dated back to late 1940s when many small finance companies offered funding for the purchase of trucks etc. Since then, this sector has recorded a phenomenal growth. Today, the NBFCs form an integral part of the Indian financial system. They perform a diversified range of functions and offer various services such as personal loans, housing loans, gold loans, insurance, and loans for purchasing motor vehicles, machinery, farm equipment among others to individuals, corporate and institutional clients. Non-banking financing thus provides a valuable alternative to bank funding and helps support real economic activity. It is also a welcome source of diversification of credit supply form the banking system, and provides healthy competition for banks.

The NBFCs also play an important role in financial inclusion by complementing the banking sector in reaching out credit to the unbanked segments of the society, especially to MSMEs. Their success can be attributed to their better product lines, lower costs, wider and effective reach, strong risk management capabilities to check and control bad debts. The NBFCs at ground level understanding of their customers' profiles and their credit needs given them an edge, as does their ability to innovate and customize products as per their clients' needs. This makes them the perfect conduit for delivering credits to MSMEs.

In India, a company is considered as an NBFC if it is incorporated under the Companies Act (1956) and carries on as its business or part of its business, any of the activities listed in Section 45 I(c) of the RBI Act (1934), viz., business of making loans / advances or acquisition of shares / securities, etc. or hire purchase finance or insurance business or chit fund activities or lending in any manner provided the principal business of such a company does not constitute any of the following non-financial activities, viz., (a) agricultural operations, (b) industrial activity, (c) trading in goods (other than securities), (d) providing services, and (e) purchase, construction or sale of immovable property.

Further in terms of section 45 I (f) of the RBI Act, a company would also be a NBFC, if its principal business is that of receiving deposits under any scheme or arrangement or in any other manner or lending in any manner (these are known as Residuary Non-Banking Company). While it is mandatory that every NBFC should register with RBI, certain categories of NBFCs that are regulated by other regulators are exempted from the requirement.

While the functions of NBFCs seem to be similar to that of banks, there are certain important differences between the two. They are: (i) banks are the only institutions that are capable of creating credit from the monetary policy point of view; (ii) NBFCs are not covered under the scheme of Deposit Insurance & Credit Guarantee Corporation of India (DICGC); (iii) NBFCs are not eligible to accept demand deposits; (iv) NBFCs are not a part of a Payment Settlement System of RBI; 6 and (v) NBFCs-D are not subject to Cash Reserve Ratio (CRR) requirements like banks but are mandated to maintain 15% of their public deposit liabilities in Government and other approved securities as liquid assets.

The following table gives the growth picture of NBFCs during 2012-17. A comparison is made between NBFCs assets as a per cent of India's GDP vis a vis scheduled commercial banks' (SCB) assets.

¹Visiting Professor of Finance and Insurance, Madras School of Economics. Views are strictly personal.

Table-1: Number of NBFCs and their assets as a per cent of GDP (as at end March):

Year	Number of NBFCs	Number of NBFCs-D	NBFCs Assets as % of GDP	SCBs Assets as % of GDP
2012	12385	273	12.1	95.2
2013	12229	254	12.9	96.4
2014	12029	241	12.6	97.7
2015	11842	220	11.9	96.7
2016	11682	199	12.6	96.0
2017	11517	179	13.0	93.2

Source: RBI Report on “Trend and Progress of Banks in India”—various issues

As of March 2017, there were 11, 517 NBFCs, of which 179 are deposit taking ones (NBFCs-D) and 220 Systematically important non-deposit taking NBFCs (NBFCs-ND-SI) as compared with 69 Scheduled Commercial Banks (SCB). These SCBs comprises of 21 public sector banks, 21 private sector banks and 27 foreign banks. Since November 2014, NBFCs-ND-with assets of ₹5 billion and above were classified as systemically important non-deposit taking NBFCs. The total assets of NBFCs amounted to ₹12.85 trillion as at end of March 2017 as compared with ₹141.586 trillion for SCBs. Since 2014, NBFCs-D and NBFCs-ND-SI are subject to prudential regulations such as capital adequacy requirements and provisioning norms along with the reporting requirements. In India we have witnessed a happy and vibrant co-existence of both banks and NBFCs and these financial institutions have significantly contributed to the financial development of India.

