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

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Dear Friends,

I know most of you would be busy in year-end closing activities, Board related work and with work related to submission returns to various stakeholders including IRDAI. In addition, students would be waiting for their examination results. I wish all the best to those who appeared in the recent IAI examinations.

As a chairperson of wider field committee, I would like to take opportunity to briefly touch the activities IAI has undertaken for wider areas. The employment of Students' is IAI top most agenda. For actuarial personnel, particularly students, IAI is trying to widening scope so that actuarial personnel are accepted in wider areas.

When we talk of wider areas, there are two items come to my mind. One is other areas within Insurance Companies, other than Actuarial

Department e.g. finance, risks, product development, marketing, underwriting, reinsurance, claims, etc. If organizations are educated properly, over 1,000 jobs can easily be accommodated in wider areas within Insurance Companies.

Another is wider areas which we really mean wider, other than traditional areas of life insurance, general insurance, health insurance, pensions and employee benefits etc. Actuaries by their education and training are well suited for any roles relating to risk management, irrespective of Industry.

However, IAI has taken initiative to debate and find how actuaries can play a critical role in area of finance and investments. To achieve the aim, 1st Seminar on Finance and Investment is being held in Mumbai on 18th May, 2018 by the Working Group on Wider Areas of Actuarial Application.

This group is supporting the initiatives of the Wider Area Committee (WAC). This seminar may be of significant interest to those who would like to pursue interested to work particularly in banks and others cos in financial services sector. The seminar participation would allow six hours of technical hours as well under APS 9. The students particularly who are in search of employment may also find it useful. They will also come to know what the expectations are. The bankers are also expected to be present in the seminar.

IAI had conducted product design and pricing and statutory valuation certification program each of five days in 2017-18. Nearly eighty actuarial personnel got certifications. These courses were conducted by industry hands on experts. The students' response was extremely positive and feed - back is that more such courses could be conducted. One such course is being conducted for health insurance product pricing. Students are encouraged to attend these classes.

As Chief Editor of the Actuary India, I see that the magazine has attracted many job advertisements from insurance companies, KPOs, actuarial firms etc. This could be possible due to branding of IAI. The employers are showing interest and approaching IAI job-portal. There would be many areas explored for actuarial personnel in future.

With this message I would like to sign off.

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Government of India
Ministry of Communications
Department of Posts
(Directorate of Postal Life Insurance)
Chanakyapuri P.O. Complex, New Delhi-110 021

NOTICE INVITING REQUEST FOR PROPOSAL (RFP)

Directorate of Postal Life Insurance, Department of Posts, Government of India invites applications from interested Actuaries for engagement of Consulting Actuary in Directorate of Postal Life Insurance, Chanakyapuri PO Complex, New Delhi- 110021 through the process of competitive bidding. Detailed terms and conditions are prescribed in the RFP document, which may be downloaded from the e-procurement portal www.eprocure.gov.in (tender Id. 2018_DOP_334634_1). The last date of submission of bids is 07.06.2018 (1630 Hrs).

General Manager (Operations)

CALL for ARTICLES

We invite articles from the members and non members with subject area being issues related to actuarial field, developments in the field and other related topics which are beneficial for the students of the institute.

The font size of the article ought to be 9.5. Also request you to mark one or two sentences that represents gist of the article. We will place it as 'break-out' box as it will improve readability. Also it will be great help if you can suggest some pictures that can be used with the article, just to make it attractive. Articles should be original and not previously published. All the articles published in the magazine are guided by EDITORIAL POLICY of the Institute. The guidelines and cut-off date for submitting the articles are available at http://actuariesindia.org.in/subMenu.aspx?id=106&val=submit_article



Organized By: The Advisory Group on Life Insurance (AGLI), IAI
Venue: The Club, Mumbai **Date:** 26th – 27th March 2018

Session: Welcome & Introduction

Speaker: Mr. B. N. Rangarajan



Mr. B. N. Rangarajan presented the initiatives and activities undertaken by AGLI like the 'Young Actuaries Program', 'Surveys' conducted and 'Creating platform for Appointed Actuaries or Practicing Actuaries to raise their queries', which is still work in progress due to complexities involved. He also informed that two more surveys are expected to be rolled out by August 2019 in line with the surveys on 'With Profits Management' and 'Best Estimate Assumption Setting Process' conducted by AGLI. Draft for APS4 is ready and it is planned to review APS and Guidance Notes.

Mr. B. N. Rangarajan briefly discussed the upcoming calendar of events like the Actuarial Evening for 'Young Actuaries Program', Capacity Building Seminar on IFRS 17 & RBC and CILA, the dates for which were to be finalised after discussion with the Institute.

He thanked his team - the Advisory Group for their support on various activities throughout the year.

Address by President, IAI



Mr. Sanjeeb Kumar, President IAI, extended a warm

welcome to all participants with special welcome to Member-Actuary, IRDAI- Ms. Pournima Gupte.

Mr. Sanjeeb, briefly touched upon the topics that were to be discussed in the seminar. The topics largely relate to the current issues faced by the industry, particularly core issues like with profit management-fair deal to the policyholders, protection business and its increasing importance, current and upcoming challenges for actuaries, need for business acumen for actuaries to gear up for the future. To fulfil the need of skill development related to areas under IFRS 17 and RBC reporting, IAI intends to offer customised workshops at different levels, right from beginners to seniors.

Session: Key note Address

Speaker: Ms. Pournima Gupte



Ms. Pournima Gupte was optimistic that the seminar would provide solutions to atleast some of the issues faced by the industry and shared her observations on issues concerning the industry, ranging from bonus declaration to with profits policyholder, Independent Actuary on With Profits Committee (WPC) and Peer Reviewer, Product Approval Process, Expense Allocation and Asset Share Calculations.

Member Actuary shared her observations on some important statistics from the last Financial Year 2016-17

- ♦ New Premium collected was INR 1,75,000 crores showing a 26% year on year growth, while Total Premium collected was INR 4,18,000 crores with 14% year on year growth.
- ♦ With insurance penetration at 3.49% and insurance density at US \$ 59 as compared to the world averages of 6.28% and US \$ 638 respectively, industry shows

tremendous scope for expansion

- ♦ Channel Mix shows 70% from Individual Agents, 25% from banks as Corporate Agents- scope for expanding different types of channels. Business from online channel still appears to be marginal.
- ♦ Last few years has seen an increase in Single Premium business which puts stress on getting new premium every year.
- ♦ Increase in non profit savings business indicates increase in the guarantees offered and Companies need to be more vigilant in this regard.

She also expressed concern on the total accumulated losses for the industry which stood at INR 11,143 crores. These losses are contributed by 15 cos in private sector of which 14 companies have been in business for 10 years or more and 6 companies for 15 years or more.

Day 1

Session 1: Early Lapses- Impact on policyholders/ companies

Speaker: Mr. Udbhav Gupta

The session started with comments on impact of early lapses on insurers, distributors and policyholders. While for the insurer it means no growth in business, continuation of expense overrun, loss of reputation/ goodwill, for the distributor it is loss of renewal commission and loss of further business due to bad customer experience. For the policyholder it is loss of entire premium and high cost for entering in to new policy due to increased age.



Mr. Udbhav Gupta shared presentation on the trends observed on early lapses in the Indian Life Insurance Industry in the last few years.

- ♦ 13th month persistency : In 2012-13, 42% of companies had persistency less than 50%, large improvement was seen in this bucket over the last 5 years, so that in 2016-17 only 4% of the companies are in that range.
- ♦ Initially there were no companies with persistency of 75%+, 13% companies are in this range now.
- ♦ 30% of the companies are still with persistency below 60%.
- ♦ At a broad level, the weighted average 13th month lapse rate is 33%, which means industry lost about INR 20,000 crore of premium in FY 16-17.

Results from the report on joint study conducted by LIMRA and SOA about US individual business lapse rates (study over exposure period 2005-07) showed 13th month lapse rate by policy count to be around 7% with overall lapse rates remaining same across policy years, which is in contrast to the Indian experience.

Session1: Panel Discussion: Developments that have taken place so far to address the issue of Early Lapses, current status and future impact if not addressed

Moderator: Mr. Kshitij Sharma

Panelist: Mr. Munish Sarda, Mr. Sandeep Batra, Mr. Niraj Shah



Mr. Kshitij Sharma welcomed the panelists and discussion started with the reasons for early lapses.

Mr. Munish Sarda shared his view that an insurance sale must be looked at from both the buyer's and seller's standpoint. From buyer's point, if his needs are not well defined and the product does not match his needs, it will lead to low persistency. From the seller's standpoint, if relationship exists between seller and buyer, policies will be sold more transparently and show high persistency. **Mr. Sandeep Batra** stressed that alignment of interest between customer, company and distributor is the key to improving persistency. He believes that public disclosures on persistency were the main driver for persistency improvement. In addition to bonus, IRR of participating products at maturity should also be disclosed. **Mr. Niraj Shah** said that understanding the economics of the business is important. Low persistency, expense inefficiency, fraud etc. does not help customers, distributors or insurers. Understanding how the three things viz. regulatory environment, customer's preferences and shareholder's economics move is important.

Key measures like simplification of product structures post 2010 guidelines, selling products that are need based, increasing the mix of protection, changing the culture of right selling by giving incentives, linking rewards and penalties to persistency have improved the persistency experience.

The panel further discussed issues related to Special Revival Campaigns, commission clawback and

confirmatory calls at point of sale. All these tools have limited scope for improving persistency. Further the panel view was that action can be taken against distributors showing low persistency as it does not make financial sense to have such distributors.

The panel responded to questions on lapse experience and its link to remuneration system, issue about recycling of policies, complexities of UL products and investment guarantees under traditional products.

Session 1: Panel Discussion: What measures have worked, practical challenges faced and what options are still unexplored by the profession/ industry

Moderator: Mr. Kshitij Sharma

Panelist: Mr. Sanket Kawatkar, Dr. Rajesh Dalmia



The discussion started with the question on complexity of insurance products and intervention required from the profession to make them simpler.

Mr. Rajesh Dalmia spoke about product hierarchy from simple to complex products in the order of Protection, ULIP, Guaranteed Savings and Par products. Protection is the simplest insurance product, with benefit easily understood by customers.

In ULIP it is difficult to understand how benefits will move with market changes, what is NAV etc. Investors exposed to mutual funds may find it relatively easier to understand. Guaranteed savings products seem simple as premium and benefits are known but as special surrender values are not disclosed customer does not know the value of this option. Par products are more difficult to understand as the benefit that the customer is likely to get is not known as it depends on bonus.

Mr. Sanket Kawatkar was of the view that more than product complexity, how the product is sold is the main driver for persistency. So even if there are more disclosures and higher surrender values, the core issue will be the way product is distributed. Even with cap on charges and mandated level of surrender benefits, some companies still experience high lapses under ULIPs.

Allowing lapsed policies to convert, secondary markets for traditional policies, stick & carrot approach by

regulator, rewards to customers, customer loyalty programs, rewarding and penalizing distributors based on persistency levels are some of the measures that were suggested to improve persistency. Customer education and awareness will also go a long way in improving persistency.

On query about lapse supportive product, the panel replied that such products do exist, particularly in non participating segment and also to some extent in participating segment. There will be an issue if persistency goes up for such traditional products. Increasing the Surrender Value will not be helpful, unless other aspects like distributor behavior, distributor conduct, disclosures and customer awareness are addressed.

Member Actuary observed that along with IRDAI, the Life Council, insurers, associations of distributors, professional bodies like IAI have a definite role in curbing this issue. The session was concluded with audience poll.

