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INDIAN ACTUARIAL PROFESSION
Serving the Cause of Public Interest

19

**Global
Conference
of
Actuaries**

**30th & 31st
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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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Message from the President



It reminds me the quote of Vince Lombardi, one of the famous American footballer when I saw the Institute has conducted CT5 and ST1 examinations in Mumbai on a day when the city was almost shut down due to heavy rain converted into flood all over Mumbai, be it roads or railway tracks. I would like to salute our entire Institute staff, in particular Bharat Solanki and Madam Khushnum who went beyond their duties/ responsibilities and managed to reach the Mumbai examination Centre at CST area, to control on any eventuality related to the exam on that day. I salute all our CT5 & ST1 Mumbai candidates who took a brave decision to reach the exam center to write the exam in spite of non stop rains for 24 hours. Though we were ready for any on spot decision to delay or defer the exam but the people I mentioned above did ensure that both exams were conducted on time. Our profession appears to have full of fighters winning adverse

situations and reminding the above quote. Congratulations to the entire IAI team and all those students made it possible to present themselves to the examination.

The flag hoisting of signature event of the profession - 19th Global Conference of Actuaries has been done during last month and count down started for the GCA on 30th & 31st of January 2018. The GCA website is also ready and will open for registration and will be available for registrations too by the time you read this column. I appeal all our members to make use of early bird offers for registration and make the event a big success! We have many successes from GCAs and last year's AAC which we will utilize in this event.

The Institute has hosted the 11th Annual General Body Meeting of the members of the profession on 23rd Sep 2017 in our new office. Among the highlights of the annual report

and accounts, I am pleased to inform you that our total assets have crossed ₹ 50 Cr, first time during the last FY. This is a proud moment for us to celebrate and to sincerely thank our processon volunteers who could make this possible. Its now evident that we are a financially strong body.

Encouraged by the overwhelming response on Economic Capital seminar conducted during the last two months, we have announced Embedded Value Capacity Building Seminar at two centers for serving the need for our students and members in two key locations, one at Gurugram on 11th Oct and another one on 13th at Mumbai. The registration response on both programs has been overwhelming. This shows the requirement of the profession in terms of capacity building on key topics; we have many such topics in the pipeline which will be rolled out in the days/ months to come.

The online coaching for CT level subjects will continue to occupy the central position in supporting students with quality teaching; to keep students occupy in their studies early and in advance, the announcement of online coaching for students appearing for March 2018 examinations shall be on 10th October, classes would start on 1st November. The IAI is also planning to conduct a series of class room coaching for different CT, CA, ST and SA level prior commencing sometime in December second fortnight.



Message from the Chief Editor



The demand for the Jobs relating to data science and data analytics is growing rapidly. As per a paper by Burning Glass Technologies, around 23.5 lac jobs were listed in North America in 2015. By 2020 the demand for data scientist and data engineers is projected to grow by 39%. Further, over 3.6 lac jobs listing is expected by 2020. Interestingly, the research further suggests that the positions are advertised with average salary of around \$ 80,000 which is relatively higher than positions requiring graduation degree.

When the jobs were plotted on a scale of difficulty of filling position and projected 5 year growth, they look like this.

Low difficulty of filling position and high growth

- Human Resources Analytical manager
- Market Research Analyst
- Financial Examiner
- Business Intelligence analyst
- Statistician
- Business Management analyst

High difficulty of filling position and high growth

- Data Scientist
- Data Engineers
- Business Intelligence architect
- Director of analytics
- System Analyst

high difficulty of filling position and low growth:

- IT Project Manager
- Marketing Manager
- Product Manager
- Finance and Risk Analytics Manager

low difficulty of filling position and low growth:

- compensation and Benefit analyst
- Risk Consultant
- Data Mining Analyst
- Data base administrator
- Budget Analyst
- Procurement Sourcing Manager
- Computer /system engineer

In my mind, actuarial analysts are best suited for filling the positions of data scientist, data engineers, and system analyst and business intelligence architect.

Let's look at what are the skills required for a statistician and data scientist.

A statistician must possess following minimum skills:

- communication skills to ensure proper communication of results
- Visualization skills to ensure he/she able to spot the relationship in data
- Data modeling to analyze the data
- Programming to do proper analysis

The skills required for a data scientist are similar but bit more sophisticated.

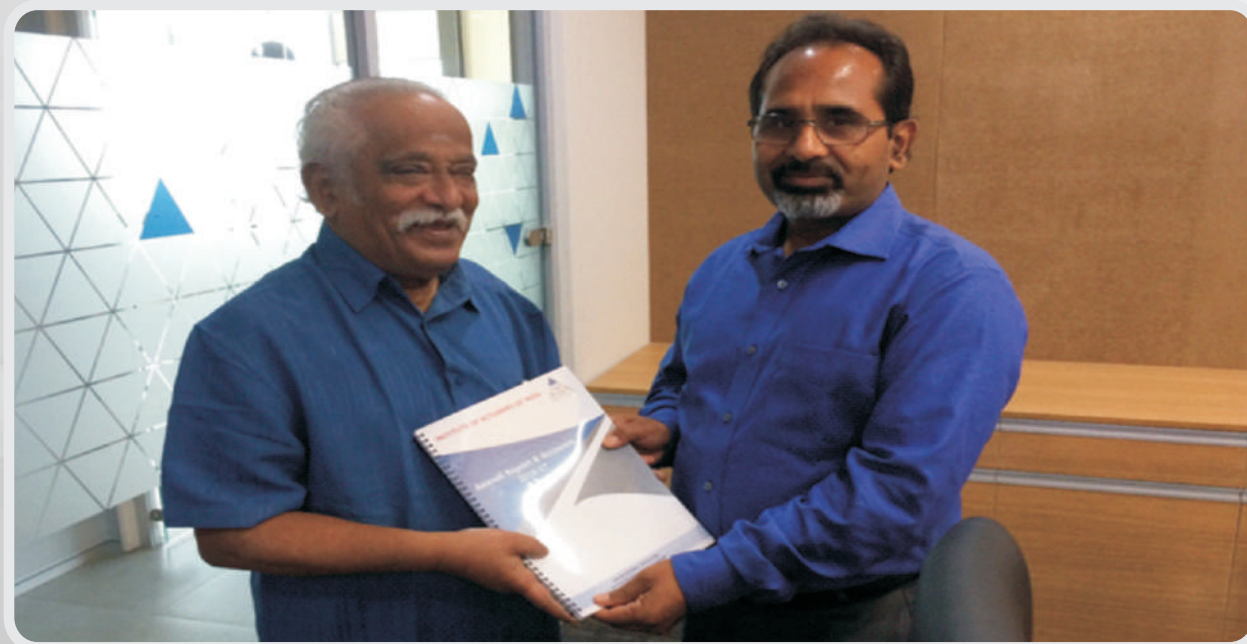
- Communication skills to interact with business to explore challenges
- Visualization skills required to clearly communicate insights for the business
- Modeling to integrate analytic workflows and data and further understand to solve business challenges
- Programming to ensure analytics is embedded into the deployable applications

If I ask, are actuaries the data scientist of the Insurance companies? Well, we are strong in certain areas but there are few areas where we need to develop ourselves. We are pretty strong on core statistical training, analytical thinking, quantitative skills, good at communicating insights to the business and insurance domain knowledge. However, we still need to develop skills in area of being a better programmer, visual representation ability and technologist.

Given significant potential in the area of data science there is a need for the profession to prepare the budding actuaries in the area of Advance business Analytics and covers areas like use of R, GLM, cluster analysis, credibility using GLM, predictive analytics, Certification courses on Using R, SAP etc.

Finally, I would like to wish all the best to all the students writing the examinations this season.

President handing over a copy of the Annual Report for FY 2016–17 to one of the senior member of the Profession present in the AGM held on 23rd September 2017



INVITING THE EXPRESSION OF INTEREST IN IAI ACTIVITIES

Dear IAI Members;

IAI initiatives in the recent past have been communicated to IAI members including students through various mode of communications- audio-visual-print and digital. Not all but a few may be cited;

- ✓ Successful hosting of Asian Actuarial Conference in Delhi
- ✓ Having own building
- ✓ Actuary India magazine becoming better medium of communication and in process attracting good numbers of advertisement attracting
- ✓ Successful conduct of coaching for 7 subjects for September 2017 examination diet
- ✓ Successful conduct of examination despite heavy downpour at Mumbai
- ✓ ECP seminar at Gurugram and Mumbai
- ✓ Upcoming EV Seminar
- ETC

Such activities are possible because of help rendered by IAI members. IAI wishes to create pool of talent of volunteers who have passed at least all subjects upto CT level. There are following minimal areas where you may support IAI;

- ✓ Letting others be benefitted by your expertise in technical actuarial topic/function, actuarial/statistical software and/or modelling in Excel
- ✓ Help in class room coaching for particular subject
- ✓ Examination related- volunteering marker, Examiner
- ✓ Supporting various committees and groups
- ✓ Writing for the Actuary India magazine
- ETC

You may write your interest to hoet@actuariesindia.org

Communication from Institute of Actuaries of India



FEATURES

Corporate Social Responsibility In India – The Emerging Discourse & Concerns

An incisive analysis about the CSR efforts of corporate world raises pertinent questions. Are CSR efforts really required? What are the challenges in the implementation of CSR? One has to carefully think about the real merits of CSR in the context of frequent economic recessionary cycles in the post globalization phase. Is CSR driven by social agenda of business or profit agenda of business? In India, the previous Congress government made valiant attempts to provide a sense of legitimacy to CSR in India. The government went to the extent of revising the Companies Bill, but how effective are these measures?

CSR is considered as the commitment of business to contribute to sustainable economic development by working with employees, their families, the local community and society at large to improve their lives in ways that are beneficial for both business and development. At the international level, CSR is aggressively projected as a model of development which provides an alternative to state intervention. CSR is expected, in addition, to address issues of governance.

There is a need to clarify the role of CSR in view of the development challenges in India. None can deny that India has a multitude of problems - caste, inter religious strife, mal-nutrition, illiteracy, poverty, unemployment, pollution, regional disparities (for instance the Cauvery water dispute between Tamil Nadu and Karnataka) and religious fanaticism. To expect the business to do what the Government could not do all these years since 1947 is a preposterous idea. India has suffered from unequal and imbalanced development and a

corrupt bureaucracy. Globalisation has further added to the woes in terms of increasing the gap between developing countries and developed countries.

Skeptics view CSR efforts as an attempt by the Indian government to iron out the problems that have resulted post globalization. In the last few years, multi national corporations have become dominant and there have been governance, ethical and tax issues involving them. Coca Cola plant shutdown in Varanasi is a case in point. Apparently, Coca Cola did not take the required regulatory approvals - then how did they operate the plant for so long? Your guess is as good as mine. If Coca Cola talks about CSR, then it will be ludicrous. If a MNC can't do business in an ethical fashion, there is no point in the MNC talking about CSR.

The more is the global footprint of a multinational corporation, greater are the conflicts and contestations with regard to social justice and human rights. The problem is that the state, corporate and civil society looks at CSR from their respective vantage points. Post globalization, business houses are being looked up to to provide solutions for those areas of public good where the state has not been able to do anything or is unwilling to do anything. In the era of globalization, new forms of regulation have become necessary to instill greater accountability and regulatory discipline.

NGOs have lapped up the opportunity to work with MNCs to fulfil the latter's CSR goals. The government has projected CSR as a concept that has been a part of Indian culture or showcasing it as an instrument of wealth redistribution. Manmohan

Singh went to the extent of comparing CSR efforts in India with the trusteeship concept of Mahatma Gandhi. The former PM steadfastly refused that CSR was a Western management concept and called it (CSR) a part of India's cultural heritage. Critics point out that references to Gandhian model have been made with the sole intention of gaining unquestionable legitimacy.