If one argues that SCBs is a heterogenous group then the same argument applies to NBFCs also, as we observed significant variation regarding deposit distribution, credit distribution to various sectors etc., among SCBs. It is a well known fact that core retail business were almost copied by the SCBs from NBFCs, whether it is auto loan, gold loan or consumer finance etc.. In a similar manner, if we consider the manner in which the investments are managed by NBFCs, they closely followed the practices of SCBs. It is very interesting to examine the current health position of SCBs and NBFCs, so that one can draw the future course of policy actions to nurture them.

One of the principal health parameters is Gross NPA ratio. Higher the ratio lower the profit and more money is needed for provisioning. Moreover, this high NPA ratio increases the credit risk measure. During 2012-17, GNPA for SCBs increased from 2.95 per cent in 2012 to 9.32 per cent (almost three times) as compared with an increase from 2.3 per cent to 4.4 per cent for NBFCs (2 times). (Table-2) The increase in this GNPA ratio is more pronounced for SCBs during 2016-17 (around 25 per cent) as compared with that of NBFCs. The difference between GNPA ratio and that of Net NPA ratio gives an idea of money available under 'provisioning'. For SCBs this is almost 400 basis points as compared with 200

basis points for NBFCs. This gap between GNPA and NNPA has widened for SCBs as compared with NBFCs for the years 2016-17. These developments put the SCBs in a weaker position as compared with NBFCs as a group. Capital to risk weighted asset ratio (CRAR) for SCBs revealed a marginal increase during this period, as this has moved from 10.1 per cent in 2012 to 11.2 per cent in 2017. Since 2014 this ratio is increasing for SCBs mainly due to injection of capital by the Government of India. On the other hand, for NBFCs this has revealed a declining trend since 2013. However, this is above the minimum prescribed ratio of 15 per cent. This indicates the free capital (risk weighted capital - regulatory minimum) is decreasing thereby constraining the capacity of NBFCs to take higher risk business. Return on asset ratio is almost 5 times for NBFCs as that of SCBs. Net profit to total income ratio has improved for SCBs in 2017. This year witnessed a reversal of trend in this ratio, as in earlier years, this was higher for NBFCs as compared with SCBs. Even then for both the group this is more than the accepted minimum. Leverage ratio is higher for SCBs than the NBFCs. While NBFCs are within this limit, SCBs have far exceeded this. In order to understand the impact of volatility passed on from the stock markets to the financial institutions, we considered 'exposure to capital market'. This ratio is lower for NBFCs as compared with SCBs.

Credit risk is one of the major risks facing the financial sector and especially SCBs and NBFCs. It is of interest to see how the credit risk will have its impact on important health parameters, discussed above. In this context the Financial Stability Report of the RBI is very useful, as this has measured the impact of credit risk on CRAR, inter alia. Stress test on credit risk is conducted under three scenarios, viz., GNPA increases by 0.5 Standard Deviation (SD) (ii) GNPA increases by 1.0 SD and (iii) GNPA increases by 3 SD. The impact of these three scenarios clearly exhibit the intensity of credit risk. Table-2 gives the results for both SCBs and NBFCs. While the above methodology was followed since 2014, before that scenario testing was done on the basis of GNPA increased by 2 times and NNPA increased by 5 times. The current practice is more robust than the earlier one as this takes into account the distribution property of GNPA.

For NBFCs, the decline in CRAR ratio consequent to the shock given, is more pronounced under the Scenario 3. The decline in CRAR is maximum in 2017 as compared with other years, i.e., the impact of credit risk is slowly increasing for NBFCs. But credit risk is much less for NBFCs as compared with SCBs. While the decline in CRAR is about 4.5 per cent for NBFCs, this is 23.6 per cent for SCBs. Even in SCBs we observed that decline in CRAR is more in 2017 as compared with other earlier years. However, system as a whole, the minimum CRAR for NBFCs (15 per cent) and SCBs (9 per cent) is maintained as hence there is no system-wide risk. (Table-3)

Stress tests for credit risk for individual NBFCs / SCBs reveal that under scenario III, 11 per cent of NBFCs would not maintain the minimum prescribed CRAR of 15 per cent. This percentage has increased in 2017 as compared with 2016 but lower than in 2015. At the SCBs level, the percentage number of banks which could not maintain the minimum prescribed CRAR (i.e., 9 per cent) is 24 per cent in 2017 as compared with 22 per cent in 2016 and 28 per cent in 2015. At the individual level, this risk is more pronounced for banks than for NBFCs. This analysis clearly says that credit risk is more pronounced for banks than for NBFCs. Major factors contributing for lower credit risk in NBFCs are prudent credit appraisal procedures and continuous contact with the borrowers.