Session 2: With Profits business - Presentation of Survey Results

Speaker: Mr. Bikash Choudhary

Panel Discussion: Key actions that needs to be taken to improve the management of with profits business in India

Panelist: Mr. N M Govardhan, Dr. K Sriram , Mr. Shyama Prasad Chakraborty

The survey results on with profits business were shared by **Mr. Bikash Choudhary**. A total of 18 out of 24 companies participated in the survey. The survey questions related to Asset Shares, Reserves, Bonus and with profits fund.



On the role of Independent Actuary and the role of WPC in general, **Dr. K. Sriram** said that the independent actuary is like a catalyst for a two way process of interaction between the Appointed Actuary & WPC. His role is to propel more discussion on items like policyholder IRR, surplus projections, bonuses supportability, investment strategy, customer complaints of with profits policyholders, comments from regulator etc. As there is asymmetry of information on industry practices, he also suggested that there should

be workshop for independent actuaries or panel discussion in CILA to have free flow discussion.

Mr. S. P. Chakraborty added that scope of WPC should be expanded and there should be some internal governance policy to cover bonus distribution, investment of par fund, bonus review process, monitoring & management of fund, Policyholder's Reasonable Expectation (PRE), fair treatment of policyholders with respect to the return and disclosures to policyholders.

Mr. N. M. Govardhan shared his thoughts on with profits business and its management. Though scope of WPC is limited to expense allocation and asset share calculations, IRDAI can look in to this to provide wider scope to WPC like in UK. Advantage of with profits business is that it gives long term funds. The large amount of funds under with profits business can be used by government to fund infrastructure development. He shared his thoughts on how with profit management can be improved through investment performance, reducing expenses and lapses. Use of technology efficiently will help reduce expenses considerably. With profits business should be redesigned so that it becomes a blue chip investment for policyholder. Less segmentation and simple bonus system is better understood by policyholder and allows expenses to be averaged out, with later generation paying for older generation.

Mr. S.P. Chakraborty said that companies should follow consistent approach and the policy should not change from year to year. Insurers can look at the projection of ratio of Asset share to Gross Premium Reserve. On Terminal Bonus, the panel was of the view that Terminal bonus declaration will depend on bonus distribution philosophy of company, corporate governance, management of participating fund, equity between different groups of policyholders (between participating and non participating policyholders, within participating-different generations of policyholders), PRE etc.

The discussion then moved towards investment strategy of with profits funds. The investment mix is influenced by the extent of guaranteed benefits offered. To support discretionary benefits, more investments should flow in to equity. Due to long term nature of with profits contracts higher investment in equity will help in managing inflation. Though it is desirable to have maturity amount to be atleast equal to the amount of premiums paid, at high age mortality component will be high, which will mean that this product cannot be offered to older people. On the other hand more investments in equity or investment in property or derivatives will raise the requirement for more capital. **Mr. Govardhan** placed the argument that in with profit policies, capital is contributed by policyholders and it is possible that companies may require less capital. On expense management, companies should reduce expenses by increasing direct contact with customers and should

think innovative ways to manage expenses.

The panel answered questions on reduction in yield applicability on participating products, investment in property for par fund etc.

Session 3: The race for protection business - how sustainable it is?

Panel Discussion: challenges industry currently facing and way forward

Moderator: Ms. Sunayana Mahansaria

Panelist: Mr. R.Srinivasa Rao, Ms. Kalpana Sampath, Mr. Hariharan Mani, Mr. Abhay Tewari, Mr. Puneet Nanda



Ms. Sunayana Mahansaria set the context for the discussion with presentation on protection business in India. Growth in credit life and protection offered in the form of Critical Illnesses, average sum assured for term cover stabilizing at INR 5 crores, push for combi products, initiatives for Point of Sale products, removal of some of the exclusions for accident and critical illness riders, reduction in online term rates by 20% over the last 6 years, use of unconventional underwriting methods like credit scores, move towards multi-pay and disease specific severity products post 2010 and increase in standardized definitions by regulator prompting the insurers to cover more number of Critical illnesses were some of the highlights that were presented.

The discussion started with question on scope offered by digital channel to exponentially increase the protection business in the country.

Mr. Puneet Nanda stated that protection business is gaining importance at it is the most underpenetrated segment within insurance space. Opportunity for digital growth can be seen from the number of internet users and mobile users in the country. Digitalization has led to democratization, with different classes of customers having the same experience across industries and the same is also reflected in insurance.

While digital will become an important channel, both face to face and digital channels will co-exist and the impetus will be on giving better customer experience in terms of product features, pricing and simpler onboarding process. On the question, do we see the trend of lighter mortality experience in early years owing to strict medical & financial underwriting, in India and the impact of re-pricing basis insurer's experience of past 5 to 7 years.

Mr. Srinivasa Rao responded that some companies have experienced lot of early claims due to frauds and it would not be reasonable to use such experience. Mortality inputs used in pricing are largely driven by the reinsurers, who derive the rates based on futuristic projections on longevity experience and medical advancement. Some companies may be recognizing the positive mortality experience on their retained portfolio and this could be one of the reasons for aggressive rates however it is too early to comment that insurers are recognizing the early experience and factoring it for pricing.

The discussion then moved towards innovative practices followed globally in pricing which can be used in India.

In more global scenarios where solvency II is prevalent it is observed that pure protection products require a lower level of capital. **Mr. Hariharan Mani** shared the experience, where some of the products showed uplift in margins when looked at from the advance solvency regime point of view, under the assumptions like full credit in reinsurance, calibrations' used on solvency II basis, etc. On pricing of group business, economic capital gives better results as compared to solvency capital basis, which indicates scope for future pricing of protection products. Reinsurers have a strong role to play under a more complicated solvency regime eg pricing of the lapse risk under non proportional reinsurance and lot of scope for innovative pricing under IFRS 17.

On whether it was possible to achieve a zero fraud scenario in life insurance business and do we have the right legal system in place, **Ms. Kalpana Sampath** replied that while it is practically not possible to have zero tolerance, we can tighten the norms, go for more digitalization and cross verification to reduce the scope of fraud. While cross verification of all cases is not possible due to time constraint and cost benefit trade off, the fraud cases should be within some small zero tolerance limit. Systematic frauds should be stopped and penalized to help reduce the gap further. **Mr. Rao** added that we need to see if adequate controls are in place to reduce fraud. The discussion then revolved around low insurance penetration and potential for growth in protection due to evolving ecosystems, open mindsets of people, rising income levels and opportunity to do better risk management through data

analysis and digitalization.

Mr. Abhay Tewari shared his observations that while savings products were priced conservatively; pricing of term products was done aggressively. It was observed that the term rates in Japan and Singapore markets are higher than that of India. Though longevity has not improved in last 10 years, more focus on price competitiveness has brought down the rates to a level which is not viable. Showing higher than average mortality in the early years indicates anti-selection effect rather than the select effect of underwriting.

The panel members shared their views on the customer onboarding process and whether they would be willing to pay higher prices for smoother onboarding. The aim should be to make the process of buying as simple and delightful as possible while managing risks at the same time eg ease of having credit card and loans. Tying up with agencies for risk management and managing more at backend and less at the front end should be the way forward. Customers are willing to pay for convenience subject to a certain minimum and may not value the proposition if there is significant difference in cost. In addition to price, brand value, claim settlement ratio, claim experience and overall onboarding are some of the factors that are taken in to consideration by consumers. This was substantiated with example of Policy Bazaar.

The panel also deliberated on the low price offered under term products and the pace of rate reduction.

The panel members answered questions from participants on relaxation in solvency capital requirement for term products to help expand the pure protection business, public disclosure of claim settlement ratio separately for protection to increase transparency; use of Artificial Intelligence in protection pricing, wearable influenced pricing, data sharing within the industry, etc.



Mr. Ramakant Malpani summarized the key points and the session concluded with audience poll.

Day 2

Session 4: Life Insurance Industry - Way forward and Role of Actuary

Panel Discussion: Current state of life insurance industry and the way forward

Moderator: Mr. Kunj Maheshwari

Panelist: Mr. K. S. Gopalkrishnan, Mr. Sathyan Jambunathan, Mr. Vivek Shah, Mr. Nidhesh Jain



Mr. Kunj Maheshwari set the context for the panel discussion and introduced the panelist.

The discussion started with question on achievement of objective of privatization in the last 17 years. **Mr. Gopalkrishnan** summarized the market scenario after privatization. It brought a lot of new products, more transparent products to the market but the cost to the end customer has gone up due to high acquisition and marketing costs. The individual business regular premium showed a CAGR of only 3% from INR 379 billion in 2006-07 to INR 505 billion in 2016-17. Lapse rates after privatization have worsened and 61st month persistency is between 20% to 52%. So privatization has not helped in meeting the objective of deepening insurance coverage and retaining customers. In **Mr. Sathyan Jambunathan's** view, a one product, one channel, one service architecture has grown to multiple products, multiple channels and multiple service architecture. **Mr. Nidhesh Jain** said that life insurance industry is in a much stronger position and should be able to sustain growth in next 5 to 10 years without seeking extra capital. Investors' confidence in the industry is reflected in the valuations of some of the companies. The value propositions for customers have improved substantially in last 4-5 years as majority of value is passed to the customer. **Mr. Vivek Shah** stated that privatization has brought the focus back on protection from savings. He gave example of China Life, where protection and health together form 33% of the insurer's book. These markets moved from savings to protection due to increase in GDP per capita and also because people started valuing their lives more. We can

see the same scenario replicated in the future in India and a lot more penetration in protection business. **Mr. Sanjeeb Kumar**, added that the three most important factors from point of view of customers are products, services and protection of money. Privatization has seen a lot of innovation in products, improvement in services, capital brought in by shareholders and strong supervision from regulator. All these have benefitted the customers. LIC also scaled up due to competition in terms of products, services and risk management.

The discussion revolved around products that can cater to digital savvy younger generation in future. We may see more General Insurance type of products and products which are offered directly by insurers to customers like online term. Move towards products which are simple and transparent, with clear value proposition visible to the customer will be more beneficial. More focus on protection and unbundled savings products will be the way forward. The savings products offered by life insurance companies should be seen in competitive context of products and services offered by other financial institutions like banks, asset management companies, mutual funds etc in terms of liquidity offered, process of onboarding and complexity. We need to reconsider offering long term products in context of changing needs, shrinking time horizons for customers and workforce in unorganized sector with uncertain income levels. Products should be designed from customer's perspective particularly on surrenders. We need to take up the challenge to provide term insurance to the unorganized sector.

Differentiated business model, identifying and focusing on niche products, customer segments and geographies could be the way forward for small companies to increase their market share.

There was much deliberation on self regulation and advocacy in life insurance.

Session 4: Panel Discussion: Role of Actuary in the next generation life insurance industry

Moderator: Mr. Kunj Maheshwari

Panelist: Mr. G.L.N.Sarma, Mr. Sanjeev Pujari, Mr. Sai D. Srinivas

Deriving from the last panel discussion on way forward for the insurance industry, **Mr. Kunj Maheshwari** set the context for the panel discussion on the role of actuaries in future.

Mr. Sai Srinivas opined that actuaries have to involve themselves in broader discussion with other functions like strategy, finance, operations etc. The issue of headcount can be addressed by putting forth requirements in a clear way. **Mr. G. L. N. Sarma** shared his experience on how actuaries are perceived by other



functions in the company. **Mr. Pujari** said that while actuaries do give the perception of always being busy, in the larger context, we need to see how this contributes to the company or the policyholders. On self-regulation, **Mr. Sanjeev Pujari** was of the view that we did not take stance on things that were not going well and priced products that were detrimental to the interests of policyholder, which ultimately required regulator intervention. Going beyond professional guidance, we should contribute to the industry to make products better understood and better perceived.