CSR may be touted as a marriage of social and business goals. But in the era of consumerism, all the talk about sustainable development ends up being rhetoric with little concrete action. The problem is that the CSR guidelines are silent on the rights of communities. CSR activities are not directed towards where actions are needed to improve the social and economic fabric of India. Sports, cultural activities, energy conservation, pollution, infrastructure development, climate change are pressing issues. When we have MNCs contributing to infrastructure development as part of CSR, this can generate livelihoods and support cottage industries and empower the communities. The once flourishing toy business in Chennapatna (in Karnataka) did not have any supporters when they had to fight the invasion of Chinese toys in the Indian market.

For example - automotive companies are responsible for adding to the environmental pollution, but how many of them are actually involved in a responsible CSR effort? The truth is that the brand CSR is profit driven. CSR being used to strengthen brand equity is a mockery of the sensibilities of the population. If corporates pollute the environment and then use CSR to camouflage their actions, it can be a travesty of

justice.

The truth is that CSR activities can't be delegated. The Government cannot absolve itself of the responsibility for social responsibility. Checks and controls need to be in place to ensure that CSR efforts are genuine and not a red herring to deflect attention from governance issues / unethical activities in the corporate world. The proposal by FICCI to demand tax breaks for CSR efforts defeats the purpose of CSR. We know the fragility of the tax system in India. The Vodafone- retrospective tax controversy in India is a case in point. There have been malpractices galore in transaction cost model adopted by MNCs in India. The scope for abuse/ misuse of the CSR route to get tax breaks is immense. In India, the perception is that the government has failed in its social agenda and is trying to pass the buck of social responsibility to the corporate sector.

There is no ambivalence about the fact that for both the government and the corporate world, CSR is a business strategy. But the development issues in India are too complex to be treated as business projects. Though the laws in India are comprehensive, business community feels that CSR guidelines are above

these laws. Yet, it is a fact that statutory violations abound in India.

CSR is not a panacea for all developmental problems in India and neither can it be a one-stop solution for addressing all such problems. If CSR is used to counter the negative effects of globalization, then the communities become more dependent on such funding. How will this impact their lives when there is a downturn in the economy? Will the corporate world continue to drive their CSR agenda when shareholders are fuming about dipping profits? Thus, when we talk about CSR in India, politics appears to have taken the front seat instead of statesmanship.

The government must applaud genuine CSR efforts of the corporate world and must highlight it so that awareness is created among the populace. To reiterate, giving tax exemptions for CSR efforts is not the right move because then that means that the corporates are funding the social responsibility efforts with the tax that they would have paid the government otherwise. CSR efforts also need to be diverted to areas like community development, rural education, protection of water bodies, disaster management and empowerment of rural India. The government has a major

responsibility to steer actions in this direction. Considering the huge population in India and the wide geographical area, there can never be any dearth of opportunities.

Self interest of each actor precedes the CSR agenda. CSR efforts have now become necessary diversionary tactics to appease certain sections of society by the government and thus abdicate their own responsibility. The interpretation of CSR in India depends on who is handling it. That is where the problem lies.

Reference

Sharma, Seema. (2013). CSR in India - The Emerging Discourse & Concerns, The Indian Journal of Industrial Relations, 48(4), 582-596.

About the Author



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

The Actuary India wishes many more years of healthy life to the fellow members whose Birthday fall in October 2017

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Equity Release – Valuation Part 5: No negative equity guarantee

Equity Release valuation depends upon choice of valuation model, assumptions and customer data. This article is fifth in the series of articles on actuarial valuation of Equity Release. This article covers discussion on no negative equity guarantee which is a feature of Equity Release product. First part describing product features and valuation model was published in May 2015. Second part describing longevity assumptions was published in June 2015 along with its youtube link covering discussion on its contents. Third part was published in February 2016 along with link for youtube covering discussion on lapse assumption. Fourth part was published in August 2017 covering discussion on Property value projection and house price index.

Equity release is a financial contract that allows elderly people, who may not have enough liquid cash to access the equity in their home. Equity release is also known as reverse mortgage or home equity conversion loan. Equity release is a means of retaining use of house (or object which has capital value), along with obtaining a lump sum or a steady stream of cash inflow, from value of such house. The equity release provider must be repaid later with interest, usually when policyholder dies or goes in for long term care from sale proceeds of home. Equity release is particularly useful for seniors who do not intent or are not able to leave a large estate for their heirs when they die. Such elderly persons must be of minimum age (which is country specific, for US 62, UK 55) and live in their own home to sign equity release contract.

No Negative Equity Guarantee (NNEG): Equity Release Council (ERC) is one of the regulators for Equity release product in the UK. Insurers intending to sell Equity release product are required to comply with regulations issued by the ERC. As per ERC's prescription, following guarantees should be provided to the customers:

1. To allow customers to remain in their property for life provided the property remains their main residence.

2. To provide customers with fair, simple and complete presentations of their plans. This means that the benefits and limitations of the product together with any obligations on the part of the customer are clearly set out in their literature.

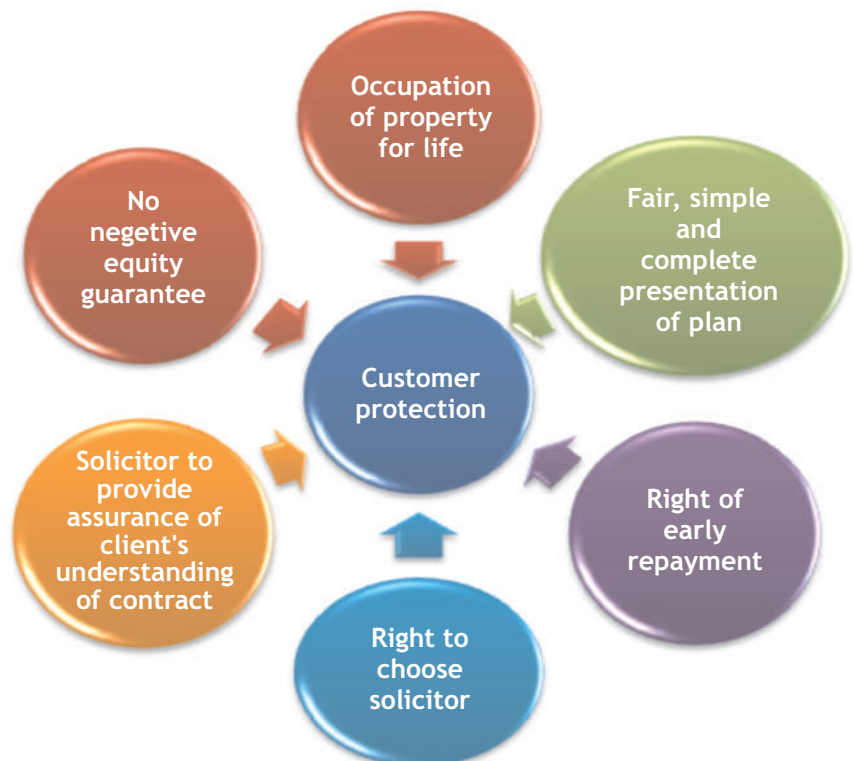
3. The right to move their plan to another suitable property without any financial penalty.

4. The right for the customer to choose an independent solicitor of

their own choice to conduct their legal work.

5. The ERC certificate signed by the solicitor is there to ensure clients are aware of the terms and implications of the plan including the impact of equity release on their estate.

6. All ERC plans carry a no negative equity guarantee. This means customers will never owe more than the value of their home and no debt will ever be left to the estate.



Because of Point 6 above, insurer is required to value the guarantee and provide for it in the valuation of its Equity Release assets. Through the NNEG, the provider guarantees the borrower that the redemption amount of the mortgage will be capped at the lesser of the accumulated amount of the loan and the sale proceeds of the home, usually net of sale expenses. The NNEG cannot be priced accurately using a deterministic approach because of its option-like features. Furthermore, the NNEG cost on a portfolio of Equity Release loans is the sum of number of individual outcomes on the different loans in the portfolio, and the circumstances of each will be different. The average portfolio loss/surplus outcome does not measure the cost of NNEG completely. NNEG is the sum of losses on individual cases with no offset for cases where there is surplus equity cover. This is known as non-recourse provision (NRP) in the US. This risk is sometimes referred to the crossover risk.

Value of such guarantee can be approximated using:

1. Stochastic valuation
2. Black Scholes put option valuation model



Stochastic valuation: Use of 'real world' stochastic valuation techniques is common actuarial choice for assessing the risk of ruin and for the purpose of computing consequent economic losses. Many scenarios (say 1,000 or 10,000) are projected based on simulations of housing price index (HPI). It is also reasonable to apply regression on Retail Price Index (RPI) simulations to derive HPI simulations where HPI simulations are difficult to derive

due to lack of data or resources. Property valuations are then computed for each such scenario by rolling forward the initial value of property. Some of the scenarios will then result in accumulated loan being lesser than property value at a particular future time point. This future time point is generally an assumption by the actuary. Average of such shortfalls can be taken as reasonable approximation of NNEG.

Alternatively, for scenarios resulting in shortfall, present value of shortfall is projected at all future time points. Maximum present value of shortfall at any time point is then selected for each scenario. Average of such deficiencies can be taken as reasonable approximation of NNEG. There can be other more reasonable models to compute NNEG stochastically.

Considerations in generating HPI simulations:

1. Choice of statistical distribution

to generate simulations of Housing Price Index: Easy candidates are normal and log normal distributions for modelling change in housing price index. Log normal can be preferred over normal distribution because of following reasons:

- a. Lognormal distribution has fatter tail than normal distribution. Normal distribution implies that property value is mathematically "well-behaved", and the central limit theorem provides for such a distribution. However, traumatic "real-world" events (such as an oil shock, a large corporate bankruptcy, or an abrupt change in a political situation) are usually not mathematically well-behaved.
- b. Lognormal avoids negative values.
- c. Black Scholes model also assumes change in price of underlying asset follows geometric Brownian motion which can be modeled using log

normal distribution.

However, there can be other more reasonable choices of statistical distribution.

2. **Assessing if the tail of the distribution is appropriate** for loss modeling. From above discussion, log normal distribution appears better than normal when it comes to tail of the distribution.

3. **Determination of parameters** of the chosen distribution. Parameters can be based on empirical data and can be refined as and when more data becomes available. The length of the period covered by the historical data that is relevant may be limited by availability (e.g. the UK property market). In other cases, data may be available going back much longer (e.g. UK gilt yields). An assessment should be made of the data available and the effect that different lengths of observation period would have. The selected parameter should also be consistent with the firm's underlying future economic expectations.

4. **Market consistency of parameters:** It is difficult to assess market consistency of parameters as market for such put option (i.e. alternate way of valuing NNEG) is not liquid. Where no established derivative market exists, particularly for options on property, then calibration cannot be based on market data. Here, the use of historical data for calibration may be a more suitable.

5. **Number of simulations** to consider. When the model is created for the first time 10,000 simulations can be a reasonable choice. Once model is mature, number of simulations can be cut to a lesser number to reduce run time. Alternatively, absolute error and/or relative error can be computed and minimized to identify minimum number of simulations required.

Generating variates from lognormal distribution $X \sim \text{LogNormal}(\mu, \sigma^2)$: μ

and σ are to be calibrated using historical data. Here X is the change in Housing Price Index.