In the last 3 / 4 years NBFCs play an important role in selling insurance products. They are acting only as intermediaries and they do not take risk.

In the years to come the role played by NBFCs is going to be crucial for the development of insurance sector. Given the comfortable situation regarding their Balance sheet strength, insurance companies must use them to augment their sales.

All these parameters put the strength of the NBFCs few notches above the SCBs. Thanks to the regulatory measures imposed by the RBI on NBFCs, which have contributed to the enhanced strength of NBFCs. There should be no complacency. The crucial issue is what is the role of NBFCs in the future is not clear. This issue is all the more assume more importance under the new set of regular banks, payment banks etc.. None of the committees appointed by the GOI and RBI have adequately and comprehensively addressed this issue. Each committee has considered some issues which are partial in nature. The measures suggested by these committees clearly portray, in a subtle manner, the limitations of the RBI in undertaking a comprehensive supervision of NBFCs on par with banks. A more focused and thought-provoking public discussion is needed in order to position the NBFCs on a strong footing, so that their contributions to the development of Indian economy is continuously available and NBFCs' growth add enhanced stability to the system.

Table-2: Important health parameters: SCBs Vs NBFCs

(end March—in per cent)

Parameter	2017	2016	2015	2014	2013	2012
1.Gross NPA Ratio						
SCBs	9.3	7.5	4.3	3.8	3.2	3.0
NBFCs	4.4	4.6	4.6	4.7	3.6	2.3
2.Net NPA Ratio						
SCBs	5.3	4.4	2.4	2.1	1.7	1.6
NBFCs	2.3	2.5	2.5	2.5	1.6	1.4
3.CRAR						
SCBs	13.6	13.8	12.6	12.5	10.3	10.1
NBFCs	22	24.3	27.3	28.1	28.1	25.5
4.Return on Assets						
SCBs	0.35	0.4	0.8	0.8	1.04	1.08
NBFCs	1.8	2.1	2.2	2.3	2	1.8
5.Net profit to total income						
SCBs	16.04	12.69	12.34	11.77	11.35	11.64
NBFCs	14	18.3	18.8	18.3	17.4	17.6
6.Leverage ratio						
SCBs*	6	6.2	5.8	5.3	6.3	6.1
NBFCs	2.8	2.8	3.7	3.4	3.8	4.1
7.Capital market exposure						
NBFCs \$	7.8	8.5	6.7	6.7	8.1	8.4

* : SCBs—Tier 1 ratio

\$: Capital market exposure on a consistent basis for SCBs are not available

Source: RBI Report on 'Trend and Progress of Banking in India', and 'Financial Stability Report'—various issues

Table-3: Impact of credit risk on SCBs Vs NBFCs—A comparative picture

A : Level I—System level credit risk—CRAR ratio as a result of the shock given:

(i) Scheduled Commercial Banks:

Year (end March)	Actual CRAR	Scenario I (GNPA increased by 1 SD)	Scenario II (GNPA increased by 2 SD)	Scenario III (GNPA increased by 3 SD)
2017	13.6	12	11.6	10.4
2016	13.8	13.3	11.8	10.6
2015	12.6	11.7	10.8	9.9
2014	12.5	11.8*	10.2**	Not applicable
Sep 2013	12.7	12.4*	11.1**	Not applicable

(ii) NBFCs:

Year (end March)	Actual CRAR	Scenario I (GNPA increased by 1 SD)	Scenario II (GNPA increased by 2 SD)	Scenario III (GNPA increased by 3 SD)
2017	22	21.6	21.5	21
2016	24.3	24	23.8	23.3
2015	27.3	27.1	26.9	26.6
2014	28.1	27.8 #	26.95 ##	Not applicable
Sep 2013	21.7	21.4 #	20.75 ##	Not applicable

*: GNPA increased by 0.5 SD

** : GNPA increased by 1 SD

#: GNPA increased by 2 times

##: GNPA increased by 5 times

B : Level II—Credit risk at each bank / NBFC level—Percentage of number of banks / NBFCs which could not maintain the minimum prescribed CRAR consequent to the shock given. (This ratio is 9 % for SCBs and 15 % for NBFCs)

(i) Scheduled Commercial Banks:

Year (end March)	Scenario I (GNPA increased by 1 SD)	Scenario II (GNPA increased by 2 SD)	Scenario III (GNPA increased by 3 SD)
2017	4%	18%	24%
2016	5%	16%	22%
2015	4%	19%	28%
2014	16 banks	Not applicable	Not applicable
Sep 2013	Not available	Not available	Not applicable

(ii) NBFCs:

Year (end March)	Scenario I (GNPA increased by 1 SD)	Scenario II (GNPA increased by 2 SD)	Scenario III (GNPA increased by 3 SD)
2017	8%	8%	11%
2016	5%	5%	8%
2015	14%	14%	19%
2014	8.8% #	10.1% ##	Not applicable
Sep 2013	3.5% #	8.9 % ##	Not applicable

#: GNPA increased by 2 times

##: GNPA increased by 5 times

Source: RBI Report on 'Trend and Progress of banks in India' and 'Financial Stability Report'—various issues

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“Dr. R Kannan, a former member of the Insurance Regulatory Development Authority (IRDAI).”

Change is happening and our role as actuaries needs to be ready to take the limelight

We have spent most of the last 10 years in this areas of practice focused on actuarial work related to employee benefits valuations for corporate accounting. Going forwards, in addition to this, I see good opportunities on the horizon. In order to position our profession well, we need to raise the public awareness and perceived value of what we can do in the area of pensions, employee benefits and social security.

What are driving these opportunities?

- Corporate clients require greater explanations and support for the accounting valuations. Their stakeholders and auditors are demanding more rigour and governance from them and in turn that comes to us. For example assumptions, forecasting and variance analysis.

APS27 provides a further tool for members to educate, highlight our professional duties and increase our value to clients and auditors.

- Retirement trust investments are being managed more closely by Trustees. There are opportunities here for investment consulting, as well as asset-liability modelling. With investment regulations evolving, this area of work can increase.
- The current Government of India has embarked on a number of labour reforms. Part of that is promotion and roll out of social security schemes. We have a real opportunity to be an independent voice on these issues, which impact the country for generations to come.

Atal Pension Yojana and National Pension System, Maternity Benefits Act are just a few examples.

- The big topic not discussed much to date is the Labour Code on Social Security. This Code is part of the rationalization agenda of labour laws. The

Code is one of four such Labour Codes being introduced. The Code on Social Security is currently in its second draft.

The current draft outlines a rationalization of labour laws, whilst also creating a new combined governance and implementation organizational structure at a Central and State level to cover all forms of workers. Up to now coverage of such social security in labour law has largely been limited to the organized sector. The code aims to expand coverage to the unorganized workforce sector too. That's around 500 million people!

The Code has specific mention of potential roles that actuaries can play in this architecture. As a profession we must position ourselves uniquely so we have a key seat on the table as decisions on the plan designs, financing and ongoing funding governance are being taken by relevant authorities.

It will be a key goal of the advisory group to gather feedback from members about such developments and assist the Institute be the collective voice of the practice area to wider stakeholders.

This will be in addition, to continuing to provide learning opportunities and technical guidance for practicing members through seminars, technical notes, research papers etc.....

I look forward to providing regular updates and please do reach out to the advisory group with any ideas and thoughts that may help us all in the future.

Submitted by



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Crop Insurance 2017-18 at a Glance!!!

Agriculture has been backbone of the Indian Economy contributing a major part of the GDP. Approximately 58 percent of the rural population relies heavily on Agriculture as their primary source of livelihood. Due to such an imperative contributor in the economy, Agriculture has always topped the list in Government policies. One such initiative was the Pradhan Mantri Fasal Bima Yojana (PMFBY) started in 2016 with the following objectives:

- To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests & diseases
- To stabilize the income of farmers to ensure their continuance in farming
- To encourage farmers to adopt innovative and modern agricultural practices
- To ensure flow of credit to the agriculture sector

The PMFBY scheme has the following highlights:

- Uniform Actuarial premium rate to be paid by farmers: 2% for Kharif Crops, 1.5% for Rabi crops and 5% for annual Commercial & Horticulture crops
- No upper limit on government subsidy. Even if balance premium is 90%, it needs to be paid by farmers
- Extensive use of technology (Remote sensing, smart phones for uploading pictures of crop cutting etc.)