Actuaries have access to the board and various committees and can put forth their views on these platforms, as they have insights on the underlying finances and strengths of the company.

On competencies and skill sets of actuaries, the panel was of the view that Actuaries are natural data scientists, but are narrowly trained. Making sense of the numbers, designing products for customer benefit, improving efficiencies of the company are unique skills that actuaries possess. To be more relevant, they can develop their communication skills and step up learning skills eg. Machine Learning.

Session 5: Tomorrow's Actuary -A perspective

Speaker: Mr. Vivek Jalan

Moderator: Ms. Shobhna Sharma

Panelist: Mr. G.L.N.Sarma, Mr. N. M. Govardhan, Mr. Pankaj Kumar Tewari, Ms. Peuli Das, Ms. Sanya Gupta, Ms. Kriti Makkar

Mr. Vivek Jalan shared his experience on how he joined the Actuarial profession. The panelists were drawn from different generations and they shared their experience on how they joined the actuarial profession. On how the profession has evolved, Mr. Govardhan said that it was felt that actuaries are not open and communicative; they should develop soft skills, gain knowledge on data analytics and other disciplines and look at things from a wider



perspective.

Ms. Peuli Das commented that the profession has seen a dramatic growth in the number of students, associates and fellows and has gained acceptance and recognition amongst the younger generation. While the profession has fulfilled her expectation in terms of using numerical skills, providing intellectual stimulation, **Ms. Sanya Gupta** feels that even within insurance the role of actuary is limited and collective push is required to achieve widening of horizon for actuaries in other areas. **Mr. Pankaj Tewari** said that working in different environments like LIC, private company and regulator's office had given him a diverse experience. Increased acceptability with non actuaries and effective communication are the key areas which actuaries should focus on.

The discussion progressed with interactive participation from the audience through poll with questions on various topics like strength of actuarial team, issues related to hiring and how the role of actuary can be expanded to other areas of insurance.

Session 6: Survey results - Best estimate assumptions

Panel Discussion: Documentation and other requirements: IPO perspective, Reserving perspective and RBC perspective

Moderator: Mr. Kailash Mittal

Panelist: Mr. P. K. Dinakar, Mr. Souvik Jash, Mr. Subhendu Kumar Bal

Presentation of Survey Results

The survey results on Best Estimate (BE) assumptions were shared by **Mr. Kailash Mittal**. A total of 15 out of 24 companies participated in the survey. The survey results are available on institute's website.



On what is meant by best estimate, **Mr. Subhendu Kumar Bal** said that BE calculation depends on the purpose for which it is done, eg. for EV, to understand actual experience, valuation assumption setting etc. It can be calculated based on actual experience and adjusting it for other factors. Documenting will help in analyzing it in future. **Mr. Souvik** said that BE is to estimate assumptions based on the experience of the data and what the experience is likely to be in the future. BE is a single

number and stochastically if you run a 1000 scenarios to produce a number, it is a median of the output, i.e 50% probability of actual experience being above or below this estimate. BE is not based on any actuarial judgment.

Mr. P. K. Dinakar shared the definition of BE "It is a subjective derivative of the mean of all possible outcomes taking in to account all available information about the business being analysed". As per the definition it is difficult to find a unique answer to BE. Documentation will help in future to understand the basis used in setting BE, help in justifying it to management or any external parties and thus enhance credibility. The data used for BE should be complete, accurate and appropriate and should reconcile with other available data. **Mr. Liaquat Khan** agreed with **Mr. Souvik's** definition of BE and stated that while the requirement for BE comes from international Accounting Standards, the definition is provided by actuarial principles which is a median number.

While standardization will be difficult due to risk profile and target market catered by companies, there can be guidelines on how to treat lack of data, reinsurer's rates etc. and profession can provide such guidelines. For a listed company, more focus is on persistency and expense assumptions.

Mr. Souvik Jash, reiterated that documentation is important irrespective of the regime and it should be such that an independent person should be able to make a sound judgment based on it. He then shared some details on BE documentation required under RBC framework. **Mr. Sanjeeb Kumar** shared an important observation that while setting BE, suitable adjustment should be made to past experience.

The session concluded with audience poll.

The CILA was concluded with a vote of thanks by **Mr. Ramakant Malpani**.

Thank you!

About the Author



Ms. Shilpa Korade



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"Ms. Shilpa is currently working as AVP, Chief Strategy Office in Edelweiss Tokio Life Insurance Company Limited."

Feedback of 13th Current Issues Seminar in Life Assurance (Pension)



Welcome



Ms. Swapnil Gupta has joined on 20th April, 2018 as Assistant Manager- Examination. Her qualification is M.B.A (International Business) and B.Sc. (Biotechnology). She carries 4 years of experience in handling administration at ALLEN Career Institute and prior 2 years of experience in executing PR campaigns for clients in FMCG sector. Her hobbies include Reading novels, listening music. We welcome Swapnil to the family of Institute of Actuaries of India. She can be reached at: +91 22 6243 3334 or swapnil@actuariesindia.org

Welcome



Ms. Samidha Parab has joined on 24th April 2018 as Senior Manager- IT. Her qualification is BSc and Aptech-Karrox Diploma in System Management. She carries 12 years of experience in IT Domain. Her hobbies include Reading, Drawing Making New Friends. We welcome Samidha to the family of Institute of Actuaries of India. She can be reached at: +91 22 6243 3354 or srmgr.it@acturiesindia.org

1st

SEMINAR ON FINANCE AND INVESTMENT



Date: 18th May, 2018 **Venue:** Hotel Sea Princess, Mumbai
Planned by: The Working Group on Wider Areas of Actuarial Application

Background

1st Seminar on Finance and investment is an event of the Institute of Actuaries India, in the Finance and Investment area, scheduled on 18th May 2018, in Mumbai. It is the first seminar being organized by the 'Working Group on Wider Area of Actuarial Application' of the Institute.

The objective of the seminar is to create awareness amongst the Actuarial members and anybody interested in finance and investments on the role of actuaries and actuarial skill set in these non-traditional areas. Actuarial knowledge and skill set are valuable not only in the traditional sectors like Insurance and Pensions, but also in the emerging sectors like Banking, Asset Management, Corporate Finance, etc. Globally the markets have opened significantly for the Actuaries to work in these emerging domains. In India the actuarial penetration in these domains is in its infancy but is growing rapidly. Many actuarial aspirants do not have a clear guidelines or career pathways to move into the Finance and Investment Domain.

This One-day seminar will help participants to gain an insight on current issues in this domain, from not only Actuaries but also other Industry experts, who have already been working in the respective domains. The coverage is broad so as to be of interest to a diverse set of participants working in different areas of Finance and Investment sector. The content, in large parts is non-actuarial, non-technical and hence of relevance to the non-actuarial audience as well.

Seminar Topics

- ✧ Role of Actuaries in Banking Sector in India
- ✧ ALM for Employee benefit funds - are we doing enough
- ✧ Actuaries in Alternate Assets - a case study on Venture Capital
- ✧ Application of Actuarial skills in Investment banking
- ✧ Emerging role of Actuaries in Finance and Investment - (Panel Discussion)

Who should attend?

Actuarial Students and Qualified Actuaries, Bankers, Mutual Fund Managers, HRs, CEO's and all other financial service professionals involved in the financial risk management.

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Overview of the typical actuary career path and the impact on employability.

The objective of this article is to give you an overview of the typical actuary career path and the impact on employability. It will present some advices to manage it as much as possible and identify challenges that actuaries have to pay attention

Ms. Christelle Dieudonné, is full qualified actuary and Senior Partner at Aliotts Executive Search (www.aliotts.com) Her focus is on recruitment in France and at the international level. In India, Aliotts Executive Search has a subsidiary based in New Delhi for more than 10 years now.

After 20 years of experience, starting her career as a life actuary during 10 years working within insurance companies and consulting and then as a pension actuary for another 10 years within a consulting firm and corporate, she decided to give another direction to her career and move into Human Resources, devoting her time to recruitment for the Insurance and the Financial sector. It has been now more than 4 years that she has been serving her clients to find good profiles and assist profiles to give another impulse to their career as well as to challenge themselves. She feels passionate and engaged to find the best match between clients' needs and her projects on professional profiles.'

My first trip in India was in November 2016, at this time, the financial sector was really calm and therefore I did not identify any local "crucial" needs in term of senior actuaries within that sector.

Close to two years later, I decided to come back to India and join the 19th Congress of Actuaries of India last January 2018 organized by the Institute of Actuaries of India (<http://www.actuariesindia.org>). Attending to this congress was a great surprise. I was surprise of the energy of all these young actuaries and was really impress by the quality and level of all roundtables with actuaries coming from all over the world (International actuaries, NRI actuaries, etc.). I also had the opportunity to meet senior actuaries to share our view of the local actuarial market and our view on the evolution of the role of actuaries on the Indian market.

As you all know, the insurance market in India on the private sector started around 2000. Which means that in term of actuarial skills, on the market, it is pretty hard to identify senior actuaries with more than 15 years of experience (life sector and moreover within the non life sector "General Insurance" sector).

Close 20 years after, the Indian Insurance market is growing really fast, especially on the General insurance market. This can easily be explained by the increase of the middle classes, which now is looking for insurance products (general insurance product, life protection). And the increase of the growth is just at its first stage. This

explains why it seems to be important to highlight the actuary career path and its management to help local actuaries.

My own experience as an actuary and this recruitment experience give me a clear view on the typical career pathway for an actuary. And I define it as the following: 'If we consider that a career for an actuary is about 40 years, I think this career can be split into 4 phases. Phase 1 is as junior actuary: he finds a job quickly and brings his hard skills to his employer. Phase 2 is as a confirmed actuary: in most of the cases, he will start to manage a team, usually junior actuaries, and want to increase responsibility, salary et cetera. Phase 3 is as a senior. This actuary is now looking for a professional project, usually around middle life. This actuary is looking for a sense of his day-to-day job. And finally Phase 4: this actuary depending on the profile will continue to increase responsibility, bringing his global view to the insurance fields and starting to develop younger actuaries. Also and depending on whether the phase 3 was a success or not, this phase can be really difficult on an employability basis: it may happen that he loses his job for example.'

On employment basis, even if we understand that being an actuary means to find a job quite easily at the beginning of the career, being an actuary means also be engaged within the profession to keep up to date the actuarial skills and wins in experience working as an actuary for a few years within a specific area (life, non life...). This last point is really important to keep years

after years its employability.

What does mean “employability”? ‘It means that the actuary needs to be valuable in the job market and at a level which is consistent with his professional experience and the market where he is working for. For example, employability for a “Fortran programmer” is now close to zero because there are very few employers who are looking for such hard skills! To keep a certain level of employability, actuaries have to manage their career. Of course, employers can help but in most cases with internal training and specific objectives on these points. However, on a global view, actuaries should be actors of their career.’

Therefore, which kind of advises to give to actuaries to manage and to be actor of their career? The actuary should challenge themselves on technical subjects, stay up to date, regarding actuarial hard skills (continuous development), cultivate the risk view and understand the business and its evolution. Secondly, this does also mean to increase and develop soft skills throughout the career - soft skills are the most important at senior level. Third, it means to develop and cultivate professional networks which help to meet people and therefore to understand the cosmos of our profession; and finally, it means to be engaged globally within the actuarial profession meeting other actuaries, sharing technical points of view, participating in local actuarial associations within working groups or other local initiatives, publishing papers on specific actuarial points of view, research, ideas ... and understanding the international organizations which embrace our profession, like the International Actuarial Association (www.actuaries.org) . All of these points above give actuaries the opportunity to be open minded and help to be and stay employable.