Generate standard normal variate, Z using Box-Muller algorithm, or Polar algorithm or approximation method. These methods require generation of random numbers from uniform distribution. Random numbers from uniform distribution can be

generated using:

- Linear congruential generator: This generates random numbers using an initial integer value called a seed and a recursive formula.
- Mersenne Twister Generator.
- Quasi random sobol sequences.
- Preexisting random numbers can be used
- Rand () function can be used in

spreadsheet

- Any other model which actuary may deem appropriate

Return $X = \text{Exp}(\mu + \sigma \cdot Z)$. 10,000 simulations can be generated for change in HPI in such a way. The pseudo random number generator underlying the model(s) should be tested to ensure that it produces numbers which display sufficient randomness.

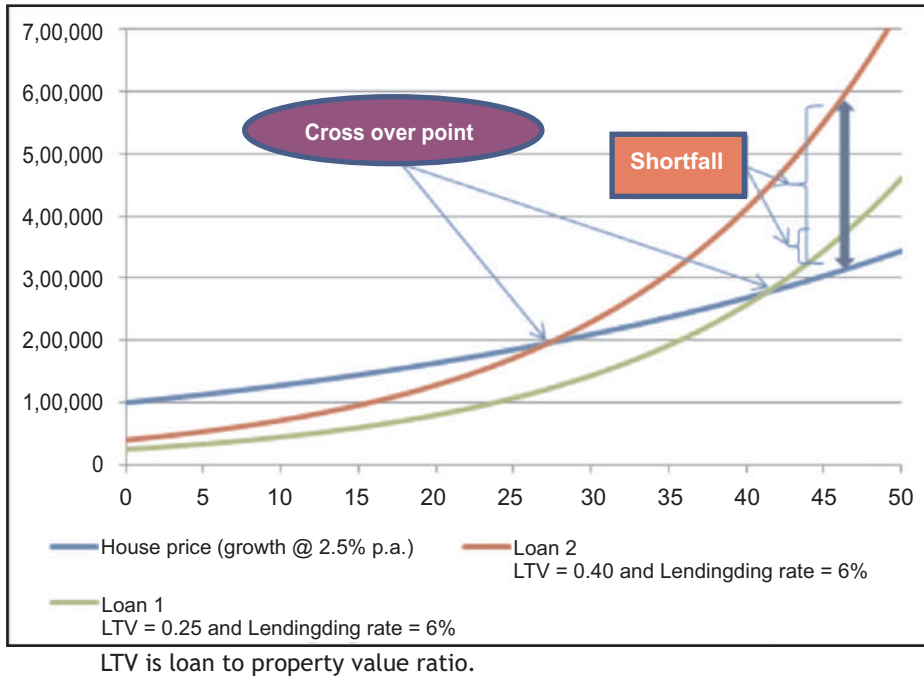
A realization of a random variable generated by a computer is random variate. A random variate generated from the uniform distribution $U(0,1)$ is called random number. There are two types of random numbers:

1. *Pseudorandom numbers: Numbers that appear to be random but are generated by a computer algorithm (usually using linear congruential generator (LCGs))*
2. *Truly random numbers: Numbers generated by a physical process (e.g. radioactive decay) and are unrepeatable*



Valuing NNEG as put

Put option is a right, not an obligation to buy an underlying asset at a particular price in future by the person paying premium (i.e. holder of put). Put can be valued using binominal model as well as Black Scholes model. From the lender's viewpoint, the inclusion of the NNEG is the same as writing a put option on the mortgaged house with the strike price being the outstanding balance of the loan when the loan is terminated and current price being the value house at the time when policyholder dies or goes into long term care. The payoff from the guarantee is determined by the interest rate on the loan, the house price appreciation rate, and the termination date. There is uncertainty around termination date. This uncertainty is relevant, because the longer the loan continues the more likely that the outstanding balance will exceed the net house value.



From an option valuation perspective, the strike price keeps increasing at the interest rate on the loan, which will be greater than the risk free rate. Therefore, the value of the put option is an increasing function of the term.

Through the NNEG, the provider guarantees the borrower that the redemption amount of the mortgage will be capped at the lesser of the accumulated amount of the loan and the sale proceeds of the home. Products at times differ as to whether the NNEG extends to the sale expenses or not.

If we define the accumulated value of loan at the time of sale of the home at time t , as K_t , and the sale proceeds of the home (possibly net of sales expenses) as S_t , then the NNEG

restricts the amount of accumulated loan to be repaid to minimum of K_t or S_t . We assume that all future values of K_t are known in advance, either because we are dealing with a rollup mortgage having a fixed rate of rollup, or with a fixed-repayment mortgage. The shortfall to the provider upon redemption at time t as a result of the NNEG is $\max [0, K_t - S_t]$.

This is same as the payoff under a European put option having an option term t . Effectively, by incorporating NNEG in the product, the regulator (ERC) has made it mandatory for the provider to write a series of put options. Expected value of which at the time of termination of contract ($Loss_{Tx}$) can be expressed as follows:

$$Loss_{Tx} = \int_{t=0}^{t=T} {}_t p_x \cdot \mu_{x+t} \cdot P(S_t, t) dt$$

Expected present value of NNEG (V_{NNEG}) can be computed as follows:

$$V_{NNEG} = Loss_{Tx} \times \sum_{s=1}^{Kx+1} m_s$$

Where,

- x is the age at contract inception,
- T is the point such that $x+T$ is the uppermost age of the life table,
- ${}_t p_x$ is the probability of a life aged x at inception surviving until time t ,
- μ_{x+t} is the force of exit from home (for any reason inclusive of death or moving into Long Term Care) for a life aged $x+t$. For joint-life mortgages, appropriate adjustment should be made in this,
- $P(S_t, t)$ is the value of put option of term t on the underlying house price, where the strike price of the option, K_t , is the accumulated value of loan at time t and S_t is the estimated net realizable value of the home at the termination of contract (net of sales cost), and
- K_x denotes the curtate random future lifetime of a life currently aged x
- m_s denotes the risk adjusted discount factor at discrete time s .

Black Scholes model for NNEG valuation:

$P(S_t, t)$ can be computed using Black Scholes's model as follows:

$$P(S_t, t) = N(-d_2) \cdot K_t \cdot \exp^{-r \cdot t} \text{ Less } N(-d_1) \cdot S_t$$

$$d_1 = [\ln(S_t / K_t) + \{r + (0.5 \cdot \sigma^2)\} \cdot t] \div (\sigma \cdot t^{0.5})$$

$$d_2 = d_1 - (\sigma \cdot t^{0.5})$$

Where,

- $N(\cdot)$ is the cumulative distribution function of the standard normal distribution

- t is the time to maturity i.e. time from date of contract inception to future year when contract termination is expected
- K_t is the strike price i.e. the accumulated value of loan at the time of sale of the home at time t
- S_t is the sale proceeds of the home at time T (net of expenses)
- r is the risk free rate (annual rate, expressed in terms of continuous compounding). For NNEG calculation model this can be increased by appropriate margin to reflect liquidity and marketability risk for equity release asset.
- σ is the volatility of returns of the underlying asset i.e. volatility of housing price index. Empirical national data on annual percentage change in declared HPI of Halifax (monthly without seasonality adjustment from January 1983 to November 2013) gives volatility of 9.5%. However, an increase in it will be required by a reasonable percentage as region wise index will have more volatility in comparison with a diversified national index.

Although put option value so computed may require some further adjustments. This is because Black Scholes model is not fully appropriate to measure NNEG. Here are the reasons:

1. Volatility varies with time. Therefore an appropriate average will be required.
2. Property market lacks many of the attributes of perfect frictionless market. Particularly, the underlying asset, that is, the house property, is unique and infrequently traded. The Black-Scholes model assumes that markets are perfectly liquid and it is possible to purchase or sell any amount of stock or options or their fractions at any given time.
3. The time to maturity is random, because it is dependent on the timing when the borrower leaves the property permanently.
4. In comparison to equity returns, house price returns are highly correlated, with significant effect of leverage and heteroskedasticity. The Black-Scholes option pricing formula, assumes returns on the underlying asset follow a geometric Brownian motion.



Implied volatility: A key assumption in the Black-Scholes model is the volatility assumption. Here, the usual (and preferred) approach is to infer (or back compute) the appropriate volatility assumptions from corresponding market option-prices. This is known as market-implied volatility. This approach ensures that the options being valued are priced consistently in relation to the prices of other quoted options on similar underlying assets. However, this possibility does not exist in the case of the NNEG as put options in property are not traded. This makes usage of Black Scholes for NNEG more difficult.

Hedging NNEG: NNEG option is not readily hedged, either by any derivative or by insurance. Therefore, the potential value variability will need to be met by:

1. Backing the product with significant amounts of risk-based capital and
2. Its appropriate pricing

Each provider of Equity Release product should assess the costs of the NNEG against their own circumstances, product terms and property underlying contracts. Provider should then determine appropriate modeling approach and model parameters. In practice one would expect there to be significantly different assessments of costs between different providers.

Next and last part of this series will focus on Expense assumption, securitization and ALM using Equity Release assets.



About the Author



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“Saket Vasisth is involved in Asset Liability modelling for life insurance. He is a student member of IAI and works for AIG.”



Life Insurance Insights Top 10 – news, views and trends

“SBI Life has launched an IPO with the issue getting subscribed 3.58 times the offer size. HDFC Life has filed for a public listing as well post its proposed deal to merge with Max Life hit regulatory hurdles. There has also been buzz of other potential transactions activity in the market, as per press reports.

Life insurance industry registered a relatively subdued growth in weighted new business premium collections of 11.5% in the first quarter of FY2017-18, as the state-owned LIC witnessed a decline of 1.2%. Private life insurers, collectively, outpaced state-owned LIC with a growth of 28.1%. A few more Point of Sale (PoS) products have been launched following its debut in the previous quarter. Insurers appear to have maintained their emphasis on non-linked products as well as health related offerings, based on the products launched during the reporting period. We summarise below these and the top ten key trends and developments that shaped the life insurance market in India for the period June to August 2017.”

10

The Authority releases a master circular to address the issue of unclaimed amounts of policyholders

Various regulatory directions related to unclaimed amount of policyholders have been consolidated in a Master Circular issued by the Authority. The Master Circular requires all insurers having unclaimed amounts of policyholders for a period of more than 10 years as on 30 September 2017 to transfer it to the Senior Citizen's Welfare Fund (SCWF) by 1 March 2018. It also seeks to ensure convergence in compliance under the SCWF Act and the new rules proposed.

case of an AA having less than the minimum required experience (i.e. at least 10 years of relevant experience in life insurance out of which five years should be post-fellowship and at least three years of post-fellowship experience in statutory valuation), the insurer must then appoint a mentor until the AA becomes eligible. However, the transitory provisions also stipulate that minimum requirement for an AA supported by a mentor is of at least two years of post-fellowship experience in the life insurance industry. These also detail out the eligibility criteria along with the practical experience that a person should hold to be appointed as a mentor to the AA. The responsibilities of the mentor range from new product filing to maintaining solvency in the books of an insurer.

PoS offerings. Canara HSBC OBC Life has launched a simple non-linked and non-participating term plan, primarily targeted at the mass market segment with the objective of simplifying the insurance buying process. Reportedly, the insurer is also planning to make this product available online in the coming months. IDBI Federal Life has also launched two PoS products, both being simple endowment plans.

7

Positive profits reported by 12 private life insurers for Q1 FY2017-18

As per financial results disclosed by 22 private life insurers, 12 have reported profit at the end of first quarter of FY2017-18, similar to that observed in corresponding period in the previous fiscal. Amongst the 12 insurers to have reported profit, eight have recorded a positive year-on-year growth compared to the profit figures reported for Q1 FY2016-17. The total profit after tax for private life insurers making such disclosure has increased by 10.3% from INR11.02 billion in Q1 FY2016-17 to INR12.17 billion, year-on-year.

