
IFRS Insurance Contract Valuation

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PROJECT OVERVIEW

This project focuses on the approaches applied in IFRS regarding the measurement of insurance liabilities for insurance companies. There are three building blocks in the measurement approach for insurance contract: cash flows, time value of money and a margin. The content of the project will be based on the actuarial methods applied in the two building blocks, cash flow and margin.

The two distinctive methods that will be considered are the Fulfillment method (entry value) and the Exit method. As for the measurement of risk margins, the two quantification methods in establishing risk margins that will be focused on are the “Quantile” method (Conditional Tail Expectation) and the Cost of Capital method.

IFRS stands for International Financial Reporting Standards. It is a set of principles-based global accounting standards developed by International Accounting Standards Board (IASB). Companies adapted to IFRS will have a globalization Accounting Standards that is compatible internationally.

There is an urge of convergence from GAAP to IFRS as more than 100 countries has accepted IFRS and it will be a huge disadvantages for companies in the U.S. internationally. Hence, a joint board of members of IASB and FASB have come together to analyze the details of the proposed convergence of IFRS and US-GAAP.

The objective of this project is to analyze the different method being considered for the measurement of Insurance Contracts in IFRS. Currently, In July 2010, an exposure draft for the Insurance Contracts in IFRS is issued by the boards with a target date that it will be effective in near future, probably year 2013.

The exposure draft highlights a single International Financial Reporting Standard to all insurers in all jurisdictions and is applied to all insurance contract types.

In the assessment of the insurance contract, the building block approach that is decided by the boards consists of:

- the unbiased, probability-weighted average (expected value) of future cash flows;
- the effect of time value of money; and
- a margin.

FULFILLMENT VALUE

The fulfillment value is the expected cost that insurer demands to fulfill the insurance obligations over time. It does not include the cost of bearing risk. Based on this method, upon inception, there is a possibility of experiencing loss on day 1 if the initial premium collected does not cover the insurance obligations. Hence, to eliminate this risk, a composite margin is calculated based on the difference between the expected premiums collected and the estimated cost of fulfilling the contracted obligations. This margin is then included into the initial premium to eliminate loss/profit on day 1. The margin is considered as profit over time and will be amortized systematically over time as the exposure risk decreases.

EXIT VALUE

The Exit value is the price that an insurer is willing to pay to transfer the present insurance obligations to another party. It is the discounted value of the expected cash flows of the insurance liabilities. The risk margin for Exit value is the unbiased estimation of the margin that the other party requires for obtaining the insurance obligations.

Exit value is not favored by insurance companies as it is commented that the method doesn't reflect actual cash flow due to the fact that the observed value of life insurance liabilities are hardly available in the market. Most of the transfer of the insurance obligations is often settled by paying the policyholders the policy benefits when it is due.

FULFILLMENT VALUE VS EXIT VALUE

The two approaches that are considered: Fulfillment value and Exit value are actually quite similar in the estimation of the liabilities. Both of the methods apply the three building approaches that are discussed earlier. The calculation of the cash flows and time value money are relatively consistent except for margin.

BUILDING BLOCK: CASH FLOWS

This building block considers all the cash flows arise from the transaction of the current existing insurance contracts. The financial market variables used for the measurement should be consistent with the observable market price. Also, this estimation should be probability-weighted to obtain an unbiased estimation of the cash flows.

BUILDING BLOCK: TIME VALUE MONEY

The Discount Rate applied in the measurement of the time value money is the main discussion in the joint meeting of the boards. According to the exposure draft released by the boards, it is decided that the discount rate used in the measurement should reflect the characteristics of the contracts, not the assets. This means that the discount rate applied should be a risk-free rate regardless of the performance of the assets. Unless the expected cash flows depends solely or partially to the performance of assets (if dividends or interest depends on the performance of the investment) then only the discount rate applied should be adjusted accordingly.

BUILDING BLOCK: MARGIN

The main difference would be the calculation of the margin in each method. Fulfillment value has only one component of the margin: a single composite margin. While Exit value separates the margin into residual margin and risk margin.

