

PREFACE

The Society of Actuaries of Indonesia has the honor to be the host of the 13th East Asian Actuarial Conference, held in The Weston Resort, Nusa Dua, Bali, on September 12-15, 2005. This is the second time Indonesia acting as a host of EAAC conference – the first was in 1991, also held in Bali.

As the theme of the conference titled “The Actuary at Risk”, numerous papers were presented by 32 speakers, covering the topics of social security, professionalism, education, insurance, including shariah insurance, pension and risk modeling.

This conference has been quite an interesting process of learning and sharing experiences and expertises which have enriched more than 250 participants who participated in the conference.

It is for this reason, all the papers presented in the conference were documented in this 559 pages document.

We hope that this simple book may be of beneficial source of reference for everyone, in the development of the actuarial profession around the world.

PAPERS HIGHLIGHTS

Overview

Dealing with risk is perhaps what the work of actuaries is about. Risks are present when insurance companies provide guaranteed benefit to policyholders over a certain period based on some estimation about future events. Similar risks are faced in the management of other financial products and pension funds. To deal with such risks, actuaries develop models to measure and manage risks.

Experience study is a fundamental step that allows actuaries to assess how good their model is, what improvement should be made for subsequent modeling works, and most importantly what cautious efforts should be taken to control risks.

Risk measurement forms the basis for risk management. For example, some safety margins on identifiable risks need to be considered in pricing new insurance contracts or setting up reserve for inforce business. At the company level, an economic capital needs to be determined and established to guard the company from insolvency. Reinsurance is a common and effective risk management tool which can optimize the use of a company's limited capital.

The New Indonesian National Social Security Law

The new Law promulgated on October 19th 2004 prescribes mandatory participation and contributions to five programs for all members of the labor force, formal or informal, including civil and military Government employees. In addition, the Government will pay the contributions on behalf of poor and financially disabled persons. There is agreement on the need for a basic Social Security System in Indonesia but the need for affordability and sustainability is stressed while reservations are expressed regarding the priorities. With virtually no actuarial input to the development of the social security law it has become critical that detailed and extensive modeling of the whole retirement system be undertaken without delay. The development and socialization to various stakeholders of policy options and alternative scenarios would nourish a more transparent and democratic approach to strategic issues within the civil society. Actuaries have a duty and a unique opportunity to serve the public interest in Indonesia by drawing on the resources of the global profession.

Morris Review

1. Peter cut through an abundance of information on a very complex subject to give us some historical context, a brief review of the process, the main conclusions and recommendations. He added some personal opinions as to the lessons we can draw from this review and what the profession can do, especially the need to reduce the "understanding gap" through better

communications, The question period helped to clarify some of his suggestions regarding options open to the profession in various countries; it could have lasted much longer.

- 1.1. A difficulty in a unique context: What made this case unique is that the Equitable, founded in 1762, is the oldest surviving insurance company organized on the basis of actuarial principles and that actuaries have occupied a dominant position in its top management, The proximate cause of the Morris review was a court case challenging the right of The Equitable Life Assurance Society to vary the bonus otherwise payable for policyholder that benefited from Guaranteed Annuity Rates. The difficulty was that the compounded effect of the decrease in market returns and increased longevity significantly increased the value of that guarantee thus requiring the strengthening of reserves.
- 1.2. Follow-up from a high court decision: An adverse decision of the highest court in the UK caused the Society to put itself up for sale and eventually the Society close to new business and the whole Board resigned. A number of enquires were launched including one by the Institute of Actuaries of the UK but more importantly two successive high level studies by the UK Government. The Penrose enquiry, whose 817 pages report was published in March 2004 after 2½ years. The Morris review, which followed upon this enquiry and was completed in March 2005..The Equitable case generated criticism aimed at the Equitable management, the Regulator (FSA) and the professions, both the actuaries and the accountants.
- 1.3. The context: The Morris review must be seen in the context of a wider review of the financial services industry in the UK. It was one of 3 reviews recommended by the Penrose enquiry, the others being the Governance of Mutual Life Companies and the Accounting for Life Assurance. The UK profession had also undertaken a review that led to reforms which were implemented in parallel with the government initiated enquiries and are ongoing. A parallel initiative of the FSA replaced the function of the Appointed Actuary by a troika comprising an actuarial function actuary, a with profits actuary and a reviewing actuary.
- 1.4. Two important comments by Sir Derek Morris: *“The overwhelming majority of actuaries in the UK are dedicated, skilled professionals providing important and useful advice, with commitment, integrity and a strong sense of duty”* and *“The review has identified a number of quite serious problems faced by the profession in the UK and sets out a challenging agenda for reform of the profession.”*
- 1.5. Introducing independent oversight: The central recommendation is that the actuarial profession should be subject to independent oversight by the Financial Reporting Council. Although the recommendations target the UK context and cannot be exported as such, the issues identified by the review constitute a useful check list and provide relevant analysis for the actuarial profession worldwide.