9

The Authority releases guidelines on Transitory Provisions under IRDAI (Appointed Actuary) Regulations, 2017

Following the recently released IRDAI (Appointed Actuary) Regulation, 2017, the Authority has now released the transitory provisions to the said regulations for an Appointed Actuary (AA). The guidelines state that in

8

Increase in Point of Sale (PoS) product launches since its introduction last quarter

Following the lead taken by Edelweiss Tokio Life last quarter, Canara HSBC OBC Life and IDBI Federal Life have also launched their

6

Quarterly results round up: Life insurers record a moderate growth of 11.5% in the first quarter of FY2017-18

As per statistics released by the IRDAI, weighted new business premium (measured as 100% of regular premium and 10% of single premium) collections for the life insurance industry amounted to INR136.1 billion during April to June 2017, representing a year-on-year growth of 11.5%. State-owned LIC registered a decline of 1.2%. Private insurers outperformed LIC by achieving a year-on-year growth of 28.1%, leading to an increase in their market share to 49.7%, up from 43.3% in FY2016-17, year-on-year. ICICI Prudential Life topped the table amongst private insurers, registering a significant growth in weighted new business premiums of 83.8%, year-on-year.

5

Securities Appellate Tribunal stays IRDAI's order on Sahara Life business transfer

The Securities Appellate Tribunal (SAT) has ordered a stay on the IRDAI's order asking ICICI Prudential Life to take over the business of Sahara Life. Based on a report by one of its officials appointed to manage the affairs of Sahara Life, the regulator had concluded that continuation of its business was not in the interest of the policyholders, citing a failure of its governance system amongst other factors. Following this, the regulator had ordered ICICI Prudential Life to take over the business of Sahara Life. However, in response to the appeal by Sahara Group to the SAT, it has put the insurance regulator's order on hold and the matter remains sub-judice.

4

Non-linked, non-participating products remain dominant, as group credit life and health products gain popularity

The life insurance industry has witnessed around 17 new product launches during the period of June to August 2017. All the products launched were non-linked, thereby keeping up with the continued trend of emphasis on such products. Further, life insurers are also focusing on increasing their health insurance portfolios by launching heart and cancer products. This is evident through the launch of three more heart/cancer based products during this period. There have also been various group credit plan launches during this period, thereby indicating an increasing focus on this proposition.

3

Increase in the number of bancassurance tie-ups by insurers along with increased focus on online platforms

Canara HSBC OBC Life and DHFL Pramerica Life have entered into bancassurance agreements with Dhanlaxmi Bank. Further, Bajaj Allianz Life has renewed its corporate agency agreement with Dhanlaxmi Bank thereby extending their long standing partnership dating back to 2009. Varanasi based Utkarsh Bank has reportedly been looking to cross sell insurance products and has already tied up with ICICI Prudential Life, Shriram Life and HDFC Life for the same. Axis Bank, which currently sells products of Max Life and LIC, is reportedly looking to tie up with Tata AIA Life to sell the latter's products under open architecture. While some insurers are focusing on consolidating their presence through bancassurance agreements, further initiatives are being taken by others to move towards digital channels to obtain a

wider reach. Insurers are also placing increasing confidence on digital platforms like e-commerce and fin-tech platforms.

2

Merger and acquisition update: Life insurers looking at stake sale options

Media reports indicate that the joint venture (JV) partners of IndiaFirst Life - Bank of Baroda, Andhra Bank and Legal & General Group are exploring multiple strategic options which involve partial or full stake sales. Reportedly, the partners have sought the advice of an investment bank regarding the options available. Reports also suggest that stakeholders in IDBI Federal Life, a JV between - IDBI Bank, Federal Bank and Ageas of Europe are also exploring stake transfer/sale options.

1

IPO activity: SBI Life launches IPO; HDFC Life also plans an IPO this fiscal

SBI Life has launched an Initial Public Offer (IPO) for its 12% stake, of which SBI will be offloading 8% while its JV partner BNP Paribas Cardiff will be selling 4% stake in the insurer. A total of 12 million shares were offered at a price band of INR685 to INR700 per share between 18-22 September, valuing the insurer at INR700 billion at the upper end of the price band. Reportedly, this is the country's first billion dollar IPO in the last 7 years and was subscribed 3.58 times on conclusion of bidding on the final day of offer.

Following the failed merger between HDFC Life and Max Life, HDFC Life has decided to come out with an IPO this fiscal. As per the Draft Red Herring Prospectus (DRHP) filed with the stock exchange regulator, SEBI, the

issue will comprise an offer for sale of 298.8 million shares with a face value of INR10 each. HDFC and its JV partner Standard Life will be diluting 9.55% and 5.42% stake in the company, respectively. Media reports suggest that SEBI has sought certain clarifications from the insurer on a number of issues including risk factors, employee stock options policy (ESOP) and any potential conflict of interest arising with the promoter bank.

Thanks

About the Author



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

WE ARE HIRING!



Applications are invited for the following positions in Canara HSBC Oriental Bank of Commerce Life Insurance Co. Ltd., Gurugram.

DEPUTY MANAGER – ACTUARIAL (PRICING)

Role: The role holder would assist in all tasks relating to product designing and pricing of new products as well as redesigning/ repricing of existing products. This includes assisting in developing products suitable to needs of the customers, developing pricing models to optimize profitability, capital usage, commission and customer returns; ensure product meets risk appetite of company; assist in developing pricing report for peer review by Group Insurance and for regulatory filling; and assist in launch activities including review of marketing literature, system testing and negotiations with reinsurers.

DEPUTY MANAGER – ACTUARIAL (BUSINESS PLANNING)

Role: The role holder would assist in developing long term and annual operating plan for the company, understand the dynamics of the business and threats to the plan using stress/scenario testing on the Company's key vulnerabilities. He/she would be required to develop models to carry out necessary calculations to provide inputs needed by the business to understand the current and projected financial position of the Company, the exposure of the company to various risks and carry out a host of internal, regulatory, regional office and shareholder reporting.

SPECIFICS:

No of papers: 4-8 exams cleared with CT5 mandatory

Experience: 2-3 years relevant experience in a life insurance company or an actuarial life consultancy firm

Interested candidates are requested to send their updated resume to Naina Juneja (naina.juneja@canarahsbclife.in).

Corporate Office Address: Canara HSBC Oriental Bank of Commerce Life Insurance Company Limited (IRDAI Regn. No. 136)
2nd Floor, Orchid Business Park, Sector-48, Sohna Road, Gurugram – 122018, Haryana, India



ANNOUNCEMENT

19th Global Conference of Actuaries

We are pleased to invite you to 19th Global Conference of Actuaries, which will be held on 30th & 31st January, 2018 at the Hotel Renaissance, Mumbai.

We encourage you to register early to avail **Early bird discounts** on the Registration fees. Visit <http://www.19gca.org/> to register now. Please ensure to visit the 19th GCA website regularly to check the latest updates.

Following are the Registration Fees applicable for 19th GCA:-

Categories	Early Bird Rate till Nov 30, 2017	Standard Rate - Dec 1, 2017- Jan 15, 2018	Onsite Rate - Jan 16, 2018 till event
Student	₹ 6,000/-	₹ 8,000/-	₹ 10,000/-
Associates	₹ 12,000/-	₹ 16,000/-	₹ 20,000/-
Affiliates	₹ 18,000/-	₹ 24,000/-	₹ 30,000/-
Fellows & Non Member	₹ 18,000/-	₹ 24,000/-	₹ 30,000/-
Fellows above 70	₹ 12,000/-	₹ 16,000/-	₹ 20,000/-
Delegates paying in foreign currency	300 US\$	400 US\$	500 US\$
Accompanying Person (only for AGFA)	₹ 4,000/-		

The above mentioned rates are exclusive of 18% GST

Call for Papers - The conference provides an excellent platform for participants to exchange ideas and share experiences with fellow participants from different jurisdictions within and outside Asia, the event has taken the stature of world-event, though focused on issues around Asia. More information on interest to present paper is available at <http://www.19gca.org/Call-For-Papers>. The last date for the same is 13th October, 2017.

Certified Professional Development (CPD) - As per APS9 (Rev.Ver.2) IAI Fellow members can claim CPD credit of 6 hrs per day for attending 19th GCA (Total 12 hrs for 2 days).

Accommodation - Please make your hotel reservations without delay to secure your room before our room block is either sold out or any unsold rooms are released by 1st January, 2018. <http://www.19gca.org/Accommodation>.





ANNOUNCEMENT



5th & 6th Young Actuaries Connect



Actuarial students are not only faced with tough actuarial examinations, but also a need to keep themselves abreast with the developments in the industry. To address this, we have invited distinguished speakers engaged in this domain to provide the students more insight on demands and developments of the profession. The Education & Examination Advisory groups of Institute of Actuaries of India are happy to announce **Young Actuaries Connect** events for IAI student members, as per details mentioned below:-

Date: Saturday, 14th October, 2017
Venue: Fortune Select Exotica, Vashi, Navi Mumbai
Time: 09:00 - 17:00

Date: Saturday, 28th October, 2017
Venue: Gurgaon - The Pllazio Hotel, Gurugram
Time: 09:00 - 17:00

Why Attend:

- To learn from other people's experiences and background knowledge;
- To gain perspectives and points of view that you might not have otherwise considered;

What's in it for you:

One of the best things about attending this event is discovering what other students are experiencing in terms exams & career prospects. By sharing your concerns you will be able to put them into perspective. Moreover the event may facilitate following:-

1. Opportunity to clarify and deepen your understanding of the subjects & exams
2. A comfortable environment in which to practice and develop a range of valuable study skills
3. Ideal chance to build up a network of peer support

We are thankful to **Canara HSBC Oriental Bank of Commerce Life Insurance Co. Ltd.** & **GIC RE** for their generous support to organize this event.

Program Schedule for the Event:

Sr. No.	Time slot		Topics
	09:00	09:30	Registration
1	09:30	09:45	Welcome Address
2	09:45	10:45	Opportunity in Insurance areas (Life, General, Health)
3	10:45	11:00	Networking Tea Break
4	11:00	12:00	Opportunity in Other areas (Pension, Risk, Investment)
5	12:00	13:00	Moving between markets (India and abroad)- opportunities and challenges
6	13:00	14:00	Lunch
7	14:00	15:00	IAI Examinations- system and process overview
8	15:00	15:30	IAI Exam- techniques and common mistakes
9	15:30	15:45	Networking Tea Break
10	15:45	16:45	Cracking the recruitment & selection process
11	16:45	17:00	Vote of thanks & open discussion

Who Should Attend:

The event would be aimed at freshers/ students who have only covered the initial set of exams (say 0-6 papers) and are relatively new into the profession.

General matters:

- **Participation Fees:** ₹ 500 (+18% GST) (The participation fees includes Lunch & Tea/Coffee).
- **Login to your account on IAI website** to Register & pay online
(Kindly ensure that your subscription is up to date for the year 2017-18)
- **Point of Contact for any query:** Quintus Mendonca (quintus@actuariesindia.org)



FEATURES

Implementing an Internal Model for Economic Capital

This paper focusses on implementation of an EC framework in a life insurance company. The first part discusses the introductory concepts and the second part sets out a roadmap for implementation of the EC model.