What are the biggest challenges? ‘In Europe, in some cases, actuaries, during phase 4, can’t find any job opportunities and therefore don’t have any other options than doing consulting on their own. This option can be a good way to terminate a career. However, this phase will be easier if actuaries have paid attention to the points above throughout their career.’ In fact, it’s hard to define a “best career path”, however, building years after years strong relationships and working together within team spirit help! This explains why, the best advice for candidates, when they want to change their job, is that they need to find first the professional project, the team they will work with and of course the company where they feel they will be in line with the management and the strategy.

So to conclude, managing one’s career when we have the privilege to be an actuary is to work hard during the whole career to stay up to date on the technical subjects, which does not mean keeping the capacity to do the technical job but to understand objectives, concepts, reaching the point where the actuary has the global picture and understands interactions between subjects, like a pyramid built with cards, and at the same time, develop the soft skills which are key to developing a career.’

About the Author



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“Ms. Christelle Dieudonne is Senior Partner, Insurance and Financial Services Practice at Aliotts Executive Search.”

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1	Advertisements send to	library@actuariesindia.org.
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Study of a Large Scheme – Risk Factors in an Apparently Solvent Scheme

The purpose of this Note is to study the provisions of a Scheme (which we came across), analyse its special features and come to a conclusion about its fairness and sustainability in the long run. The Scheme is run by a Trust Fund registered with the authorities. It is a well-run Scheme with its own bye-laws. (The Scheme is assumed have started on 01-01-2002 with 8000 members. It has now over 20,000 members). For the last several years, it has not been able to attract more than 300 new members per year on the average.

Note the following:

- (i) The Scheme has been conceived to assist the family of the community member on his death;
- (ii) The upper age limit for admission stands at 55. The lower age limit stands at 18. Even as of now, there is no health requirement for admission, though a waiting period of 6 months has always been stipulated.
- (iii) The Scheme works broadly on “assessment” or “mutual benefit” principles. For every death, the members contribute a certain amount. The per death contribution amount as of now stands at INR 20.00 per death.
- (iv) The sources of income for the Fund are: Admission Fees (age-related), Administration charges every year, 10% of the contributions received per death (the full amount of death fund contribution received per death from the members is not fully passed on to the beneficiaries), Interest income and other small incomes from miscellaneous sources;
- (v) The unique feature, and the most attractive feature, of the Scheme is that the death fund contributions (DFC) are payable for only 25 years. Thereafter the Trust Fund takes over the responsibility of making the death fund contributions on behalf of the surviving members. To illustrate, if a member has joined at the age 40, he contributes till the age of 65. Suppose he lives for next 20 years. Then for the next 20 years, in respect of each death taking place, the Fund contributes. Thus after the contribution stops in respect of him and if in the next year 100 deaths take place, the Trust Fund contributes $20 \times 100 = 2000$ on his behalf. Then in the next next year, if 120 deaths take place, the Fund contributes, $120 \times 20 = 2400$ on his behalf and so on. This is in respect of one member. The same logic will apply in respect of other members similarly affected. Consider, out of 8000 members

who joined on 01-01-2002, 5000 complete 25 years. Then in respect of these 5000, for 100 deaths taking place, the amount required would be $5000 \times 100 \times 20 = 1,00,00,000$. Next year, the survivors of persons joining on 01-01-2003 would stop contributing. Thus next year, survivors of 5000 + survivors of persons joining on 01-01-2003 would qualify for relief in respect of each death taking place. The process continues. It would be clear that this would throw up considerable Post-Contribution liability and this liability requires to be scientifically assessed and provided. [The valuation is required under Bye-laws which provide for (a) cessation of the contributions by the members to DFC (Death Fund Contribution) after 25 years of continuous membership and (b) the payment by the Trust Fund in lieu thereof in respect of eligible members on rolls on the relevant dates and assessment of Post-Contribution Liability on relevant dates].

- (vi) It will be noted that the Post-contribution Liability will be increasing almost exponentially. The Funds of the Trust would start depleting very fast and bulk of the funds would get exhausted in 5-7 years' time, once the Trust's liability starts. However, curiously the Fund would show solvent position since the number of members surviving would be reducing at a rapid rate and the amount receivable on death would be in 5 digits (and later on in 4 digits, 3 digits, 2 digits. The minimum amount payable to the beneficiary has not been laid down). This would indicate the problem we would be facing and the measures required. If the Scheme has to remain fair and attractive, systematic steps would have to be initiated to fund the liability appropriately. The Scheme also bristles with several other weaknesses. It is imperative that the weaknesses of the Scheme are brought to the notice of the members in a transparent manner.

(vii) The weaknesses of the Scheme:

- (a) The Scheme needs continuous inflow of new members. To maintain the present levels of benefits on death which now stands at say, INR 360,000, it would be necessary to keep the number of contributors constant. Thus not only the deaths but those crossing 25 years also have to be replaced. This is a very daunting task;
- (b) No minimum amount has been guaranteed on death. Thus when the number of members taper off in the later years, the beneficiaries of the

members would not get back even the contributions so diligently made by the members over the years, leave apart a small interest on the contributions. (Refer Vi. above). This is unjust. Once the members realise this, they would feel cheated.

(viii) Measures suggested and General Observations:

A drastic solution is called for. Let us start with the assumption that everyone must get back his contribution (with interest, if possible). One approach would be that (i) The contributions of members be a flat amount of say, INR 5000 p.a. for 25 years; (ii) On death, the beneficiaries would get a fixed amount of say, INR 240,000. Thus only the needed funds would be built up and hopefully meet the commitments EQUALLY to all the members irrespective of their date of exit.

No increase in the entry age for new membership. This group is the main stay. They may be expected to contribute for the next 25 years and add to the kitty. However, this is the group that is vulnerable and would lose if the numbers in the Scheme fall.

With sufficient New Entrants not coming forth, the average age in the group would increase. There is a tendency for the younger members to withdraw and for the older members to stick. With this anti-selection, the Scheme would tend to collapse. Several assessmentism schemes in UK failed for this reason.

Also an approach would be to stipulate that everyone contribute up to the age of 60 (or more) subject to a minimum of 25 years. For deaths taking place before 25 years of membership, the unpaid instalments of contributions would be deducted from the death amount. This in no way is an insurance scheme.

Increasing the upper age increases the number of beneficiaries, throwing the burden on the existing members.

It looks that implicitly the Scheme makes certain commitments. Since these commitments cannot be met, a spate of legal actions would follow, sooner or later. Again new trustees will have to be introduced time and again and after a few years if the members of the community start realizing that the scheme will not sustain longer then no community member would want to get involved in the administration process.

It would be advisable not to promise INR 240,000 to the members as non-payment of promised amounts in the future could lead to members taking legal action. The Admission Form will have to be suitably revised to make the intention clear. The revision should also apply to the existing members.

If at a certain date in future, the Scheme is closed and the amounts distributed, the amount everyone would then get would be in five digits and not six.

Let the members appreciate the limitations of the Scheme and reconcile and do not raise high expectations. The collapse of the Scheme is certain shortly after the scheme has run for 25 years, unless drastic measures are initiated now itself to ward off the impending disaster.

About the Author



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“Mr. N. K. Parikh is a Fellow member of the Institute of Actuaries of India.”

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

**A R PRABHU
NICK TAKET
N M GOVARDHAN
P I MAJMUDAR
S CHIDAMBARAM**



This article tries to look at the way a potential investor may value an Indian general insurance company strictly from a quantitative point of view after making necessary qualitative adjustments.

Financial year 2017-18 has been a very important year for the Indian general insurance industry. A couple of general insurers and a reinsurer which predominantly deals with general insurance got listed and close to 1.5 Lac crores of market capitalization was added to the Indian stock market. More companies are expected to be listed soon. While listing provided visibility to these companies and even started influencing their business practices the deal flow in the industry has also been very strong. Quite a few companies are looking at changes in ownership and merchant bankers are busy arranging deals between potential buyers and sellers.

As most of you are aware, a key ratio that is monitored is the company's combined ratio (COR). The ratio is essentially not a ratio but a sum of three ratios - the incurred claims ratio, expense ratio and commission ratio. It gives an idea about the core operating profitability of a company. From an investor's perspective though when it comes to buying any company what matters is the return on equity of the company. Companies with a high return on equity or more specifically companies with ability to deploy capital incrementally at high rates of return are generally rewarded with higher valuations.

So when similar companies are compared, lower the combined ratio, higher is the profitability, higher the ROE and higher the valuation that a company can command. The key phrase here "when similar companies are compared" and rarely do you find companies which are similar in all respects even when they are all belonging to the same space. In general insurance which is our topic of discussion there are various factors like business mix, reserving practices, nature of investment book, for how long the company has been in operation, extent of solvency cushion available and so on that distinguishes one company from another. A stand-alone health company can be very different from a general insurance company where Health is only one of the many lines of business. A general insurance company with a high amount of crop exposure can be very different from another where segments like Fire, Marine, Motor and Health dominate. Any valuation method that is adopted should be able to lend itself to adjustment for these factors. Comparing all these companies with a one size fits all methodology like looking at the combined ratio or the reported return on equity may lead the investors to incorrect conclusions.

An interesting aspect of a general insurance company is

the extent of technical reserves it holds, what Warren Buffett called "float". Technical reserves comprise the unexpired risk reserve and provisions for claim outstanding (including IBNR & IBNER). This reserve belongs to the policyholder but the economic benefits of the reserve flows to the shareholder. The extent of technical reserves is dictated by factors such as business mix and reinsurance policy of the company. Barring some lines like crop insurance, unexpired risk reserve will be roughly 45-55% of the net premium written during the previous 12 months. The provision for claim outstanding depends on the business mix with long-tailed lines like Motor Third Party Insurance having high provisions while short tailed lines like Health do not have as much.

In a market like India where yields are high, reserves are to be provided on undiscounted basis, and regulator prescribed reserving methodology disallows negative IBNR, income on technical reserves is an important component of operational income. This is completely ignored by the combined ratio.

In the ensuing paragraphs an approach that marries these intricacies and still tries to bring the diverse companies into a common platform of comparison is elucidated. An attempt is also done to quantify the relationship between combined ratio and return on equity.

Every insurance company requires an amount of capital prescribed by the regulator to support a volume of business. The capital usually increases as the volume of business done increases. In India the companies must have an available solvency margin of at least 1.5 times the required solvency margin. The required solvency margin is calculated as per IRDAI ALSM regulations and is roughly a percentage of the premium income. For the sake of illustration, I am assuming that the required solvency margin is 25% of the net premium written in the previous 12 months. This means that every company needs roughly 37.5% of the net written premium as capital to support the business.

A problem with using an accounting ROE is that it fails to distinguish between operational issues and capital allocation issues. Everything else remaining the same a company with a lower solvency ratio usually ends up with a higher accounting ROE than a similar company with a higher solvency ratio. Since capital allocation issues can be dealt with by the shareholder through the Board like to like comparison can be made by assuming the capital deployed as that required by the regulator. The value for the free capital which will be incrementally deployed by the company in the future to support growth maybe ascribed a different value separately based on the extent

of free capital and the returns at which it will be deployed in the future.

So the core ROE of a company from its current operations can be estimated which can be used to benchmark the company against its peers. Note here that, since regulatory capital required is being used in denominator, ROE issues arising out of different capitalization structures (debt equity mix) of the companies is avoided.