DIFFERENCES IN THE METHODS

Both fulfillment method and exit method converges if market inputs such as mortality, morbidity or expenses are available. However, the exact mortality table and the expenses of an insurance company are hardly available in the market. At this point, both methods will produce different measurement of the liabilities.

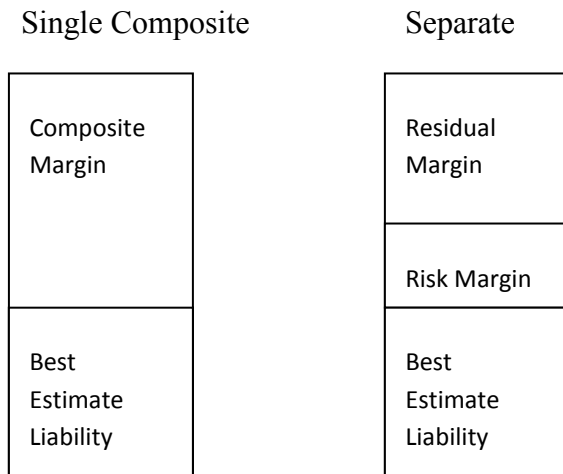
The Exit value applies Reference Entity cash flows but Fulfillment value applies Entity-Specific cash flows. This implies that the expected cash flow of a highly rated, diverse, hypothetical company is incorporated in the Exit value approach but Fulfillment Value would apply the specific expected cash flows of the insurer. Since the expenses and mortality table for each insurance company is often unavailable in the market, it is hard to assume the cash flows of a reference entity making the Exit value approach rather challenging and irrelevant.

The difference in the recognition of the credit standing of the liability in deciding the discount rate is another key difference in both methods. Fulfillment value does not recognize the credit standing but Exit value does. This would significantly affect the discount rate applied for the calculation of time value money which would result in different valuation of the insurance liabilities.

MARGIN

Margin is the allowance for the uncertainties in the amount and timing of future cash flows as well as unforeseen deviations. Margin is required to be incorporated in the balance sheet of the insurance company to ensure solvency and to compensate the insurer for bearing the risk. There are many definitions for margin: profit margin, risk margin, risk allowance, so forth.

There are two approaches to the measurement of margins that are considered by the boards; a separate risk adjustment with a residual margin, or a single composite margin. IASB favors the separation of margin while FASB prefers a single composite margin. According to the boards, the third margin, service margin (the cost of providing insurance obligations) should be calculated individually.



SINGLE COMPOSITE MARGIN

This composite margin reflects the difference between the best estimated cost of the insurance obligations and the initial premium collected at day 1. It is calculated so that the risk of experiencing a loss is included in the initial premium to eliminated profit recognition at day 1. This single composite margin is equivalent to the combination of risk margin, service margin and residual margin.

Should a single composite margin is selected; the composite margin charged initially remains constant regardless of the fluctuation in the cash flow. This means that the price per unit of the risk will not change; it will always use the initial price upon inception.

This margin charged shall be systematically returned back to policyholders as profit over time. This is reasonable because over time, the exposure risk of an insurance obligation reduces, reducing the margin risk required.

FASB favors the amortization of the composite margin in two periods; the coverage period which is the duration where the insurance is enforced and the claims handling period which is the duration where a claim is paid.

The composite margin should be amortized back to policyholders using the amortization formula that FASB proposed:

$$\frac{\textit{Premium allocated to current period} + \textit{current period claims and benefits}}{\textit{Total contract premium} + \textit{Total claims and benefits}}$$

RESIDUAL MARGIN

Same as composite margin, the residual margin is the amount charged in the initial premium to ensure no profit upon inception. It is based on the day one difference, which is the amount that will eliminate profit on the first day of contract. Hence, this amount should never be negative. Likewise, residual margin should be amortized as time passed by.

SIMILARITIES IN RESIDUAL AND COMPOSITE MARGIN

Both the residual or composite margins serve as an adjustment on the first day of the contract term in eliminating the possibility of profit upon inception. Therefore, the value for both margins should not be a negative value. Moreover, both margins should be determined at a cohort level of aggregation. This means that portfolios of the insurance contracts are grouped according to the similarities in the duration (length of the contract) and the date of enforcement of the contracts.