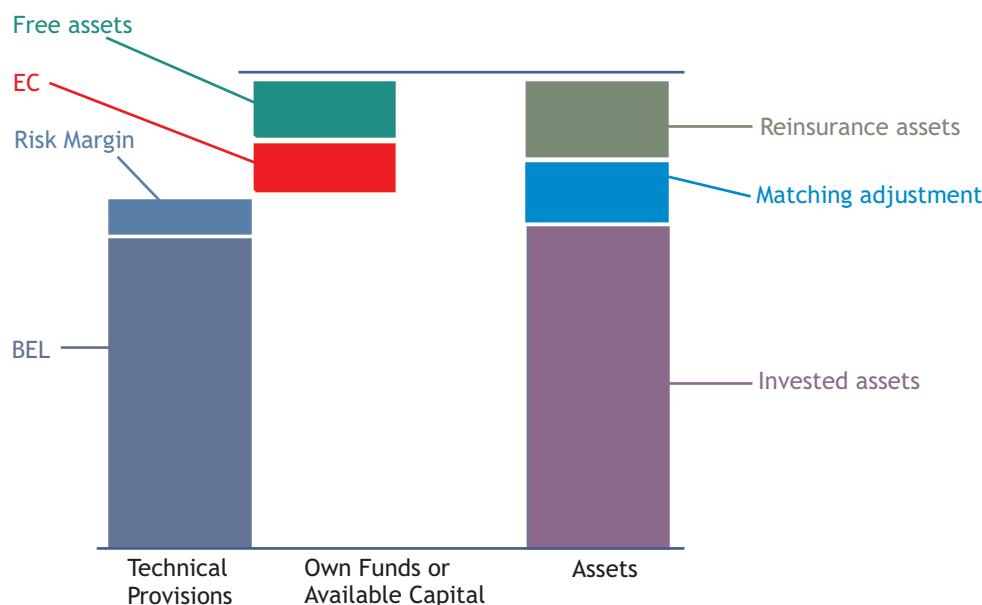
EC is an extensive subject and this article doesn't go into full technical details on all the issues. Instead, this paper focusses on implementation; especially on making the high-level decisions. This article assumes some basic understanding of EC and statistical distributions.

Section 1 - Introductory concepts

What EC implementation entails?

An EC framework is not limited to implementation of capital requirements alone. Rather, the entire balance sheet of an insurer is drawn up, and several new elements are introduced.

Let's take a brief look at what an EC balance sheet looks like:



This figure would seem quite familiar to anyone who has some knowledge of EC, Risk based capital (RBC) or Solvency II, and the concepts are well understood. Instead of going on to explain each of these blocks, it is best to highlight just a few points at this stage:

- Under an EC framework, reinsurance assets are disclosed separately on the balance sheet. Under many regulatory regimes, reinsurance assets are completely omitted and the liabilities are disclosed net of reinsurance.
- Reinsurance assets are calculated after allowing for 'expected defaults' by the reinsurers.

Figure 1: Economic (realistic) balance sheet

- Matching adjustment arises when long-term business (e.g. annuities) is backed by assets that earn credit spread, over and above the risk-free rate. Examples of such assets include corporate bonds, mortgages, equity release. Rather than shown separately as an asset, matching adjustment is most commonly included within the Technical Provisions as a negative liability.

Where to start developing an EC framework?

The first step is to define your EC. If the EC is part of a wider ERM framework, the definition of EC will be in line with the 'risk appetite' statement set out by the Board of Directors. If such a statement has not been set out by the Board, the EC can be defined in isolation. However, an EC which is not part of an ERM framework is likely to be of limited use.

The definition most widely used is:

"To remain solvent with a probability of 99.5% over a 1-year period."

In this case, the EC is defined as the amount of capital the company will need to keep to stay solvent over the next one year with a probability of 99.5%. This is also an example of 1-year VaR (Value-at-Risk) approach.

Companies can go a step further and define EC as:

“To remain solvent if a 99.5th percentile stress event was to occur over a 1-year period.”

This definition aims to keep enough capital to remain solvent even if a 99.5th percentile stress event was to occur. The EC in this case will be based on Tail VaR (TVaR), also called Conditional Tail Expectation (CTE).

Building an EC model based on Solvency II

The concept of EC is not new. Insurers and their regulators around the world have been working towards making sure that their businesses are run on a robust EC framework.

Solvency II could be a potential starting point. Solvency II is a European solvency framework for all insurers based on EC and ERM principles and has been in place successfully since 1 Jan 2016. Solvency II is a 3-pillar framework and the first pillar deals with estimating Solvency Capital Requirements (SCR; equivalent to EC).

Calculating EC as per Pillar 1 principles

An insurer can choose to adopt Solvency II Pillar 1 principles for developing an EC framework. The Level I and Level II (Delegated Acts) texts set out the principles on which the SCR needs to be calculated. These principles need to be followed by companies developing their own internal models (IM) for EC calculation. However, Solvency II also provides an option to adopt a Standard Formula (SF) approach. Under the SF approach, SCR is calculated as the loss under several different pre-defined stresses to risk factors and then aggregating the losses using a correlation matrix. This differs from the IM approach, in which the insurer chooses the approach, the level of stresses, parameters etc.

Choosing between SF and IM approaches

SF is primarily designed for small European insurers, since the cost of IM development is often substantial. Leaving the cost factor aside, few issues need to be considered for SF:

- SF has calculation modules for most risks, but not all. For example, there is no separate module for inflation risk, which is allowed for implicitly in real interest rates.
- SF prescribes stresses for each risk measure. These stresses have been calibrated using an extensive Europe-wide exercise and have been kept at a level to ensure that capital requirements are not understated. Therefore, SF may not provide a true EC for any insurer in Europe, and more so for insurers doing business outside Europe.
- Even for companies basing their EC on Solvency II SF, it may be necessary to estimate stresses independently to better reflect the economics of their own markets.

Alternatively, insurers may develop their own IM from ground up, making sure that the principles of Solvency II are all met.

Section 2 - Roadmap to building an EC Internal Model

This section sets out the process of developing an Internal Model based on Solvency II Internal Model principles. The process would involve two or four broad steps, as set out in the paragraphs below.

1. Risk identification

The first step would be to identify risks facing the insurer. Usually, this would involve one or more of the following:

- Analysis of the balance sheet to identify the exposures on both asset and liability sides. E.g. presence of a currency swap on the balance sheet could point to the existence of currency risk.
- Analysis of income statement to uncover any losses arising from off-balance sheet exposures. E.g. a litigation expense could point to reputation risk.
- Risk identification checklist of the UK actuarial profession.
- Interviews, brainstorming and workshops

Generally, the following risks will exist for a typical life insurer:

- | | | |
|----------------------|---|--------------------|
| • Interest rate risk | • Property risk | • Persistency risk |
| • Credit spread risk | • Currency risk | • Expense risk |
| • Inflation risk | • Counterparty default risk | • Operational risk |
| • Equity risk | • Mortality, or longevity risk (level, trend, volatility) | |

2. Risk calibration

Having identified the risks, the next step is to calibrate those risks.

1) Defining risk measures

The calibration process requires a 'risk measure' to be defined for each risk. To start with, a risk measure could be an assumption in an asset or a liability model; e.g. persistency, mortality, valuation interest rate. But sometimes the risks could be more complex. For example, interest rate risk is best represented by Principal Components (PC), rather than a single rate for EC purposes.

The risk measure is the metric for which historical values will be extracted and statistical analysis will be performed. The risk measure for equity risk could be set to NIFTY total return. The historical values of NIFTY total return can then be used for statistical analysis.

The table below provides examples of risk measures for some of the key risks:

Risk	Risk measure examples
Interest rate risk	- Principal component multipliers (complex) - Spot rate at the average settlement duration (simple)
Credit spread risk	- Average credit spread on own portfolio (complex) - iBoxx index of corporate bonds (simple)
Equity risk	- Total return on own equity portfolio (complex) - NIFTY Total Return index (simple)
Mortality risk	Historical claim counts expressed as a percentage of a mortality table
Persistency risk	- Historical surrenders split by categories (complex) - Overall historical surrenders expressed as a percentage of the pricing assumptions (simple)

2) Calibrating stresses or risk distributions

Once the risk measures have been identified, the next step of the calibration process involves one of the following, depending on the choice of IM architecture (see next point):

- Estimating the 99.5th percentile stress for the risk measure (usually referred to as the 'biting scenario')
- Estimating the entire loss distribution for the risk measure

It is important to note that the real-world probabilities distributions or stresses are produced during this process. Risk-neutral probabilities are not directly used in EC calculation.

Risk calibration is an extensive statistical process with its own set of challenges, issues and considerations, which are not discussed in this paper. These could include choice and selection of data, choice of distributions for testing, selection criteria and parameterisation approach.

3) Estimating correlations and calibrating a copula, if needed

Various measures of correlation exist and which one to use depends on the aggregation method (see next section). Generally, one of the following two types of correlations need to be calculated:

- Pearson's correlations:** this is the most familiar type of correlation which measures linear correlation between two random variables.
- Spearman's rank correlations:** each random observation is assigned a rank and then the correlation between the ranks is calculated using the usual formula.

An example of a correlation matrix is shown below:

Risk		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interest rate PC1	(1)	1.0	0.0	0.0	0.2	-0.2	0.0	-0.3	0.0	0.0
Interest rate PC2	(2)	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest rate PC3	(3)	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Credit spread	(4)	0.2	0.0	0.0	1.0	-0.1	0.0	0.0	0.0	0.0
Equity	(5)	-0.2	0.0	0.0	-0.1	1.0	0.0	0.0	0.0	0.0
Mortality	(6)	0.0	0.0	0.0	0.0	0.0	1.0	-0.3	0.0	0.0
Persistency	(7)	-0.3	0.0	0.0	0.0	0.0	-0.3	1.0	0.0	0.0
Expense	(8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Counterparty	(9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0

The correlation matrix needs to be converted to Positive Semi-Definite (PSD), so the correlations are mutually consistent.

If multivariate approach is used, calibration of a copula will also be required (see next section).

3. Aggregation

Having calibrated the risks, the next step is to decide how to use those risk distributions to calculate the EC.

This will perhaps be the most important decision to be made for developing an EC model. Broadly, an IM is generally of one of the following two types: the one that uses a correlation matrix, or using a multivariate technique.

(A) Correlation matrix approach

Under this approach, the balance sheet of the insurer is re-calculated by changing one assumption at a time, from their base value to the calibrated 99.5th percentile value. The loss, which is the decrease in surplus (i.e. decrease in excess of assets over Technical Provisions), is calculated.

These univariate losses are calculated for each risk measure. The losses are then aggregated using a correlation matrix. A simplified example is shown below:

Risk	99.5 th ile loss
Interest rate PC1	35,000
Interest rate PC2	15,000
Interest rate PC3	5,000
Credit spread	20,000
Equity	45,000
Mortality	15,000
Persistency	10,000
Expense	2,000
Counterparty	1,000
Sum of standalone risks	148,000
Diversification benefit	(89,690)
Economic capital	58,310

The aggregation is based on the correlation matrix in the previous section.

The correlation matrix approach has the primary advantage that it is easy to follow and implement. However, it suffers from several drawbacks:

- This method assumes that the loss functions follow normal (to be precise, elliptical) distributions. However, most risks do not follow a normal distribution and the corresponding loss functions will be non-normal as well. Therefore, separate adjustments will generally be required to allow for non-normality and the magnitude of this adjustment can be quite significant.

¹A distinction must be drawn between a risk distribution and a loss function for that risk. While the former is the probability distribution of the risk measure chosen to represent that risk, the latter is the distribution of losses when the balance sheet is subjected to changes in the corresponding risk measure. Loss functions, rather than risk distributions, are used for aggregation.

- Normal distribution is a thin-tailed distribution, which means it tends to under-estimate losses that are of low frequency, but high severity. Therefore, the correlation matrix approach is likely to understate the EC.
- The 99.5th percentile point of the loss distribution is all that matters. Rest of the distribution is not usually used.
- It makes no allowance for increased correlations between risks in times of stress (also referred to as 'tail dependence').
- It is assumed that there are no interactions between risks.
- It is assumed that losses vary linearly with the risk measures.