Suppose there is a company which has written a business of 100 in the preceding 12 months. The regulatory capital needed to support the business is 37.5. This becomes the capital on which return on capital can be computed. I am using the term return on capital here as the 37.5 can be funded using a mix of subordinated debt and equity and ROE enhancement using leverage can be done. But as mentioned earlier this is a capital allocation decision which is kept out of the analysis.

Depending on the business mix a business of 100 may lead to say 100 of technical reserves in steady state for a standalone health company, about 140 of technical reserves for a GI company with a mix like that of the industry or even up to 175 for a GI company with a book heavy in Motor. Please note that here I am talking about a business in steady state and not technical reserves pertaining only to the business written during the year. So technical reserves at steady state for a company will have claim outstanding pertaining to policies written over last many years. Especially lines like Motor Third Party and Fire can have reserves pertaining to claims from policies written during last several years carried in the books.

Let us assume that the technical reserves at steady state is 140 for 100 of premium written. The technical reserves is a part of the company's assets under management along with the capital deployed in the business. So, a business of 100 translates into an asset under management (AUM) of 177.5 {140+37.5}. The next important assumption is the yield that the company generates out of its investment book. Here again the yield depends on the asset mix that the company has adopted. A 100% fixed income book primarily deployed in G-Secs or FDs generates a lower yield than an investment book with a part of it deployed in equity or higher yield corporate bonds. An analysis of the investment policy followed by the company can give an idea about the normalized yield that maybe assumed on the investment book.

Based on first principles the core operating profit is equal to sum of underwriting profit/loss on the business written and the investment income from operations (i.e. investment income from assets supporting the technical reserves and capital deployed in the business). Since underwriting profit/loss can be expressed in terms of Combined Ratio (COR) and the premium the following equation maybe considered to hold good

Pre-tax Profit from operations (Op. PBT) = (1-COR) times the NWP + Investment Yield times the AUM

To put some numbers to the above-mentioned example if yield is say 8% and COR is say 105%

$$\text{Op. PBT} = (1 - 1.05) \times 100 + 0.08 \times 177.5 = 9.2$$

Since this Op. PBT is generated by deploying a capital of 37.5 the Op. ROE in this case is (9.2/37.5) i.e. 24.5%.

You may note the importance of technical reserves here. For the same combined ratio if technical reserves is only 100 the Op. PBT drops to 6 and Op. ROE drops to 16%. Similarly, if the COR is 110% instead of 105% the Op. ROE drops to 11.2%. It also explains why companies which have a sizable portion of business mix coming from long-tailed lines can afford to operate at a higher combined ratio than the ones which write predominantly short tailed lines of business.

The method to an extent nullifies the impact of different reserving practices adopted by companies. Everything else remaining the same a company which adopts a prudent reserving approach is saddled with a higher combined ratio than one which adopts a more aggressive reserving approach. The prudent company ends with a higher technical reserve than the aggressive company. But the Op. PBT is similar as the lower combined ratio of the aggressive company is sort of offset by the lower investment income on technical reserves while lower underwriting profit of the prudent company is compensated by the higher investment income on technical reserves. This is another reason why comparison on combined ratio alone does not reveal the full picture. People new to the Indian General Insurance industry often make initial judgments that companies make operating losses and survive due to investment income. The fact that technical reserves are generated out of operations and investment income from technical reserves is also a part of operating income is conveniently ignored leading to wrong conclusions.

To extend that argument let us assume that the above company operates at say 95% combined ratio. The Op. PBT in this case will be 19.2 and Op. ROE will be 51.2%. Is this a sustainable ROE in a competitive market? The underwriting cycle will ensure that fresh capital will enter the industry, pricing will drop and so will the combined ratio.

Valuing the company

Now that the Op. ROE has been established the next step is valuation of the capital deployed in the business. Financial companies are usually valued globally on price to book value basis. A common approach is the Gordon Growth Model that relates the target price to book multiple with ROE.

$$\frac{P}{B} = \frac{(ROE - g)}{(COE - g)}$$

In a market like India the factor 'g' has always posed a problem. This is usually significantly higher than COE for the near to medium term. While a multi-stage model is an

option, an approach I feel is intuitively better is to know what you are paying for growth. So a no growth ($g=0$) P/B is estimated as ROE/COE. A no growth valuation for the company is arrived at. Compare it to what the market is valuing the company at. The difference is what you pay for growth. In this example with Op. ROE of 24.5% if COE is 12% then no growth P/B should be 2.04x or company's value of capital deployed in the business is $2.04 \times 37.5 = 76.5$.

Since growth is fraught with uncertainty investors may have mental models as to what proportion of company's value he is willing to pay for growth. If future growth accounts for say 90% of the company's value at the quoted price then the investor has to have that much confidence in the ability of the company to deliver in the future. If it is only 30% of the total value, then the investor maybe significantly more comfortable. Since the target P/B multiple is also dependent on ROE the growth should be possible without compromising ROE which adds another layer of uncertainty.

Acquirer's multiple

A little bit of rearrangement of equations from first principles can also be used to arrive at company's value on a price to sales basis which is a metric that many acquirers prefer to use. If the value of a company is V then on a no-growth basis

$$V = \frac{\text{Op.Profit}}{\text{Cost of Capital}}$$

$$V = \frac{\text{Underwriting profit} + \text{Investment Income}}{\text{Cost of Capital}}$$

$$V = \frac{(1-\text{COR}) \text{ Premium} + \text{Investment Yield} \times \text{AUM}}{\text{Cost of Capital}}$$

$$\frac{V}{\text{Premium}} = \frac{(1-\text{COR}) + \text{Investment Yield} \times \text{IL}}{\text{Cost of Capital}}$$

where IL is investment leverage defined as ratio of AUM to Premium and

$$\frac{V}{\text{Premium}} \text{ is the GI eq.of Price to Sales Multiple}$$

If the numbers in the above-mentioned example are plugged in the price to sales for the company at zero growth with cost of capital at 12% should be

$$\frac{(1-1.05) + 0.08 \times 1.775}{12\%} = 0.766$$

So company's value is $0.766 \times 100 = 76.6$

The value is the same as the earlier approach rounding of errors notwithstanding

Total Value of the company

Till now we were discussing how to value the capital deployed in the business. In a high growth industry companies usually grow at a pace significantly higher than what the internal accruals can support and hence require fresh capital to be deployed in the business. Companies hence, usually maintain a solvency ratio comfortably above the 1.5x control level prescribed by the regulator. The value of capital over and above the control level of solvency is free capital to be deployed incrementally into the business. Depending on the attractiveness of the core business into which the free capital will be deployed this may be valued at a premium, at par or at a discount. So the total value of the company will be the sum of the value ascribed to the capital deployed in the business and the value ascribed to free capital.

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**"It takes 20 years to build a reputation and five minutes to ruin it.
If you think about that, you'll do things differently. – Mr. Warren Buffett"**

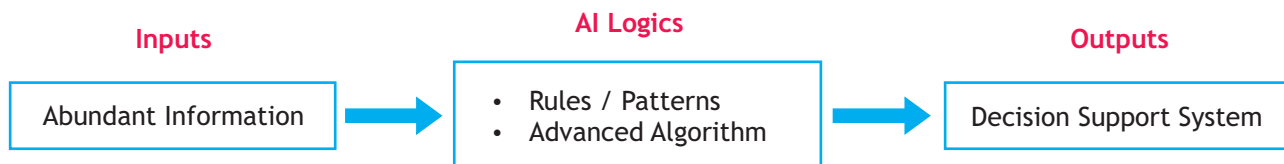
**"Honesty is a very expensive gift.
Don't expect it from cheap people. – Mr. Warren Buffett"**

Introduction

The Oxford Dictionary defines Artificial Intelligence (AI) as “the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision making, and translation between languages.” These days almost every journal from the BFSI sector will definitely feature some thoughts and views on how machine learning or artificial intelligence is going to impact/disrupt the industry. Alongside this hype, the discussions on AI also bring in varied emotions ranging from immediate unemployment to a situation where machines overpower humans. This article tries to touch upon the current usage of AI and how the Insurance industry already is, and can harness such technology.

Artificial Intelligence is often used synonymously with Machine Learning. Technically speaking, Artificial Intelligence is broader in scope in the sense that it refers to machines being able to perform 'smart' tasks whereas machine learning is one such way to do it. Machine Learning is one tool for implementing AI, where machines are programmed to learn using available data rather than everything being fed into their algorithms. Most importantly, AI is not only about training machines to perform a particular task faster and more objectively, but also about allowing them to develop intelligence so that they can provide solutions to unfamiliar scenarios using the information they have gathered while performing familiar tasks. AI usually, therefore, works on large set of data, using highly independent pieces of information to create some sort of pattern, churning out a decision mechanism through its learning and problem solving approach.

Figure 1: Basic Artificial Intelligence Architecture



(We would also like to point our readers to a very informative article on Machine Learning, authored by Mr. Suresh Sindhi in the Feb 2018 edition of the Actuary magazine.)

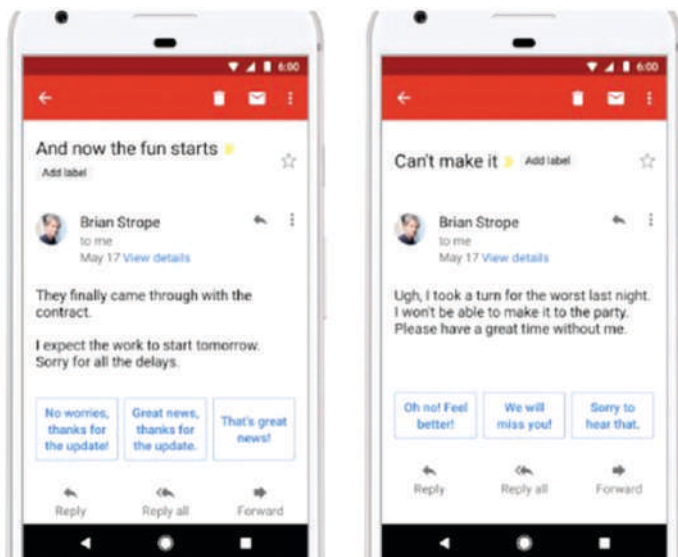
Is AI already here?

Some people still think of AI as a future technology, but the truth is it is already making an impact on our daily lives. Before looking at some everyday applications of AI, it would interest the reader to know that there are several ways in which AI can be applied, but the most common ones are image recognition, voice recognition, Natural Language Processing (NLP), and virtual robots (also known as chatbots or virtual assistants). Machine learning is akin to human learning because it also learns from its experience, i.e. the algorithm by being in a similar situation over and over again and responding to it and then analyzing the subsequent reaction to its response, it starts to develop a connection. This then leads to a decision mechanism.

Talking about everyday usage of AI, it is all around us, just that we are getting immune to it. Many of us reading this article would have noticed that one fine day in recent memory, Gmail started suggesting three

automated responses for replying to emails instantly. For some it might be annoying, but for others it is like having a secretary for free! So how does it work? This piece of AI uses neural networks to convert the incoming email into some codes for which it can pick three responses from the available database of responses. Again, the idea here is that, over time, these responses will carry the same writing style as yours and same reaction as yours. In a time-crunched world, these efficiency features can translate into millions of dollars of saving for the economy. A similar technology is being used by LinkedIn messenger.

Figure 2: Personalized responses in Gmail - an example



Gmail is, in fact, using Machine Learning, to categorize emails, including spam emails, into different priority buckets for the users. It allows users to move emails amongst buckets and based on that it learns how to categorize future emails. Quite obviously this categorization is not only based on the sender's email address or subject of the email. It is 'smart' categorization.