RISK MARGIN

In short, Risk Margin is the profit margin that investors expect to gain in return for bearing risk. For regulators, risk margin keeps a company solvent as company is required to hold a certain amount of capital as reserve for unpredictable financial fluctuation. Conceptually, risk margin for an insurance company is the variance or volatility around the expected value of loss (liability).

The allocation of risk margin serves as a reserve for the financial uncertainties due to the unpredictable amount and timing of the cash flows. It also incorporates the uncertainties caused by the possibility of error in calculation, misestimate of assumptions, inaccurate assumptions of relationships between risk factors and some other random issues.

In reality, contracts with longer timeframe has higher risk margin in comparison to shorter duration contracts because there are too many unpredictable fluctuations till the maturing of the long-term contract. Higher uncertainties mean higher possibilities of losing/gaining value. This is the reason why risk margin is incorporated in premium.

Risk Margin techniques can be split into two basic categories, the Bottom-up approaches that apply to individual assumptions (“Quantile”) and the Top-down approaches that apply to aggregate results (Cost of Capital). Should a separate margin is exercised, IASB currently only considered three techniques in the measurement of risk margin; confidence interval; conditional tail expectation (CTE) and cost of capital. The two techniques that will be focused on are the Conditional Tail Expectation (CTE) method and the Cost of Capital method.

“QUANTILE” RISK METHOD¹

The Quantile Risk method is also known as the Value at Risk (VaR). This method is also named as quantile premium principle or quantile risk measure by actuaries. VaR is the calculation of the expected maximum loss that will occur with a certain level of confidence. The symbol for the confidence level is α with α defined individually but usually it is 95% or 99%; $0 \leq \alpha \leq 1$.

If α -VaR is \$200 with $\alpha = 95\%$, this means that we are confident with a probability of 95% that the expected loss will not exceed \$200.

For example,

For Normal Loss Distribution with ($\mu=20, \sigma=80$), the 95% quantile risk measure is $Q_{0.95}$

By using the formula for normal distribution, $\Phi\left(\frac{Q_{\alpha} - \mu}{\sigma}\right) = \alpha$

$$\Pr [\text{Loss} \leq Q_{0.95}] = 0.95$$

$$\rightarrow \Phi\left(\frac{Q_{0.95} - 20}{80}\right) = 0.95$$

$$\rightarrow \left(\frac{Q_{0.95} - 20}{80}\right) = 1.645$$

Therefore, $Q_{0.95} = \$151.6$

This means that we are 95% confident that the expected loss will not be more than \$151.60 for a loss distribution with mean \$20 and standard deviation of \$80.

¹ Source: Formulas are adapted from (Mary R. Hardy, 2006)

CONDITIONAL TAIL EXPECTATION (CTE)

CTE is also the calculation of expected value at risk (mean loss) based on a specified confidence interval and it is also a special case of “Quantile” risk measures which takes into consideration the events where the loss incurred actually exceeded the expected mean loss. It measures the ‘worst case’ scenario; the event where, with a probability of $(1 - \alpha)$, the expected loss is actually greater than the expected Value at Risk.

In practice, CTE is the cost of ruin measure. It is used for the calculation of the capital needed for expected loss and is used as a basis for solvency tests. It has been used for stochastic reserves and solvency for equity-linked like insurance. There are various names for CTE such as Tail Value at Risk (or Tail-VaR), Tail Conditional Expectation (TCE) and Expected Shortfall.