Also, note that:

- The correlations used in this method should be the Pearson's correlations.
- If the correlation matrix approach is used, the process of estimating capital requirements essentially ends here, except if making adjustments such as non-linearity and non-normality.

(B) Copula approach

A more advanced alternative to using the correlation matrix approach is to use a copula for aggregating the risks.

A copula can be thought of as a 'multivariate probability distribution' of all risk measures together. In other words, it is the combined distribution of all marginal (i.e. individual) risk distributions. Since the marginal distributions can be combined in several ways, there could be multiple copulas for the same set of marginal distributions; e.g. Gaussian copula, t-copula etc.

Despite the increased complexity, the copula approach offers the following advantages over correlation matrix approach are:

- There is no need to assume that the risk distributions are normal. The risks can follow any distribution.
- With the right choice of a copula, the method can deal with the increased correlations between risks in times of stress.

Aggregation using a copula works as follows:

- Calculate **rank** correlations between the chosen risk measures by analysing the past data. These correlations between risk measures are referred to as the 'input' correlations.
- Choose a copula for aggregating the marginal risk distributions. For example, a t-copula, which allows for interaction between risks in times of stress.
- For using t-copula, a parameter called degrees of freedom needs to be calibrated. This can be done by carrying out a multivariate regression on all the risk measures together.
- The next step is to produce a large number of correlated scenarios using the calibrated copula. This can be done by generating random numbers from a uniform distribution for each risk measure, and applying Cholesky decomposition to the correlation matrix to produce correlated random numbers between 0 and 1. The correlated uniform random numbers are then inversed back into values of corresponding risk measures.

An example of the output produced from a copula simulation is as follows:

#	Interest rate PC1	Interest rate PC2		Equity	Mortality	Persistency
1	0.5	0.35		+5%	+3%	-5%
2	0.2	-0.10		-7%	-1%	+1%
....						
n	-0.1	0.10		-12%	+5%	-3%

Table: Example of the scenarios produced using a copula

4. Monte Carlo simulation

Monte Carlo simulation will not be required if the correlation matrix of aggregation has been used. It is used to construct the entire loss distribution of the insurer under a copula approach.

The output of the copula process is a set of scenarios (iteration); each scenario represents a set of values of 'all' risk measures, like drawing observations from a multivariate distribution. The balance sheet of the insurer is recalculated under each scenario.

Scenario #	Loss
1	5,000
2	-2,000
....	
n	7,000

Table: Calculated losses under each scenario

The output of the Monte Carlo simulation is the overall loss distribution (referred to as Probability Distribution Forecast under Solvency II). EC is calculated as the loss at 99.5th percentile as shown in the chart below:

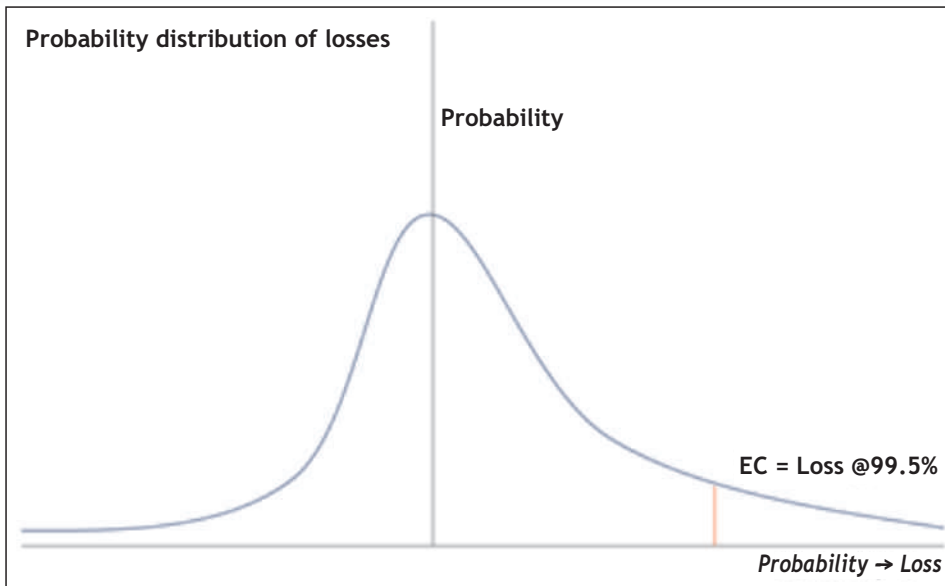


Figure 1: Probability Distribution Forecast (Loss distribution)

Proxy modelling

Monte Carlo simulation involves recalculating the value of liabilities and assets under potentially several hundred thousand scenarios. While asset values can be readily calculated under each of these scenarios, performing liability valuation under each scenario is likely to be impractical, given the computing power currently available. This is where the concept of proxy modelling comes into picture.

The idea behind proxy modelling, is to replace the liability models by polynomial functions. These polynomial functions are referred to as 'proxy models' or 'light models'.

For distinction, the liability models themselves are referred to as 'heavy models'.

Constructing the proxy models involves the following steps:

- Decide on the level of granularity of proxy models - how many proxy models need to be developed. Proxy functions are usually developed for each product line, and/or any other category deemed to be homogenous in terms of risk characteristics.
- Decide which risk measures will feature in each proxy model. Each proxy model may contain tens of terms. Each term either represents the impact of a risk measure (e.g. Ax^3 , A is the coefficient of the term and x is a risk measure), or the impact of an interaction between risks (e.g. Cx^2y). An example of a proxy model having just two risk measures (x and y) is shown below:

$$Liability = Ax^3 + By^2 + Cx^2y + Dxy^2 + K$$

- Specify calibration and validation scenarios for which the exact liability valuation will be performed using the heavy models. Calibration scenarios are used for calibrating the proxy functions and validation scenarios are used.
- Calibrate the proxy functions (i.e. estimate the coefficients and order of the polynomials) and assess the accuracy of fit.
- If the quality of fit is found to be inadequate, repeat the process by changing the order of the polynomial, recalibrate and re-validate.

Concluding remarks

Building an Internal Model for EC is a long journey. The first step is to have a clear line of sight of the process and having a vision of the outcome, which is the main focus of this paper. Many important decisions need to be made along the way. All these issues and challenges cannot be discussed in one paper, but with the high-level overview provided in this paper, the readers can get a sense of what the journey is going to look like.

Calculation of other aspects of the EC balance sheet are due for the next article.

About the Author



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“Nasrat is a qualified actuary and a Partner at Numerica.”

About us

ICICI Prudential Life Insurance Company Ltd. (ICICI Prudential Life) is a joint venture between ICICI Bank Ltd., one of India's largest private sector banks, and Prudential Corporation Holdings Limited. ICICI Prudential Life began its operations in fiscal year 2001 and has consistently been the market leader* amongst private players in the Indian life insurance sector.

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Parametric Insurance – An Innovation Relevant For Today's India

Introduction



Innovation holds the key to the future - even in a traditional business like Insurance!

It's not a secret that despite best of intentions, plans and actions, General Insurance has not flourished in Africa, South America and Asia. For example, cost of natural disasters to some of the world's poorest countries, in the last decade or so, has averaged around USD 29 billion a year. Insurance has only paid for 3 % of the average cost (or USD 900 million) of earthquakes, droughts or floods in 77 low and low-middle income countries leaving the untapped opportunity of USD 6.8 billion. Reason for not being so successful could be attributed to (1) Costly premium with respect to average earning levels in these parts, (2) Products to suit local needs (3) Complexity of intangible products as perceived by public in general (4) Gap in execution speed in promise vs. real action (5) Numerous instances of Claim rejections. To some extent, innovative Parametric Insurance holds the promise to address these.

Parametric insurance is similar to normal insurance, in that in return for a yearly premium, insured gets a pay-out if the event takes place. The key difference is that instead of making payments based on assessment of losses post the event, it makes the payments automatically based on pre-agreed triggers. Triggers are nothing but specified intensities of the natural disasters in a specified location measured by an independent agency. In other words, parametric insurance does not indemnify the pure loss. This principle can be applied to any risk where the outcome of the risk can be linked to an index of parameters (e.g.

in case of agriculture insurance) or just one or group of parameters. In most cases, these triggers are modelled and monitored by neutral third party organizations.

In parametric insurance contract, the insured buys a 'specified amount of protection' to be paid out (defined in advance or at the outset) either as per pre-defined terms and conditions or corresponding to degree of event that may occur. Thus, term 'protection buyer' seems more relevant than the concept of a 'Cedant' in the case of parametric insurance.

How it works?



Following examples of natural perils can help us better understand how parametric insurance works:

1. Flood: A threshold payment will trigger if the parameter (flood height in metres) reaches a certain pre-specified level. This threshold may vary in terms of distance (whether the farms are closer or farther from the affected area). Normally the data provided for the trigger would be a third-party organization, in this case a weather station.

2. Earthquake: The payment trigger is Richter scale magnitude. The insurance cover can vary depending upon the distance from the epicentre of the quake up to a specified distance.

Evolution and Current landscape of Parametric Insurance



Parametric insurance evolution dates

to late 1980s and early 1990s while catastrophe bond market was in nascent stage. While it is still predominantly used for risks emanating from natural catastrophes, in recent times the importance, relevance and acceptance of parametric insurance is gaining momentum for most lines of business - from retail to energy. Initially, being perceived as most cost-effective insurance model, parametric insurance found more takers in developing countries. Off late, technological advancements have made it relevant and effective for all. Today, parametric solutions are being bought and deployed increasingly far and wide - in public sector, in developing markets, by corporate clients across the globe. Following are the examples of successful application of parametric insurance transactions;

1. Caribbean Catastrophe Risk Insurance Facility (CCRIF): CCRIF can be considered as one of the world's first multinational parametric insurance arrangement. It's owned and run by Caribbean governments, provides insurance policies directly to the participators (mostly governments or government departments) with the aim to limit the financial impact of earthquakes and hurricanes in the region by offering short-term liquidity. Swiss Re, as one of the cover providers, is commercially and strategically linked with the CCRIF.

2. Spanish Olive growers: ASAJA-JAÉN is a Spanish organization which works in the interests of the agriculture industry. They recently secured a weather insurance to protect the livelihood of the farmers as, olive trees are highly susceptible to extreme temperatures.

3. Chinese green energy: China is currently the largest producer of renewable energy. In order to protect its interest & continue this growth, the

Chinese government took index-triggered insurance cover to protect the value of shareholder's investments. In Oct'16, Chinese government sealed an agreement with Swiss Re to provide parametric insurance of USD 350Mn against tropical cyclone and excess rainfall.

4. Mexico (Multi-cat Platform):

Mexico is highly exposed to earthquake & hurricane events. A USD 300Mn Cat Bond issued under the 2012 Multi Cat Program provided pay-outs after hurricane Patricia hit in October 2015.

Value propositions of Parametric Insurance



Parametric insurance is more suitable for low-frequency but high-magnitude losses such as Catastrophe losses, Weather-related Agricultural and/or Economic losses. A Parametric cover offers a higher level of satisfaction due to the predictability of pay-out. Key benefits of obtaining a parametric cover are;

- **Reduced transaction costs for Insurers** - due to lesser need for actual loss assessment, less underwriting, less rating requirements and less litigation.
- **Cheaper Cover** - due to reduced claim cost, transaction cost, defence cost etc., it's cost-effective than indemnity reinsurance/insurance.
- **Speedy pay-outs to insureds:** Formula based payment and use of triggers increases claim settlement speed. The faster pay-outs work well for both - (a) Investors who provide cat bond cover in capital markets and (b) public sector buyer who needs cash-flow soon after a calamity. Investors prefer the short-term horizon as well as the relative ease of estimating the odds of paying out.
- **Less Scope of Litigation** - due to clear triggers and pay out formulae
- **Higher satisfaction of protection**

buyers - due to cheaper cover, faster payment, lesser disputes

▪ **Makes Reserving Easier:** Parametric deals can be settled much faster, in days or weeks, compared to traditional (re) insurance which may take weeks, months or sometimes even years to finally close the payments.