to have better applicability of the scheme

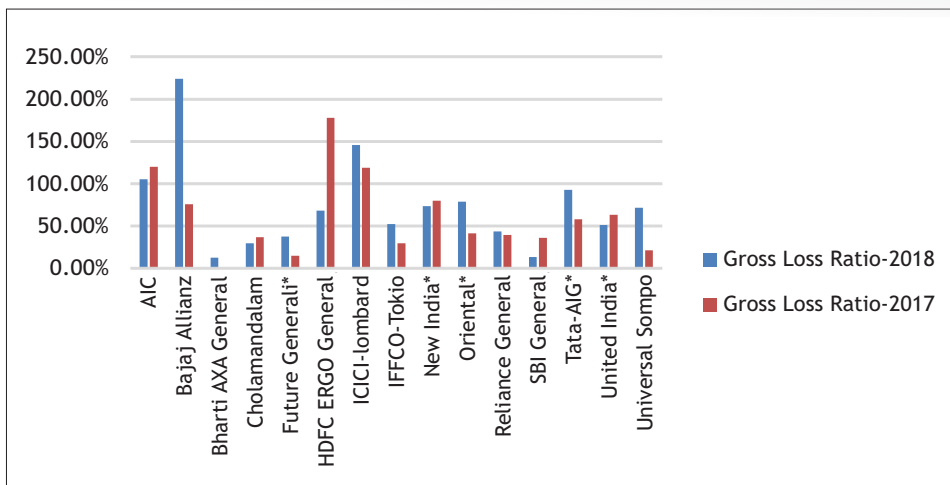
- Exemption from Service Tax liability for the implementation of this scheme

The debate over effectiveness of Crop Insurance scheme has been a hot topic amongst many political groups majorly because of the heavy profits that Insurance companies earn leaving behind the issues of the farmers in vein. As per recent RTI (Right to Information Figures), crop empaneled Insurance Companies underwritten business worth ₹49,408 Crores of premium since the start of the scheme for around 10.6 crores farmers and only paid out ₹33,612.72 crores of claims registering a profit of ₹15795.28 Crores.

The Public disclosures of crop empaneled insurance companies (Bajaj Allianz, Cholamandalam, Future Generali, HDFC ERGO General, ICICI-Lombard, IFFCO-Tokio, Reliance General, SBI General, Tata-AIG, Universal Sampo, AIC, Bharti AXA General, New India, Oriental and United India) reflects the growth in their crop business majorly due to favorable profit margins witnessed in the past two years. The Table below reflects the premiums and claims data for these companies:

Insurer	GWP-Upto March, 2018	GWP-Upto March, 2017	Claims-Upto March, 2018	Claims-Upto March, 2017	Premium Growth	Premium Growth %	₹ in Crores	
							Gross Loss Ratio- 2018	Gross Loss Ratio- 2017
Bajaj Allianz	580	464	1,301	351	116	25%	224%	76%
Cholamandalam	501	282	149	104	219	77%	30%	37%
Future Generali*	146	320	55	47	(174)	-54%	38%	15%
HDFC ERGO General	2,201	389	1,500	693	1,812	465%	68%	178%
ICICI-Lombard	2,371	2,151	3,455	2,560	220	10%	146%	119%
IFFCO-Tokio	1,077	1,255	563	372	(178)	-14%	52%	30%
Reliance General	1,181	1,089	514	429	92	8%	44%	39%
SBI General	700	312	92	112	389	125%	13%	36%
Tata-AIG*	479	506	444	293	(27)	-5%	93%	58%
Universal Sampo	1,244	549	888	116	694	126%	71%	21%
AIC	7,893	6,980	8,317	8,377	914	13%	105%	120%
Bharti AXA General	379	-	48	-	379	0%	13%	0%
New India*	2,709	1,846	1,990	1,479	862	47%	73%	80%
Oriental*	1,306	1,379	1,029	568	(72)	-5%	79%	41%
United India*	2,258	2,035	1,151	1,284	223	11%	51%	63%
Total (Crop Empaneled Companies)	25,027	19,558	21,495	3,331	5,469	28%	86%	17%

* Includes Crop as well as other miscellaneous products



- ♦ The threshold production is calculated by multiplying the average production of last 7 years with indemnity level of 70% (As per the document available on the website of Bihar's cooperatives department)

The future of crop insurance scheme in India is quite uncertain and volatile leading to many innovations and changes in the recent years. With more states coming up with their own version of crop insurance, it would be exciting to see and

witness the reforms that leads to better conditions of our farmers (in short, the major contributors to our economy and GDP)!!