To calculate the Risk Margin with the CTE method,

- First, create a sample with a certain percentage of cases with the highest estimates,
- Then, based on the loss distribution model (Normal, Poisson, Pareto etc.) of the sample, calculate the average estimate of the sample (mean).
- The CTE Estimate is equivalent to the mean.
- Risk Margin is the difference between CTE and the current Estimate Loss.

$$\text{Risk Margin} = \text{CTE Estimate} - \text{Current Estimate}$$

MATHEMATICALLY ²

Let Q_α be the α -quantile of the mode; $Q_{0\%}$ is the minimum loss; $Q_{50\%}$ is the median loss, CTE_α is the CTE value at the confidence level α ,

For Discrete Loss Distribution, with $\beta' = \max\{\beta: Q_\alpha = Q_\beta\}$,

$$CTE_\alpha = \frac{(\beta' - \alpha)Q_\alpha + (1 - \beta')E[L|L > Q_\alpha]}{1 - \alpha}$$

For Continuous case, if the loss occurs above Q_α ,

$$CTE_\alpha = E[L|L > Q_\alpha]$$

In general, the CTE for continuous case is

$$CTE_\alpha = \frac{1}{1 - \alpha} \int_{Q_\alpha}^{\infty} yf(y)dy$$

OR

$$CTE_\alpha = Q_\alpha + \frac{1}{1 - \alpha} \{E[L] - (E[LQ_\alpha])\}$$

For Normal Distribution with (mean= μ and standard deviation = σ),

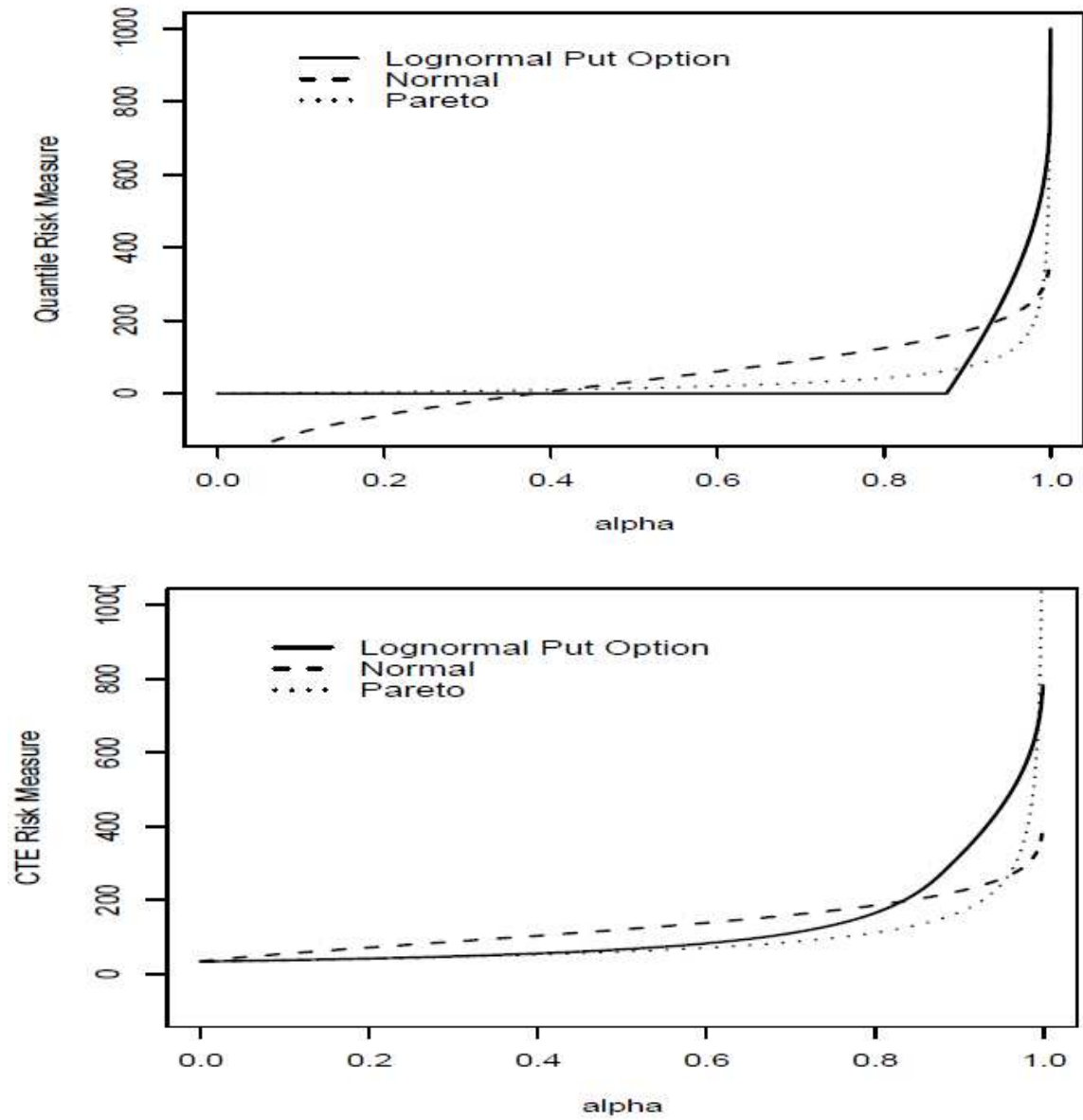
$$CTE_\alpha = \mu + \frac{\sigma}{1 - \alpha} \Phi\left(\frac{Q_\alpha - \mu}{\sigma}\right)$$