▪ **Easy to get investment:** Akin to Insurance-linked securities, parametric triggers are easier to understand, are transparent and make portfolio diversification easier - features loved by Investors.

▪ **Demand surge:** This type of insurance also addresses the problem of rise in the prices for labour and rebuilding costs, since funds are available swiftly so that demands can be met beforehand.

Funding a Parametric Insurance Contract



Besides the usual shareholders funding, there are a few risk financing (risk transfer) products in the global insurance market, to fund parametric protection. It is important to select the right one or the right mix as, issues might arise at the time of disbursement of pay-outs. Various types of methods organizations have used to provide capital for this kind of cover are;

1. Insurance Linked Securities: Catastrophe bonds, Weather derivatives & other collateralized reinsurance covers provide an alternative source for funding linked to the capital market. Cat Bonds & Weather derivatives have their respective triggers based on the specified parameters and pay-outs are made accordingly if threshold is reached. Recently, IRDA has started showing interest in these alternative risk transfers in order to provide cover for catastrophes and other weather related events.

2. Insurance Risk Pools: A multi region risk pool which caters to the

insurance coverage need of the members of the pool through traditional & capital markets. It is supported by a network risk modelling, brokerage, asset management, IT etc. (e.g. Caribbean Catastrophe Risk Insurance Facility)

3. Contingent Risk Capital:

Contingent capital is made available through an options contract which is exercisable if both parties agree on the pre-specified trigger (here trigger refers to a financial loss & not insurance loss, since this is a financial security).

Challenges and Role of an Actuary



No doubt, Parametric cover is cheaper than indemnity insurance but, lower prices can stem the greater risk (known as 'basis risk') that a policyholder may not recover their actual losses from a disaster.

Basis risk is one of the key hurdles in future development of the parametric insurance. It gains prominence when the real losses and index measurements differ significantly. In some cases, if the investors feel that the triggers are not severe enough, they may even decline to allocate capital. On the other hand, the insured might be anxiously waiting for payments. Reason for such deviation could be poor product design (including inaccurate cat risk modelling) or other geographical elements. If the actuaries can come up with work around solutions to address 'basis,' there is a lot of potential for the market. One of the possibilities could be that a captive or any other SPV funded by stakeholders bears this risk, instead of the policyholder absorbing it. Other innovative solutions are needed of the hour.

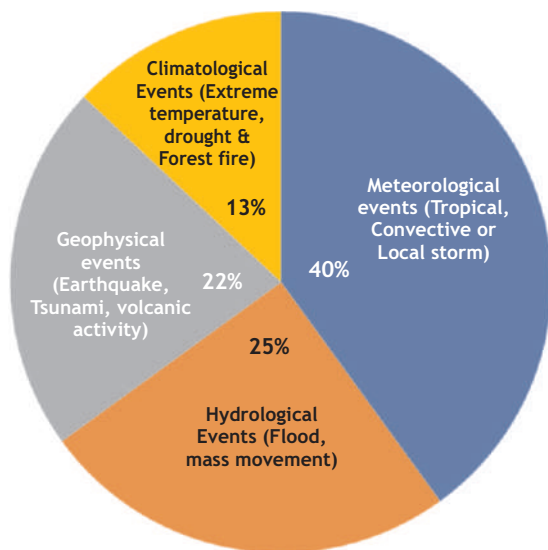
Understanding the relation between (a) probable financial and/or economic losses to the insured/ protection buyer and (b) conditions that can be used as triggers is of topmost importance. It's actuaries' responsibility to understand

the conditions comprehensively so that a trigger capable of providing very accurate protection can be designed and appropriate payments are made right at the occurrence of conditions causing the loss, either insured or economic.

Selecting the right, trustworthy and proficient reporting agency or station to provide the parameters for the triggers is also vital. Actuaries have a role to play here too.

Future of Parametric Insurance

Worldwide data by Munich Re's NatCat Services suggest that, approx. 21,700 catastrophic events occurred between 1980-2014, causing more than USD 4,200 billion in losses (Inflation adjusted). Break up of events are given in the picture. Out of the total losses only 25% (USD 1100bn) losses were insured. Apart from property losses, approx. 1.15 million people lost their lives between 2003-2013 leaving behind dependents with no livelihood.



Worryingly, due to global warming and related reasons, number of such events has been going up steadily and is showing no signs of slowing down. Thus, Parametric insurance is not only going to stay but, will gain in relevance, importance and market share. Following are some of the works taking place which will define future space for parametric products:

Millions of weather observations are being processed daily by high-

performance supercomputers at advanced meteorological offices across the globe who are using advanced atmospheric models to churn more accurate forecasts. Using these validated forecasts, risks related to climate can be modelled more precisely. Finally, these more potent climate models can be used to design and offer better disaster risk management products.

Forecast insurance is a great example of effective collaboration between early warning system and a catastrophe cover. This variation of 'Index insurance' offers insureds resources to initiate the preparation for impending emergency (e.g., boosting up infrastructure, removing the silt or cleaning up choked drainage systems, increasing food stocks, etc.) prior to the real shock. Thus, helps reducing the potential impact of the disaster, physically as well as financially.

Besides, work is in progress to develop parametric insurance mechanisms that can moderate risks emanating from a drought, and to ensure that the most vulnerable people benefit from climate risk protection.

Parametric protection providers are studying/testing new perils such as, business interruption or contingent Business Interruption. Deepwater Horizon/Macondo oil spill in 2010 offered another opportunity for application of parametric insurance in energy contracts. Munich Re is using number of direct compensation claims made against the insured as a parametric trigger in their proposed \$10 billion SOS facility for offshore energy clients.



Better defined and potent triggers are being designed. Triggers like, (a) temperature, (b) rainfall or soil moisture, (c) total rainfall, (d) hurricane wind speed, (e) hurricane minimum central pressure, (f) geographic location of a storm etc. are being complemented/replaced by 'cutting edge data intensive triggers' like (g) vegetation indices created by measuring biomass via satellites or (h) actual meteorological conditions measured by satellites or weather stations.

Summarily, considering (1) the weather conditions, events and its aberration in last 3-4 years and (2) features, utility and value proposition that parametric insurance offers, it holds unparalleled importance and relevance for Indian Insurers as well Indian Government. And, it will continue to do so for the coming decade!

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Frasier Method for the Calculation of Mortality of Joint Life 2nd to Die Policies

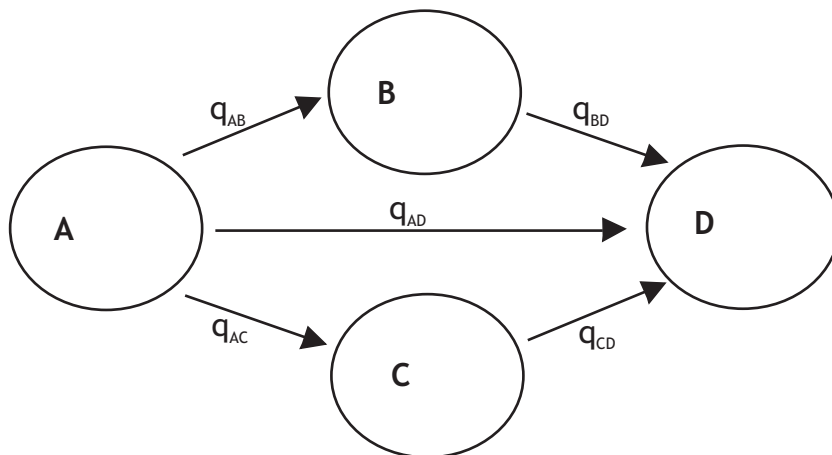
Background:

A joint life 2nd to die option is commonly offered with assurances and annuities in many life insurance markets like India, UK and the US. Such policies have two policyholders and the benefit is contingent on the death of both. For example, if it is a joint life term policy held by a husband and wife, the death benefit is paid on both being deceased. Similarly for a joint life annuity policy, the annuity payout occurs while either one of them may be alive. The benefit is tailored for the following purposes:

- 1) To pay inheritance expenses and taxes (in countries which have the same), and hence keep property inherited by dependant children intact.
- 2) As an estate planning tool to even out inheritance given to multiple dependants.
- 3) To fund education requirements and living expenses of dependent children in case both parents are earners.
- 4) In case of annuities, to ensure that the surviving spouse receives an income.

Joint life 2nd to die assurances are also cheaper than the single life option, as the death outgo is expected at a later date. Calculating the mortality rate for these policies may be approximated using alternatives like the mortality of the first life and the product of mortalities of both lives. However, as we will see in this paper, both are not equal to the Frasier method[1] which is an accepted method in most US states by regulation[2]. This paper first explains the theory, followed by an example and then will analyze the result from the example.

Theory:



Assuming that both lives are independent, we can draw a Markov diagram for the 4 states that the policy can exist in, along with their transition probabilities.

A is the state in which both policyholders are alive, and also the state when the policy is bought.

B is the state in which the first policyholder is still alive, but the second policyholder has died.

C is the state in which the first policyholder has died, but the second policyholder is still alive.

D is the state in which both policyholders are dead.

If the policy is in states A, B and C it is considered to be in-force. The number l_x of such policies are,

$$l_x = (l_A + l_B + l_C)$$

Any transition to state D represents an event the benefit is contingent on. The number of “deaths” are:

$$d_x = (l_A \times q_{AD} + l_B \times q_{BD} + l_C \times q_{CD})$$

Mortality rate can be derived as:

$$q_x = d_x / l_x = (l_A \times q_{AD} + l_B \times q_{BD} + l_C \times q_{CD}) / (l_A + l_B + l_C)$$

Example:

Assume a joint life policy whose first life is male and second life is female both of age 45. Assuming 100% of the IALM 2006-08 table as mortality rated up by one year for males and down by one year for females. Let us calculate mortality

according to 3 methods a) Frasier mortality b) First life mortality c) Product of mortalities

Sample calculation for the Frasier method for 5 years is given in the table below:

Age	q_{male}	q_{female}	q_{AB}	q_{AC}	q_{AD}	q_{BD}	q_{CD}
45	0.00320	0.00259	0.00258	0.00319	0.00001	0.00320	0.00259
46	0.00357	0.00287	0.00286	0.00356	0.00001	0.00357	0.00287
47	0.00398	0.00320	0.00318	0.00397	0.00001	0.00398	0.00320
48	0.00444	0.00357	0.00355	0.00443	0.00002	0.00444	0.00357
49	0.00495	0.00398	0.00396	0.00493	0.00002	0.00495	0.00398
50	0.00548	0.00444	0.00442	0.00546	0.00002	0.00548	0.00444

Age	L_A	L_B	L_C	L_D	L_x	d_x	q_x (Frasier)	q_x (First life)	q_x (product of mortalities)
45	1.00000	-	-	-	1.00000	0.00001	0.00001	0.00320	0.00001
46	0.99422	0.00258	0.00319	0.00001	0.99999	0.00003	0.00003	0.00357	0.00001
47	0.98782	0.00542	0.00672	0.00004	0.99996	0.00006	0.00006	0.00398	0.00001
48	0.98074	0.00855	0.01062	0.00009	0.99991	0.00009	0.00009	0.00444	0.00002
49	0.97290	0.01199	0.01492	0.00018	0.99982	0.00014	0.00014	0.00495	0.00002
50	0.96424	0.01579	0.01965	0.00032	0.99968	0.00020	0.00020	0.00548	0.00002