The next in the list will be the host of voice recognition AI based voice assistants available in the marketplace viz. Siri (Apple's), Cortana (Microsoft's), Alexa (Amazon's) and the Google Assistant. Again most of us would have come across one or more of these in our day to day lives - these virtual assistants use natural language processing (NLP) to match voice inputs from anyone into executable commands using the software they're deployed on. They not only answer questions but also make recommendations and perform actions by delegating requests to a set of internet services. The software adapts to users individual language accents, past searches, etc.

Yet another application of the NLP is online customer support systems or chatbots where the customers interact with an intelligent virtual assistant which is able to understand what the customer wants based on what he/she says or types and then translate that to pull information from the company's database. These chatbots can handle thousands of enquiries per second, making them multiple times more efficient than humans for such mundane tasks. The cost savings using these can be immense in terms of the FTEs saved as well as increased customer satisfaction. Chatbots can in fact also give suggestions as to what the customer might like to buy based on their interaction.

These applications are endless, but to quote a few examples from the Indian context, HDFC had announced

plans to deploy up to 20 humanoids in its branches over a two-year time horizon to assist its customers walking into its branches. The first humanoid launched by HDFC was named 'Ira'. The largest public sector bank State Bank of India announced in September 2017 that it is testing its intelligent virtual assistant called SIA (SBI Intelligent Assistant). SIA is a chatbot being prepared to handle customer queries and guide them through different places on SBI's website, freeing up time for the human staff which can then be used to do more creative things.

Mastercard has come up with a Machine Learning based technology to let genuine transactions go through by reducing the number of false declines, as well as being better at declining genuine frauds.

The concept of driverless cars is also a high-end application of AI. Facebook uses Artificial Intelligence to tag people in the photographs we upload, and it claims that it can now recognize them correctly with as high as 97% accuracy. A very interesting statistic picked from www.techemergence.com reads "In the future, AI will shorten your commute via self-driving cars that result in up to 90% fewer accidents, more efficient ride sharing to reduce the number of cars on the road by up to 75%, and smart traffic lights that reduce wait times by 40% and overall traffic time by 26% in a pilot study".

Artificial Intelligence in Insurance industry

Since Artificial Intelligence is making inroads into all industries, Insurance cannot stay untouched and it has not. Before sharing information on some of interesting insurance startups, let us look at where AI can make an impact in the Insurance value chain, together with some existing implementations.

1. Product Development and its Marketing: Each insurance company has a significant amount of personal information about its clients based on the proposal form. This, in conjunction with an ever-increasing amount of information about clients available online such as their geographical information, shopping patterns, risk-appetite, holiday patterns (obtained through their consent of course), the insurance companies can deploy smart softwares to understand what kind of insurance products can consumers need. At the least, it can be used to cross-sell existing products to existing customers. More interestingly, using text and voice mining, insurance companies can make their existing products better and offer tailored contract terms. Carriers can allow customers to 'manufacture' products by providing customized coverage for specific events and specific items, increasing its attractiveness to potential customers.

Example: Manulife has switched to a voice-recognition based authentication system where instead of providing a pin and a secret question

answer, the system recognizes the insured's voice and provides access. By providing such a seamless service, it is likely to benefit from a loyal customer base.

- 2. Underwriting and Pricing:** Text Mining/ Analytics, or voice recognition softwares can be used to scan for anomalies in insurance applications at the very start of the process. It can be used to deal with any bias which might creep in while assessing a risk, and also make the process more objective for the insured. This does not mean doing away with underwriters, but making most efficient use of their time. For standard risks, the bot can automatically accept or reject a risk or pass it on to an underwriter where a subjective decision is required. Imagine a scenario where in-house installed cameras can be used to price a policy without requiring the intervention of an underwriter.

Behavioral premium pricing is another area of application whereby the insurance companies can use Internet of Things, or simply said data about the customer to charge a pay as per individual risk premium, so based on information about a person the premium can be tailored. Customers are no longer categorized into pools but charged as per their individual behavior.

Example: Allstate, a well known name in insurance partnered with a technology firm called EIS to develop a virtual assistant called Able to help agents seeking information on commercial lines products offered by the company. This was deployed when the company started to venture into Commercial Lines from being Personal Lines insurer. EIS claims that Able processes up to 25,000 queries each month. Separately, Insurify.com enables customers to generate price quotes by texting a photo of their license plate.

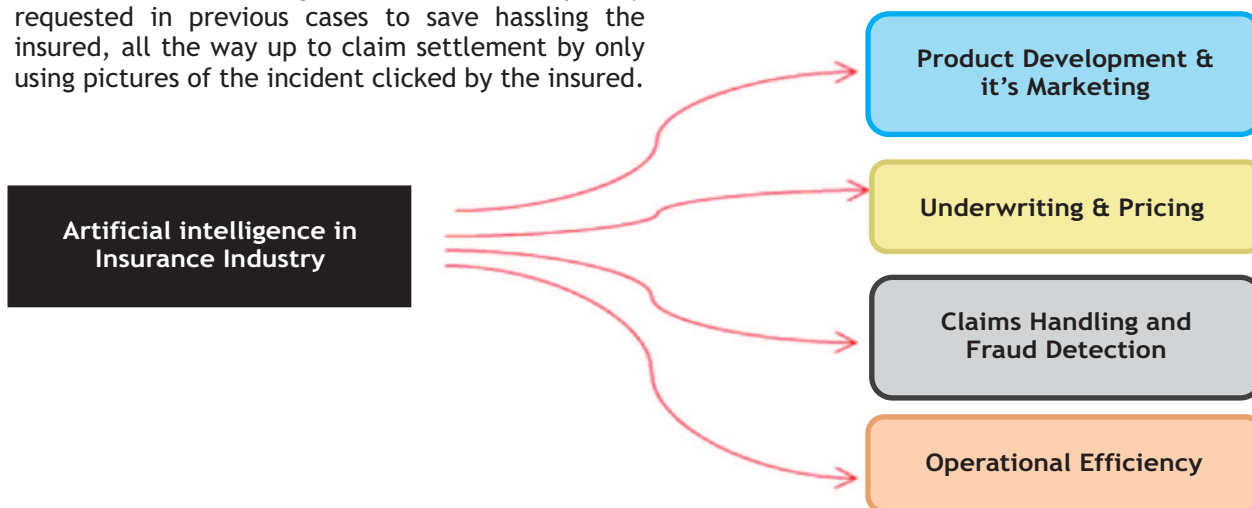
- 3. Claims Handling and Fraud Detection:** The options for application of automation and AI are abundant in this area of an insurance company's value chain. Starting from an 'intelligent' customized claim notification form using information subsequently requested in previous cases to save hassling the insured, all the way up to claim settlement by only using pictures of the incident clicked by the insured.

AI can be used to validate claims by checking in real time where the insured was at the time of incident, what the weather was, whether brakes were applied in time, etc. This can save millions in FTE costs as well as avoid fraud. The key metric here is how we can speed up claim settlement time as well as reduce fraud by the consumers. Fraudulent claims is a huge cost for the industry which is ultimately passed on to consumers through higher premiums.

Example: Zurich announced last year that it has decided to deploy Artificial Intelligence in deciding Bodily Injury claims after internal trials showed that the claim processing time was reduced from hours to seconds. They reported to have saved 40,000 work hours (reuters.com). A start-up called Shift Technology is using AI to help insurers reduce claim fraud, and analyzed over 82 million claims. Another insurance startup Lemonade rose to fame when it settled a claim in less than 3 seconds using AI.

- 4. Operational efficiency:** Finally thinking of operational aspects, AI can be used in numerous ways such as setting up meetings, identifying and reminding staff who come in late to work, pre-warning the claims team about number of additional staff required to handle claims following a bad weather event and predicting future workload. It can also generate operational efficiency by making the Management information available using machine learning. For example, if the senior management needs to find out the latest financials as at a particular date, instead of them asking an employee to pull together a report which can take days, they can instruct a virtual assistant. The requirement for an individual to scan through different folders and build tables in MS Excel and then putting it into a Powerpoint can be completely done away with. The potential is tremendous!

Example: Japanese Life Insurer Fukoku Mutual Life announced that it has introduced an AI application



based on IBM's Watson explorer to boost its operational efficiency in medical claims processing. The AI application comes up with an initial estimate based on scanning the medical reports, period of hospitalization and cover details. This estimate is then submitted to a real staff for approval - this makes claims staff happier as their work is reduced and they can use that time to do more value-add tasks. And we have happier customers too - don't forget this is a huge non-monetary benefit which cannot be ignored.

Clearly from the above, AI and Insurance can turn out to be great partners, and it is not a question of whether but one of how and when all insurers adapt to this technology. Competitiveness will soon be decided by how one makes intelligent use of available data and technology.

Insurance Start-ups

In this final section of this article, we look at some of the recent startups which are leveraging technology to their best in providing a hitherto unthinkable insurance solution.

Starting with Indian market, Digit is a new name in the Indian insurance industry whose USP is to make insurance simpler, both in terms of buying insurance as well as when it comes to settling a claim. It intends to make insurance transactions as paperless as possible, making it completely online.

The next insurance company that deserves a mention is the California based Trov insurance which has taken insurance to another level of thinking by providing on-demand insurance. So, for example, using its mobile application, the insured can switch on and off when and where he/she needs insurance. If you are using the

camera while going out, you can switch the insurance cover on and switch it off if the camera is placed in the cupboard. With its focus on electronic gadgets, it aims to cater to the needs of millennials who are increasingly getting car-free (Uber, Lyft) and home-free (renting out).

One insurance company which is making direct use of Artificial Intelligence is this insurance startup called Lemonade. Lemonade uses artificial intelligence in the form of chatbots and machine learning to provide insurance policies and handle claims, replacing brokers and paperwork traditionally associated with the process. When a customer applies for insurance, the company's software pulls data and cross-references information about a particular home or neighborhood from a variety of sources. Policyholders file claims through Lemonade's app with the company's chatbot 'A.I. Jim' who reviews the claim, cross-checks it with the policy, runs 18-fraud algorithms, and determines whether or not to approve the claim.

Conclusion

Insurance companies need to future-ready themselves by ensuring excellent database mechanisms and making maximum use of technology so that this data can be used in any form which the future may demand. Most importantly, the actuaries and other risk professional need to welcome all technology, including AI with an open and positive frame of mind. AI is not here to replace us, but to assist us providing more value add services to our clients.

No doubt, there will be challenges in adopting AI ranging from costs of implementation, IT system readiness and a change in how revenue is generated for each policy, but as the saying goes - change is the only constant in life.

References

- https://en.oxforddictionaries.com/definition/us/artificial_intelligence
- <http://www.firstpost.com/tech/news-analysis/sia-is-state-bank-of-indias-intelligent-chatbot-to-assist-customers-with-banking-related-queries-4009661.html>
- <https://www.techemergence.com/machine-learning-at-insurance-companies/>
- <https://www.reuters.com/article/zurich-ins-group-claims/zurich-insurance-starts-using-robots-to-decide-personal-injury-claims-idUSL8N1IJ3L0>
- <https://techcrunch.com/2017/04/06/trov-adds-45-million-for-the-global-expansion-of-its-on-demand-insurance/>
- [https://en.wikipedia.org/wiki/Lemonade_\(insurance\)](https://en.wikipedia.org/wiki/Lemonade_(insurance))
- <https://www.prnewswire.com/news-releases/lemonade-sets-new-world-record-300386198.html>
- <https://www.moneycontrol.com/news/business/companies/we-will-go-live-with-products-for-motor-travel-and-gadgets-digit-insurance-2398935.html>
- <https://www.cognizant.com/whitepapers/how-insurers-can-harness-artificial-intelligence-codex2131.pdf>
- <https://www.businessnewsdaily.com/10203-artificial-intelligence-insurance-industry.html>
- <https://mic.com/articles/177452/google-smart-reply-gmail-will-use-artificial-intelligence-to-let-you-answer-emails-faster#.yAtxHEpCG>
- <https://en.wikipedia.org/wiki/Siri>
- <https://newsroom.mastercard.com/press-releases/mastercard-rolls-out-artificial-intelligence-across-its-global-network/>

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Introduction

1) Analysis of Valuation Surplus is one of the important topics with which most of the actuaries will be fully familiar. Even actuarial students working in the valuation section of the actuarial departments will have fairly good knowledge of this analysis. I am writing this article mainly for the benefit of those actuarial students not working in the valuation sections.