The Loss Ratio comparison (above) depicts majority of the companies earning an underwriting profit for the crop i.e. Loss Ratio less than 100%. For the companies with underwriting loss (Loss Ratio greater than 100%), they are still managing to earn investment income due to higher topline.

In view of rising benefits to the Insurance Company and decreasing benefits to the farmers, Bihar government scrapped the ongoing Pradhan Mantri Fasal Bima Yojana scheme of the central government and came up with its own crop insurance scheme enshrined as Bihar Rajya Fasal Sahayta Yojana (Bihar State Crop Assistance Scheme) whereby:

- ♦ The farmers does not need to pay anything in premium as opposed to PMFBY scheme where farmers have to pay a fixed percentage of the premium amount (2% for Kharif Crops, 1.5% for Rabi Crops and 5% for annual commercial & horticulture crops)
- ♦ If the total production is less than 20 percent of the threshold limit, farmers will get a fixed benefit claim of ₹7,500 per hectare (maximum up-to 2 hectares i.e. ₹15,000)
- ♦ If the total loss in production is more than 20 percent, farmers will get a fixed benefit claim of ₹10,000 per hectare (maximum up-to 2 hectares i.e. ₹20,000)

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**The Actuary India wishes
many more years of healthy life
to the fellow members (above 60)
whose Birthday fall in December 2018**

**MR C S MODJ
MR N N JAMBUSARJA
MR S P MULGUND
MR S V NARAYANAN
MR T BHARGAVA
MR Y P SABHARWAL
MR T BRUCE PORTEOUS**





नेशनल इन्श्योरेन्स कम्पनी लिमिटेड
(भारत सरकार का एक उपक्रम)
'National Insurance Company Limited'
(A Govt. Of India undertaking)

Requires APPOINTED ACTUARY

National Insurance Company invites Applications from resident India Citizen for the post of 'Appointed Actuary' on Full time Basis.

Name of the Post	Appointed Actuary
No. of Post	One Post (1)
Age (as on 31-10-2018)	The candidate should preferably be between 33 to 62 years of age.
Qualification	- The candidate should be a Fellow member in accordance with the Actuaries Act, 2006 - Passed specialization subject in general insurance (Specialist Application level subject as prescribed by the Institute of Actuaries of India) - And he/she should satisfy all the requirements specified in IRDAI (Appointed Actuary) Regulations, 2017.
Experience Desirable	Desirable Experience : - The candidate should have minimum 7 years relevant experience in General Insurance out of which at least 2 years shall be post fellowship experience. - The candidate should have at least 1 year post fellowship experience in annual statutory valuation of a general insurer
Emoluments and Benefits	Negotiable. Please Indicate your expectations.
Duties and Obligations	As per IRDAI (Appointed Actuary) Regulations, 2017.
Place of Posting	Kolkata / Mumbai / New Delhi
Service Conditions	- Should be a resident of India. - After appointment he/she is not expected to act as an Appointed Actuary of any other Insurance Company nor work in any other capacity in any General Insurance Company. And as specified in IRDAI (Appointed Actuary) Regulations, 2017.
Selection Procedure	The selection procedure shall be by personal interview.
How to Apply	Complete application on foolscap paper typed in CAPITAL LETTERS, along with a recent photograph & copies of requisite certificate/documents should reach the following address on or before 15-12-2018. The envelope should be super-scribed in the top corner "NICL - Appointed Actuary". To, Shri Yoginder Paul, Chief Manager, Personnel Department, National Insurance Co. Ltd 3 Middleton Street Kolkata 700 071. Softcopy of Resume should also be mailed to Yoginder.Paul@nic.co.in

General Instruction:

- Company reserves the right to restrict the number of candidates to be called for interview.
- The decision of the Company will be final and binding in all the matters.
- In case it is found at any stage of recruitment that the candidate does not fulfil the eligibility criteria and/or he/she has furnished any incorrect/false/incomplete information or has suppressed any material fact(s), the candidature will stand cancelled. If any of these shortcomings are noticed even after appointment his/her services are liable to be terminated forthwith. Before applying for any post, the candidate should ensure that he/she fulfils the eligibility and any other norms mentioned in this advertisement. The decision of the Company in respect of the matters concerning eligibility of the candidate, the stages at which such scrutiny of eligibility is to be undertaken, the documents to be produced for the purpose of conduct of interview selection and other matters relating to recruitment will be final and binding on the candidate.
- The Company shall not entertain any correspondence or personal enquires. Canvassing in any form will disqualify the candidate.
- For detailed advertisement, refer to recruitment section of our website : www.nationalinsuranceindia.com