For Pareto Distribution with $\theta > 0$, $\gamma > 1$,

$$CTE_\alpha = \frac{\theta}{\gamma - 1} + Q_\alpha \frac{\gamma}{\gamma - 1}$$

² Source: Formulas are adapted from (Mary R. Hardy, 2006)

The following graphs depict the corresponding estimated loss value according to the desired confidence level.³



³ Source: These graphs are obtained from (Mary R. Hardy, 2006)

COST OF CAPITAL

The cost of capital (CoC) is the losses incurred in investment as companies are required by regulation to hold excess capital for solvency. Another way of saying is that it is the cost needed to transfer the liability to another party.

There are many ways to calculate risk margin via the CoC method, the first approach is the Solvency Capital Requirement standard.

SOLVENCY CAPITAL REQUIREMENT (SCR)

If the cost of capital is calculated based on the Solvency Capital Requirement (SCR) standard, then basically,

$$\text{Risk Margin Cost of Capital} = \text{Cost Rate} * \text{Capital Rate}$$

The Cost Rate applied is the difference between the expected investment return and the target return on insurance assets, therefore the calculation of the expected investment return will affect the measurement of the risk margin.

The advantage of Cost of Capital method based on the SCR standard formula is that this method is pretty straightforward, easy to understand and verify.

However, there are some disadvantages to it. It doesn't really reflect the actual transaction price between buyer and seller. Meaning it is not actually the market price but merely an estimation price.

SWISS SOLVENCY TEST (SST)

Another way of calculating the risk margin via cost of capital approach is the Swiss Solvency Test (SST).⁴

$$\text{Risk Margin Cost of Capital} = \text{CoC} \sum_{t=l}^{\text{run-off-period}} \frac{\text{SCR}_i(t)}{(1+i_t)^t}$$

(SCR is the solvency capital needed to maintain a business and i is the interest rate)

In this method, the risk margin is the summation of the discounted values of all SCRs required throughout the entire life span of the business, according to the interest rate respectively.

⁴ Source: Formulas are adapted from (Lantinga, 2007)

CONCLUSION

In the debate over the fulfillment value and the Exit value, it seems that in order for insurance companies to apply Exit value approach in the calculation of the insurance liabilities, the value of the insurance contracts need to be disclosed and available in the market. This is due to the fact Exit value relies on the market value of the insurance contracts. Otherwise, Exit value would be irrelevant as it doesn't reflect the actual transaction between the transfers of the insurance obligations.

The Fulfillment Value is much preferred by insurance companies however IASB argues that should this method is applied, the calculation and the methodology used to calculate the liabilities need to be specified explicitly.

The Conditional Tail Expectation (CTE) approach in the calculation of risk margin requires the accurate modeling of the loss distribution which is highly vulnerable to modeling risk.

The Cost of Capital (CoC) approach relies on the structure of the SCR calculation as well as the calculation of the future capital needed each year for solvency which could end up being costly and challenging for the insurer.

In conclusion, the convergence of IFRS to US-GAAP is inevitable as companies would be required to incorporate IFRS accounting standard in the balance sheet by year 2013.

The Board is expected to meet again next year June to further discuss the issues in discount rate and margin measurement.

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