Formulas used for the columns:

$$q_{AB} = (1 - q_{\text{male}}) \times q_{\text{female}}$$

$$q_{AC} = q_{\text{male}} \times (1 - q_{\text{female}})$$

$$q_{AD} = q_{\text{male}} \times q_{\text{female}}$$

$$q_{BD} = q_{\text{male}}$$

$$q_{CD} = q_{\text{female}}$$

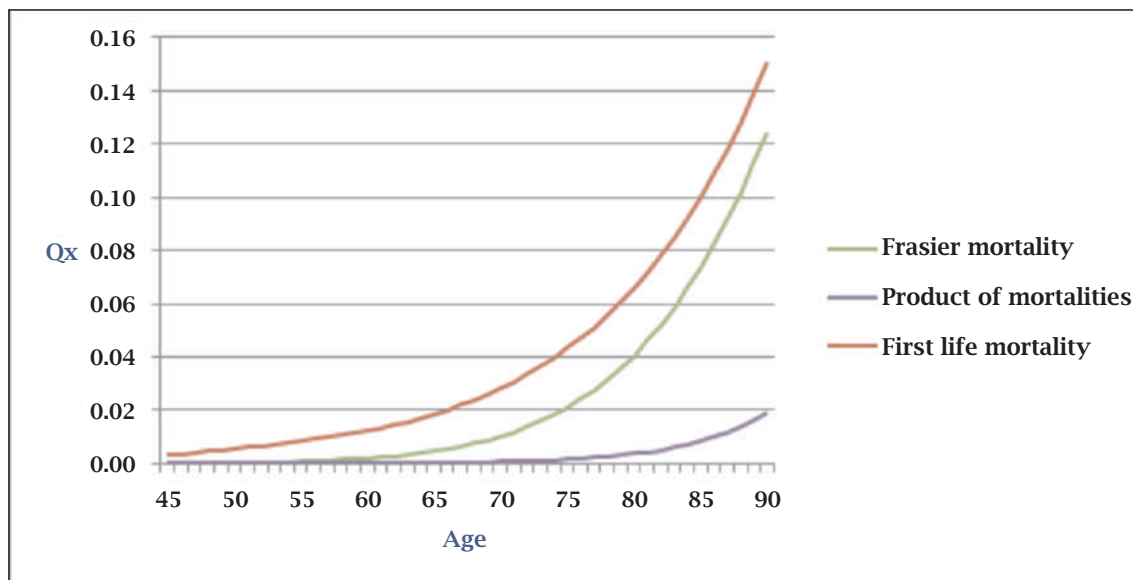
$$l_A = l_A (\text{last year}) - l_A (\text{last year}) \times q_{AB} - l_A (\text{last year}) \times q_{AC}$$

$$l_B = l_B (\text{last year}) + l_A (\text{last year}) \times q_{AB} - l_B (\text{last year}) \times q_{BD}$$

$$l_C = l_C (\text{last year}) + l_A (\text{last year}) \times q_{AC} - l_C (\text{last year}) \times q_{CD}$$

$$l_D = l_D (\text{last year}) + l_A (\text{last year}) \times q_{AD} + l_B (\text{last year}) \times q_{BD} + l_C (\text{last year}) \times q_{CD}$$

Result till Age 90:



The graph shows the results calculated by the three methods till age 90. The first life mortality is higher than the Frasier mortality and hence is more prudent for assurances and optimistic for annuities. On the other hand, product of mortalities is lower than the Frasier mortality and is prudent for annuities and optimistic for assurances.

Enhancements:

The above method is based on the assumption that both lives are independent, which is not true because:

- There is a chance of simultaneous deaths due to common accidents and diseases. This could be accomplished by applying a factor (of say 150%) to q_{AD} .
- The mortality of the surviving life continues to be higher for a few years after the other has died. These could be accomplished by applying a factor (of say 150%) to q_{Bd} and q_{Cd} for those years.
- there is a change in discontinuance rates for assurances after the first death [3].

These modifications may be used by companies if they are comfortable with the additional complexity and assumption setting.

Conclusion:

Longevity is currently a pertinent risk, as mortality improvement has increased faster than expected, leading to lesser profits in Annuity products in many developed markets. Estimating mortality for Joint Life 2nd to die is important as an assumption in pricing, valuation and other reporting, and the calculation of mortality charge for linked assurances. This can be accurately done by adopting the Frasier method.

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Hong Kong



This country report provides an update on some key areas of the HK insurance industry, in particular:

- An overview of the actuarial society (Actuarial Society of Hong Kong)
- An update on a recent guidance note issued on fair treatment of customers

Part 1: Overview of the Actuarial Society of Hong Kong

The Hong Kong actuarial profession body was firstly formed in 1968 as the Actuarial Association of Hong Kong (AAHK) and, 26 years later, its successor, the Actuarial Society of Hong Kong (ASHK) was duly incorporated in January 1994. The ASHK is a membership organisation for actuaries in the industries of insurance, consultancy, government and education institutes.

The ASHK is governed by an elected Council with President, Immediate Past President, Vice President and 10 Council Members who volunteer on special interest committees. The term of office of the President is one year and afterwards in the capacity of Immediate Past President for another year, term of office of the Vice President is one year, and that of each Council Member is two years.

Membership

There are 4 main classes of members in the ASHK, namely Honorary Members, Fellow Members, Associate Members and Student Members. As at January 2017, there were 1,179 members including 3 Honorary Members, 761 Fellow Members, 145 Associate Members and 270 Student Members.

In contrast to the Indian institute, a vast majority of the members are Fellow members who obtain fellowship with ASHK through mutual recognition of Fellowship with another society, primarily the Institutes in UK, US or Australia.

Objectives

The objectives of the ASHK are to increase the value to the community of the actuarial profession, and to encourage and assist the study of actuarial science statistics and any other subjects of interest to members of the actuarial professional. In addition, they also seek to promote the general efficiency of, to uphold standards of professional conduct among members and to regulate the practice by its members of the profession of actuary by issuing from time to time as and when necessary guidance notes and other forms of guidelines or directions.

The ASHK also discusses and comments on the actuarial aspects of public, social and economic and financial questions which from time to time may be the subject of public interest, and considers the actuarial aspects of legislation existing and proposed and to take such action as is considered desirable.

Activities

To achieve these objectives, the ASHK undertakes a number of activities for members, including:

- Discussion with industry and regulatory bodies on relevant topics
- Formation of specialist committees on actuarial related topics
- Issuing Professional Standards and Actuarial Guidance Notes to members
- Publication of regular newsletter on actuarial matters in Hong Kong
- Circulation of actuarial job advertisements
- Luncheon meetings/evening talks/seminars to encourage the sharing of information and ideas.

In addition, Appointed Actuaries Symposium are held, where appointed actuaries have the opportunity to discuss matters relating to the life insurance market in Hong Kong. ASHK also organizes an Investment & Risk

Management Symposium/Conference where senior actuaries have the platform to discuss current issues relating to risk management and investment challenges affecting insurance and reinsurance markets in Hong Kong.

Part 2: GL16 - Guideline on Transparency and Treating Customer Fairly (TCF)

This part of the country report briefly summarizes the recent major development in Hong Kong Life Insurance Industry in the area of underwriting Long Term Insurance Business (other than Class C business). The Class C business ("linked long term") is being underwritten by another guideline "GL15 - Guideline on Underwriting Class C Business". More details about classes of long term business can be referenced from "Annex 4" of the "GL5".

A Guidance Note named as "Guidance Note On Underwriting Long Term Insurance Business (other than Class C business)" (i.e. "GN16") has been issued by the Office of the Commissioner of Insurance in Hong Kong to promote transparency and fair customer treatment. Subsequently, it is named as GL16 (Guideline 16) under the new regulator Insurance Authority ("IA") in Hong Kong.

GL16 applies to all authorized insurers in Hong Kong. It embraces various Insurance Core Principles, Standards, Guidance and Assessment Methodology promulgated by the International Association of Insurance Supervisors. Reference as needed could be drawn from other relevant codes/circulars/guidance notes issued by IA or other regulatory bodies.

The compliance with GL16 applied to all new products from 1 April 2017 and new and existing policies of current products from 1 July 2017.

The key products being affected are the participating products and universal life products. It requires the insurer to consider the policyholder's reasonable expectation ("PRE") with due care by implementing appropriate Board approved corporate policy that describes management of non-guaranteed benefits and enhancing transparency by the disclosure requirements for non-guaranteed benefits in illustration at point-of sale and during policy life. It is the duty of the Controller, the Appointed Actuary and the Board to ensure that such PRE is met. It is a continuing duty of the Appointed Actuary to advise the Board of his or her interpretation of PRE.

The key requirements could be summarized as below:

Product Design

- ♦ Insurers should perform diligent review to ensure product developed and marketed continues to meet TCF principle, including sustainability of product, needs and affordability of target customers, risks of product and distribution channels for product, product features and fees/charges, insurance elements, added value/services and remuneration structure etc.
- ♦ Fees and charges should be fair, proportionate to the benefit and reflect services/added value.

Provision of Adequate and Clear Information

- ♦ Insurers should provide customers with clear, adequate and appropriate information at all stages.
- ♦ Product information should be bilingual, clear and succinct, with the use of plain language and legible font size, and should be easily understandable by average customers. Insurer should use warning statements and other tools (e.g., FAQs) where appropriate to increase customer awareness.
- ♦ Key relevant product risks should be included in the product brochure and marketing materials.
- ♦ The benefits illustrated must be comprehensive and not misleading. The requirement to disclose in insurer's website fulfillment ratios for participating products and the

historical crediting interest rates for universal life products, which has issued new policies during a specified time frame.

- ♦ The key factors affecting the determination of policyholders' dividends/bonuses must be disclosed.

Suitability Assessment

- ♦ Customers' needs should be properly assessed by verifying all available information and using the Financial Needs Analysis (FNA) form as applicable.
- ♦ Insurers should endeavor to reduce the risk of selling products that do not meet customer's needs by taking measures such as strengthening training to intermediaries, properly assessing affordability and suitability of products, and providing tools to facilitate suitable product recommendation.

Advice to Customers

- ♦ Insurers need to ensure employees and agents are adequately trained to act with due skill, care and diligence and the advice given to customer goes beyond the provision of product information and relates to the disclosed needs of the customer.
- ♦ When the customer is considering and is beginning to consider an insurance policy, he/she should be properly informed of all product features, including fees and charges, product risks and key exclusions.

Appropriate Remuneration Structure

- ♦ Remuneration structure should follow the TCF principle.
- ♦ It is strictly prohibited to provide commission in advance or on an indemnity basis.
- ♦ Insurers should put in place clawback of commission mechanism applicable in case of fraud / money laundering / mis-selling.

Ongoing Monitoring

- ♦ Any conflicts of interest should be managed appropriately through disclosure and informed consent from customer.
- ♦ Insurers must service a policy appropriately until all obligations

have been met and disclose to policyholders any contractual changes as well as further relevant information.

- ♦ On-going communications with policyholders should be maintained at least annually (projections for non-guaranteed benefits in anniversary statements).
- ♦ Insurers should put in place a proper mechanism to monitor the products after launch.

Post-sale Control

- ♦ Insurer should have proper control systems to achieve and monitor the adherence to TCF principles.
- ♦ Insurers must follow prescribed process for post sale confirmation to protect vulnerable customers.

The appendices to this guideline elaborate on the requirements applicable to the participating and universal life policies. A "Questions and Answers" have also been issued to help insurer with clear interpretation and implementation of this guideline.

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