At the same time I have tried to explain the concepts involved, in such a way that even those not having any actuarial background would be able to understand them.

There are some sections in which I had to use actuarial functions. These sections are marked "actuarial students". Those not having any actuarial background may skip them. It does not however mean that they will not be able to understand these sections. Anyone who has studied algebra upto Plus-2 level (equivalent of Senior Cambridge) and has good aptitude for mathematics would be able to understand them.

In this article, I have confined myself to Non-Linked, Individual, Assurance Plans only. I will try to take up Group Assurance, Annuity and Pension Plans and Linked Assurance Plans at a later date.

This is the first of the Four Parts into which the article has been divided.

While going through this article, keep the Excel File "CASHFLOW-ENDOWMENT" open. The hyper link to this file is given below. Click on this Link, keeping the "Ctrl" key pressed. The Excel File will get downloaded from the Web Site. But you may not be able to navigate within the Excel Sheets. On top of the Excel Sheet displayed, you will find a box with the Caption, "Open With" and a downward arrow. Click on the arrow and choose the Option "Google Sheets". The Excel File will open again and you would be able to navigate within the file.

The Excel file, "CASHFLOW-ENDOWMENT", is in MS Office format. Till now, this format was being accepted in the Google Blog. It appears that now the format has to be either Adobe or Google Sheet. So, the file "CASHFLOW-ENDOWMENT" has to be first converted to Google Sheet format.

<https://drive.google.com/file/d/1RnpAMlcoyoNoVKXAzIGiXRfVXvTYDqir/view?usp=sharing>

2) As per Sec.49 of the Insurance Act, 1938, bonus to policyholders can be declared only out of valuation

surplus. In the case of all companies, other than life insurance companies, the excess of income over (outgo + increase in liability) is known as profit. The values of income, outgo and increase in liability are determined by the Finance & Accounts department. In the case of life insurance companies, the excess of income over (outgo + increase in liability) is known as **Surplus** and not as **Profit**. While the values of income and outgo are determined by the Finance & Accounts department, the value of "Increase in Liability" is determined, or rather estimated, by the Actuarial department, based on assumptions regarding likely future experience.

Revenue Surplus and Valuation Surplus

3) There are two types of Surpluses, the Revenue Surplus and the Valuation Surplus. When we talk of analysis of surplus, it generally means analysis of valuation surplus.

4) The **Revenue Surplus** can be defined in simple terms as the excess of income over outgo.

- **Income**, in the case of a life insurance company, can be broadly classified into three groups, viz.
 - a) Premium income,
 - b) Investment income and
 - c) Miscellaneous income.

Incomes that cannot be classified under (a) and (b) will come under (c) and, the proportion of (c) to the total income should always be very small.

(Strictly speaking, we have to say premium received and not premium income. But, by usage, the term "Premium Income" has come to stay)

- **Outgo**, in the case of a life insurance company, can be broadly classified into five groups, viz.
 - a) Agency commission
 - b) Marketing expenses,
 - c) Administrative expenses,
 - d) Miscellaneous expenses and
 - e) Outgo in respect of claims

As stated under income, the proportion of (d) to the total expenses should always be very small.

5) Provisions have to be made out of Revenue Surplus for various Reserves. The Reserves for which provisions are likely to be made are, General Reserve, Revaluation Reserve, Equalisation Reserve, Catastrophe Reserve, Provision for bad loans (non performing assets), Exchange fluctuation Reserve and Solvency Reserve.

6) Valuation Surplus is the difference between the Revenue Surplus (net of provisions made) and Increase in Valuation Liability during the year. The Valuation liability is estimated by the actuary on the basis of a set of assumptions.

7) In India tax is determined as a percentage of valuation surplus; the present rate being 14.1625%. So, any advance tax paid or provision made for tax is not to be deducted from the Revenue surplus.

In those Regulatory regimes where the tax is not based on valuation surplus, any advance tax paid and provision made for tax have to be deducted from Revenue Surplus before determining valuation surplus.

Increase in Valuation Liability

8) Increase in valuation liability is defined as, the difference between (Valuation Liability **before** allocation of bonus, as at the end of current year) and (Valuation Liability **after** allocation of bonus, as at the end of previous year)

In the format for Revenue Account given by the Indian Regulatory & Development Authority (IRDA), increase in liability has been defined as the difference between (Valuation Liability **after** allocation of bonus, as at the end of current year) and (Valuation Liability **after** allocation of bonus as at the end of previous year)

So, the value of Valuation of Surplus can be determined only approximately and that too only indirectly from the Revenue Account (see paragraph 10).

9) In India, the first charge on Valuation Surplus is Tax, @14.1625%. In the case of LIC of India, **not less than 95%** of the Surplus after Tax has to be allocated to the with-profit policyholders and the balance can be paid as dividend to shareholder, i.e. The Government of India. (In the case of life insurance companies in the private sector, a maximum of 10% of the surplus emerging from the with-profit portfolio and 100% of the surplus emerging from without profit portfolio go to shareholders).

10) In the Revenue Account for the year 2015 - 16 (Page 132 of the Annual Report of the LIC of India) it is given that, Transfer to Shareholder's Account is ₹ 24,940.76 million.

This means that 5% of the Surplus after tax = ₹ 24,940.76 m

So, Surplus after tax = $20 \times 24,940.76 \text{ m} = ₹ 498,815.20 \text{ m}$
Rate of tax = 14.1625%

So, Surplus before tax = $498,815.20 / (1 - 0.141625)$
= $(498,815.20 / 0.858375) = ₹ 581,115.71 \text{ million}$

Question 1: Some life insurance companies treat their branch offices as profit centres and use the revenue surplus of each branch as a measure of its profitability. Is it a correct approach?

Answer: If a large block of policies attached to a branch mature in a year or come up for survival benefit payment in a year, the revenue surplus of that branch may appear to be lower than that of other comparable branches where such heavy payments have not fallen due. When contractual benefits are paid under a large block of policies, the total liability will also decrease correspondingly. Consequently, the valuation surplus, being the difference between the revenue surplus and increase in policy liability, may even increase.

Consider a simple example of two branches, A and B. The first one always sells policies under endowment plan of term 10 years and the other always sells policies under endowment plan of term 20 years. The premium per 1,000 sum assured, in the case of Branch-A will be almost twice that of Branch-B. If the number of policies sold in a year and the average sum assured under these policies are the same for both the branches, the revenue surplus of branch A will be much higher than that of branch B. It does not however mean that branch A is more profitable. The liability in the case of A will be much higher and its valuation surplus may even be lower.

The Revenue Surplus may therefore be a misleading indicator of profitability and the valuation surplus is a better indicator. But, it has to be used with caution. To understand how to use it, one has to understand its components and the method of measuring each component.

Components of Valuation Surplus

11) The main components of the valuation surplus are, a) Premium income, b) Marketing expenses (including agency commission), c) Administrative expenses, d) Claims, e) Investment income, f) Lapses and Paid-up, g) Revivals, h) Surrenders, i) Provision for Future Bonus and j) Impact of elimination of negative liability.

Assumptions and Results of Last Valuation

12) The starting point of the Analysis of Surplus is the "assumptions made in the last valuation, i.e. in the valuation as at the end of the previous financial year, and the results of that valuation". In the valuation basis, assumptions are made regarding interest rate, inflation rate, premium based and per policy expenses, mortality rates and rates of other risks, and rates of future bonus. On the basis of these assumptions, the expected value of each component of Surplus can be calculated.

13) In this article, other risks like death or disability due to accident, critical illness ... etc., have not been considered. In India, the basis adopted for valuation of liability is generally quite conservative and so rates of future lapses, paid-ups and surrenders are not taken into

account while estimating liability.

However, not making any assumptions regarding future lapses, surrenders and paid-ups is itself an assumption. That is, it is being implicitly assumed that these rates are zero.

New Business

14) It was stated in the last Section that, "on the basis of the assumptions made in the last valuation, the expected values of each component of Surplus can be estimated". No assumptions are made in any valuation regarding nature and volume of new business likely to be procured in the following year. In the case of lapses and surrenders it was stated that, making no assumptions is equivalent to assuming that there will be no lapses and surrenders. Such an implicit assumption is not applicable in the case of new business, since the valuation basis is determined on the assumption of an **ongoing** concern. So, while conducting an Analysis of Surplus, impact of New Business on the Surplus has to be done separately (see paragraph 83).

15) The new policies to be issued in the current year were not a part of the last valuation and, the assumptions made in the last valuation regarding marketing and administrative expenses and mortality rates need not be applicable to them.

Expected and Actual Values

16) On the basis of the assumptions made in the last valuation, the expected value of each component can be estimated. Let, P_e , E_e , O_e and I_e be the Expected Values of Premium income, Expenses (marketing expenses, agency commission and administrative expenses), policy Outgo (survival benefits, maturity claim, death claim, annuities paid ... etc.) and Investment income. Since new business was not a part of the assumptions made in the last valuation, these estimates will not apply to premium income, expense, outgo and investment income in respect of new policies issued during the year.

17) The corresponding actual values can be represented by suffix "a". For example, P_a , E_a , O_a and I_a . These actual values can be obtained from the revenue account for the year. While extracting the actual values from the Revenue Account, the values pertaining to new policies procured in the year are to be eliminated. The difference between the actual and expected values of each component will give the quantum of its contribution to the Valuation Surplus. This contribution may be positive or negative. To determine whether the contribution of a component is positive or negative, the following rule has to be kept in mind.

- In the case of incomes,
 - ◆ If the actual income is in excess of expected income (i.e. actual – expected is positive), the difference is to be treated as a positive contribution.

- ◆ If the actual income is less than expected income, (i.e. actual – expected is negative), the difference is to be treated as a negative contribution.

- In the case of outgo's
 - ◆ If the actual outgo is in excess of expected outgo, (i.e. actual – expected is positive), the difference is to be treated as a negative contribution.
 - ◆ If the actual outgo is less than expected outgo, (i.e. actual – expected is negative), the difference is to be treated as a positive contribution.

18) The sum of the contributions of each component to surplus gives the total surplus. The order in which these components are analysed is immaterial, as long as it is ensured that the effects of inter-actions between different components are kept in view in order to avoid double counting of the effects. However, once a particular order is adopted, it is advisable to stick to the same order every year. Else, it would be difficult to study the variations, over the years, in the contribution of each component to the surplus.

19) Let us consider one simple example of calculation of interest surplus. The liability as at 31st march 2017 of a life insurance company is Rupees One Trillion (one lakh crores). That is, the Life Fund can be taken as Rupees One Trillion as at 31st March 2017. The valuation rate of interest assumed in the calculation of this liability was 6%. So, the Expected Investment Income during the year 2017 - 2018 will be (6% of One Trillion = ₹ 60 billion). If the actual investment income during the year 2017 - 2018, as per the Revenue Account, after excluding the investment income pertaining to new business for the year 2017 - 18, is ₹ 65 billion, the interest surplus will be, (Actual - Expected) = 65 billion - 60 billion = ₹ 5 billion

20) The above is an over simplification of the process of determining the interest surplus.