Hong Kong insurance business statistics for Full Year 2017

The Insurance Authority (IA) released Hong Kong insurance business statistics for 2017 with reference to the audited returns and actuarial information submitted by insurers. The total gross premiums reached \$489.2 billion in 2017, indicating a year-on-year increase of 8.3%.

Total office premiums for in-force long term business were \$440.9 billion in 2017, i.e. an increase of 8.5%. The Individual Life category remained the dominant line of business, making up 94.1% of total long term business. Office premiums for new Individual Life business decreased by 15.9%, including \$137.9 billion from Individual Life (Non-Linked) business (decreased by 20.5%) and \$12.7 billion from Linked business (increased by 123.2%).

In 2017, the total gross premium and net premium of general business stood at \$48.3 billion (increased by 6%) and \$33.1 billion (increased by 5%). The overall retention slightly decreased from 69.2% to 68.5%.

The gross premium growth was mainly driven by growth in Accident & Health business followed by Motor Vehicle business.

The deteriorated claims situation of general insurance business in 2017 was mainly due to the unfavorable claims experience in Property Damage reinsurance inward business resulting from Typhoon Hato. Detailed statistics of industry aggregates and individual insurers are available at the IA website (www.ia.org.hk).

Updates on HK RBC

As mentioned in a previous update, the Insurance Authority in Hong Kong is developing a capital framework for a new risk-based capital regime for Hong Kong.

Once in effect, it will significantly overhaul the current capital framework as set forth in the Hong Kong Insurance Ordinance (HKIO). Similar to RBC requirements in other jurisdictions (eg, Solvency II, Bermuda solvency capital requirement, IAIS Insurance Capital Standards (ICS), China Risk Oriented Solvency System (C-ROSS), Singapore RBC), HK RBC is a three-pillar approach, covering quantitative aspects, qualitative aspects on enterprise risk management (ERM) and own-risk and solvency assessment (ORSA) and disclosure.

To understand the likely impact of Pillar 1 on the insurance industry, quantitative and qualitative data were collected through the first quantitative impact study (QIS 1) by the IA, which was completed on 1 December 2017. QIS 2 and QIS 3 are expected in mid-2018 and 2019 respectively, with the aim to implement HK RBC fully in 2022.

Hong Kong as a risk management centre

The Insurance Authority (IA) hosted a thematic breakout forum at the Belt and Road Summit in June 2018 to explore the immense opportunities from the Belt and Road Initiative (BRI), which could strengthen Hong Kong's role as a risk management centre.

The forum, entitled "Using Hong Kong as a Centre for Risk Management of Belt and Road Projects", brought together a panel of experts from insurance, reinsurance, insurance broking and captive companies. The panel identified the different risks faced by overseas assets and businesses under the BRI, provided insights into how insurance can help investors manage these risks, and examined ways in which Hong Kong can utilise its strengths to complement national policies and support Mainland enterprises to go regional and global.

Updates on Examination for HK Fellowship

The Actuarial Society of Hong Kong ("ASHK") announced the roll-out of its local actuarial examination (on top of the overseas professional examinations) applicable to new Fellow of the ASHK post transition period. ASHK will develop and introduce a set of local actuarial examinations as a prerequisite for the new Fellows of the ASHK starting from 1 January 2019. By passing the examinations, candidates would demonstrate their knowledge in the local landscape and the actuarial guidance notes as well as to gain appreciation in professional standards.

The examination curriculum covers areas of local regulations and industry practices pertaining to actuaries in Hong Kong practicing in life insurance, pension, general insurance and investment. To qualify as an ASHK Fellow, members must meet new eligibility requirements after the transition period. There are no exemptions for the examinations for members joining after 1 January 2019.

All existing ASHK Fellows who hold valid membership status on 1 January 2019 will be eligible for grandfathering. Any members who have subsequently lapsed their membership, regardless of any reasons, will however require to pass the examinations to requalify as Fellow of the ASHK thereafter.

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Vintage is our Vantage



Celebrating



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