- While assuming that the Fund will be equal to the liability, the Reserves like Investment Reserve (to cover non-performing assets), Solvency Reserve, Interest Equalisation Reserve, Exchange Rate Fluctuation Reserve, ... etc have been ignored. The Funds pertaining to these Reserves will also be earning interest.
- The Fund as at 31st March will not be remaining constant throughout the year, but will be changing continuously.
- While every premium and investment income received during the year will increase the Fund, every expense incurred and claim payment made will decrease the fund.

21) Let the Fund as at the end of previous year, i.e. as at the beginning of current year, be F. Ignore for the present the various Reserves held and assume that F is equal to the liability as at the end of previous year. The **Expected**

Fund as at the end of Current Year, **without taking into account** the Expected Investment Income, will be, $(F + P_e - E_e - O_e)$

The mean fund during the year will be,
 $[F + (F + P_e - E_e - O_e)] / 2 = F + [(P_e - E_e - O_e) / 2]$

If the rate of interest used in last valuation is i , the Expected Investment Income will be, $Fi + [(P_e - E_e - O_e)i / 2]$

(***Fi means F multiplied by I)

That is, the Expected Investment Income will be,

(One year's interest on the Fund as at the end of last year + Half a year's interest on the Expected Premium Income net of Expected outgo in respect of Expenses and Claims during the Current year)

The rate of interest to be used is the rate of interest used in the last valuation.

22) The implicit assumption here is that, during the Current Year Premiums will be received, Expenses incurred and Claim and other policy payments made, on the average, at the middle of the year and so, the Balance Income will earn interest only for half a year.

The actual interest income (i.e. investment income) earned can be obtained from the revenue account.

The difference between the Actual and Expected Investment Income will give the Interest Surplus.

23) Let us now see how the expected premium income, expected expenses and expected policy outgo can be determined. What I have described in the following paragraphs is only a broad outline. The full process will depend upon the type of products being marketed by the Company. Individual Assurance, Group Assurance, Individual Annuity/Pension, Group Annuity/Pension, Cash Accumulation Schemes, ... etc. have to be dealt with separately. Within each group, there can be different types of products. For example, within Individual Annuity/Pension products, there can be six or seven different options. In the following paragraphs, I have given the procedure only in respect of Assurance policies.

24) Start with the file used for valuing the liability as at the end of last year and process the records one by one. Assume that there will be no lapses or surrenders and the only ways by which a policy can become an Exit will be by death claim or maturity claim or end of policy term (in the case of term assurance). On the basis of the data contained in a record the age as at the beginning of the current year can be determined. Let this be x .

- Check whether the policy to which the record pertains will be maturing during the current year.

- If it is going to mature,
 - a) Find the total premium due under the policy till the date of maturity and add it to **PREMIUM-INCOME-ON**.
 - b) Corresponding to the premium due, determine the commission payable and add it to **COMMISSION-ON**.
 - c) Determine the amount of expenses likely to be incurred under the policy during the year and add it to **POLICY-EXPENSE-ON**. Though the policy may be becoming an Exit before the completion of the year, assume that full year's expenses will be incurred, since settling the claim may involve additional expense.
 - d) Determine the maturity amount payable (including vested bonus, interim bonus and final additional bonus) and add this to **MATURITY-AMOUNT-ON**.
 - e) It may be noted that the possibility of the policy resulting into death claim before the date of maturity has been ignored. In the actual working, this possibility will also be taken into account.

25) If the policy is not going to mature during the current year, find the probability of the policy becoming a death claim during the current year. This can be taken as q_x , the mortality rate corresponding to age x . In case the policy results into a death claim,

- a) The premium due under the policy till the end of the current policy year will be collected from the claim amount payable. If this is equal to P , the Expected amount of premium to be collected in case the policy results into a death claim, will be $q_x P$. Add this to **PREMIUM-INCOME-ON**.
- b) If the agency commission corresponding to the premium P is C , the Expected commission payable on this premium will be $q_x C$. Add this to **COMMISSION-ON**.
- c) Determine the amount of expenses likely to be incurred under the policy during the year. If this is E , Expected amount of expense that would be incurred will be $q_x E$ and add it to **POLICY-EXPENSE-ON**. Though the policy may be becoming an Exit before the completion of the year, assume that full year's expenses will be incurred, since settling the claim may involve additional expense.

26) If the policy is not going to mature during the current year, find the probability of the policy Not Becoming a death claim during the current year. This can be taken as $(1 - q_x)$, where q_x is the mortality rate corresponding to age x .

In case the policy is neither going to mature nor going to result into a death claim during the current year,

One year's premium will be collected under the policy during the year. If this is taken as P' the Expected amount of premium income under the policy during the year will be equal to $(1 - q_x)P'$. Add this to **PREMIUM-INCOME-ON**.

If the agency commission corresponding to the premium

P' is C' , the Expected commission payable on this premium will be $(1 - q_x)C'$. Add this to **COMMISSION-ON**.

Determine the amount of expenses likely to be incurred under the policy during the year is E' the Expected amount of Expense will be $(1 - q_x)E'$. Add this to **POLICY-EXPENSE-ON**.

27) We have to process each record in the above manner. In this discussion, only amounts of death claim and maturity amount were considered. In the case of plans under which Survival Benefits are payable, the Expected amount of survival benefit payable during the year will also have to be considered and added to **SURVIVAL-BEEFIT-ON**.

28) *While valuing the liability of a life office as at the end of the year, no assumption is made regarding New Business. So, income and expenses in respect of new business and claim payments made in respect of new policies issued will not directly come into the above analysis. These will be dealt with separately.*

29) If the difference between the actual and expected investment incomes is defined as interest surplus, the sources from which the actual interest income (either positive or negative) comes have to be clearly understood. These sources are,

- Fund at the beginning of the year, including all provisions (i.e. Reserves) (positive interest income)
- Actual premium income during the year (positive interest income)
- Actual marketing expenses, agency commission and administrative expenses during the year (negative interest income)
- Actual policy outgo during the year (negative interest income)

30) One reason for the difference between actual and expected interest incomes is the difference between the assumed (valuation) rate of interest and the actual rate of interest (i.e. yield on investment). The other reason is the difference between the actual and expected values of premium income, expenses and policy outgo's. When the actual premium income is say, P_a , and expected premium income is say, P_e , then, due to lapses and surrenders, P_a will generally be smaller than P_e . Consequently, expected interest income will get reduced by, $\{(P_e - P_a) \times (i / 2)\}$,

Where, i is the valuation rate of interest in the last valuation. The implicit assumption involved in the above expression is that the deficiency in premium income will emerge on the average at the middle of the year. (This is not however a hard and fast rule. It may be seen in the case of some companies the premium income will emerge on the average at the end of ninth month. The actuary has to take a considered decision in this regard). Similarly, differences between the actual and expected values of expenses and claims will also impact the

interest surplus. This is an example of the interaction between interest income and various items of income and expense.

31) Once the interest surplus is defined as above, the contribution of premium income to surplus/deficit has to be defined as $(P_e - P_a)$ and not as $[(P_e - P_a) \times \{1 + (i / 2)\}]$ as is usually done in some text books. If it is defined as $[(P_e - P_a) \times \{1 + (i / 2)\}]$ then, while estimating interest surplus, the interest portion (positive or negative) arising from excess / shortfall in premium income has to be eliminated from interest surplus; Else, there will be double counting.

32) In the following sections, the methodology involved in the analysis of surplus will be explained in simple steps by,

- Taking into consideration only one policy,
- Considering the surplus emerging at the end of each policy year, instead of surplus emerging at the end of each financial year.

With these changes, the surplus emerging at the end of first policy year will be analysed.

In the three Examples (1, 2 and 3) that follow, it is assumed that, in each year, the valuation basis as well as actual experience will be the same as given in the premium basis. Such a purely theoretical assumption has been made just to illustrate,

- ♦ Impact of elimination of negative liabilities on analysis of surplus of that year.
- ♦ Impact of elimination of negative liabilities in one year on analysis of surplus of the following year and
- ♦ Effect of lapses on the analysis of surplus

33) For this purpose an Excel File, "**CashFlow-Endowment**", having Seven Screens, has been created. These Screens are, Premium-Calc-A, Case-A, Premium-Calc-B, Case-B, Case-C and Premium-Calc-NetPrem,

A detailed explanation of different columns of the Excel Sheet **CASE-A** is given in the following sections. Non actuaries and actuarial students not familiar with preparation of Cash Flow in respect of life insurance plans may go through this before proceeding further. Even those who are familiar with preparation of cash flow may go through this, since this approach may be different from the approach they usually adopt.

(To be continued)

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Transformation of marketing

- Customers spending more time on mobiles, tablets and laptops
- Connecting with customers across devices in real time
- Create campaigns that work across social media, display advertising and e-commerce.
- Use of powerful narratives to tap into people's wishes and aspirations
- Use of the technical side of data, digital engineering and analytics.
- Getting creative marketers to work alongside technical staff can be a huge challenge.

Marketing is concerned with understanding people's motivations and using these insights to create campaigns that promote brands and encourage people to buy their products. It is a creative and often intuitive process. The technology used to achieve this, however, requires skills in mathematics, statistics and computing. How can these two different areas work together effectively?

Creativity and passion from brands have helped build customer loyalty and emotion. Three areas of marketing which have been transformed by digital are the speed, relevance and reach of campaigns. Digital marketing has also greatly increased relevancy. Messages can be targeted with a laser focus to very specific groups offering them relevant content.

Meanwhile, the reach of campaigns has also increased greatly. With so many different ways that customers access media, whether through Facebook, YouTube,

news websites, via mobile or tablet apps, a strong idea can quickly gain huge scale. Marketers need to update their skills in order to make the most of these fast-moving, and highly relevant campaigns through digital. They need to work closely with data specialists, web developers and social media professionals.

The marketer of the future needs to combine marketing and creative skills with an understanding of real-time technology. Just as marketers need to become more savvy about technology, data and analytics, so the technically minded staff on the digital side have to get more creative. A vital quality for marketers in the fast-changing digital environment is curiosity, rather than any specific technical knowledge.

Marketers ultimately need to rely on their natural intuition rather than on technology. For brands to work effectively together in the digital world, chief marketing officers and chief information officers must work in unison. But this is hard to achieve for many organisations and the two sides can end up in conflict. But “legacy” businesses that need to undergo a digital transformation must decide who should lead that change. Should it be the chief information officer or the chief marketing officer or perhaps someone from a different department?

Today's connected consumers are using smartphones, iPads, laptops - and even glasses and watches - to access content. As a result, marketing departments need to provide compelling campaigns across these different devices and become proficient in using technology. Marketers need to work closely with IT departments and technologists. They need to understand the processes behind developing websites, handling data and running social media campaigns. The panel discussed how marketers could develop the skills to enable them to work hand in hand with technologists while retaining their creativity, flair and intuition.

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The Actuary India - Editorial Policy

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A: "The Actuary India" published monthly as a magazine since October, 2002, aims to be a forum for members of the Institute of Actuaries of India (the Institute) for;

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

B: The Institute recognizes the fact that;

- a. there is a growing emphasis on the globalization of the actuarial profession;
- b. there is an imminent need to position the profession in a business context which transcends the traditional and specific actuarial applications.
- c. The Institute members increasingly will work across the globe and in global context.

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

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

D: The magazine also seeks to keep members updated on the activities of the Institute including events on the various practice areas and the various professional development programs on the anvil.

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

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

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Vintage is our Vantage



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