- 1.6. Lessons to be learned: Need to build trust; no longer sufficient to say “Trust me, I am an Actuary”. Need for external scrutiny: Openness, transparency, non-actuarial involvement. Need for effective communications: board, policyholders, regulator and profession.
- 1.7. Message to other associations: Ensure that the processes of your professional association are open and transparent. Do not be afraid to open your association to scrutiny from external sources. Indeed consider involving non-actuaries in your governance processes. Adopt the “Headline Test”: How would a particular activity or decision appear if it were reported as a headline in the daily newspaper? Be abundantly clear in your communication – both at the association level and at the level of the individual actuary. Always bear in mind that none of us are as good communicators as we like to think. There is always room for improvement!
- 1.8. From press release of final report: 16 March 2005, Sir Derek Morris: *“With strong leadership, I believe that the profession can move forward, on the basis of reforms proposed in this review, to fulfill a wider remit in the field of financial risk analysis, bringing expertise, robust standards and the benefits of professional conduct to both traditional and new sectors.”*

Experience study and risk modeling

2. One important experience study was presented by Simon Walpolle paper on Taiwan’s last 10 years experience which shows a significant deviation of the actual from the expected results. At the heart of the problem is the liability strategy with particular points of focus on marketing, managing new business volumes and, most importantly, product design. Good product design can significantly reduce the liability risk profile. This includes transferring risk by moving to unit-linked products. Finally, insurers need to put a value to any guarantees made and to monitor them.
3. Mortgage loan is one common investment type entered into by insurers. One risk to consider is prepayment risk, in which the mortgagee (borrower) exercises an option to prepay the mortgage earlier than the scheduled term. This presents a reinvestment risk, where the lender may not be able to earn the same rate of investment return over the remaining duration. A study on the home mortgages in Netherlands reveals that the duration until early prepayment is exercised is influenced by various demographic and financial factors. Understanding these factors help lenders to account and price for prepayment risk.
4. Modeling the survival distribution of a pair of lives is important to develop premium rates or reserves for a certain types of insurance contracts involving a pair of lives such as reversionary or last-survivorship annuities. A common approach is to assume independency between these lives which produce a relatively simple mathematical solution. However, dependency seems to be more realistic for various reasons such as common disaster, common life style or broken-heart syndrome. Copula model can be used to study this kind of dependency and to fit a survival model where dependence exists.

Consideration of risk in pricing, reserving, and assets management

5. Stochastic control models can be used to make an optimal decision in the presence of uncertainty. One among standard stochastic control methods is Hamilton-Jacobi-Bellman equation, which is used to find an optimal solution, subject to a given set of control variables and business objectives. Maratina Castillo discusses an application in the problem of finding an optimal investment strategy which is very important in insurance business.
6. Profit sharing has been a common marketing strategy in group insurance market in India and elsewhere in Asia especially with tightening competition. Therefore understanding how much this profit sharing benefit does cost is very important. A stochastic model is useful to measure such a cost as it appropriately reflects the volatility nature of the experience. To improve proximity to the actual situation, the model should consider, amongst other things, the distribution of sums assured and age.
7. Stochastic modeling has been increasingly used to determine premium rates where future interest rates follow some stochastic process. Among known stochastic processes for interest rates are Vasicek and Cox-Ingersoll-Ross financial models. The potential loss for a given premium can be measured using Wang's transform risk measure.
8. Mortality volatility along with interest rate presents an important risk with respect to annuity products. There is a tendency that mortality rates reduce over time, and this creates a potential loss from annuity contracts due to longer survivorship. The Japanese insurance authority has adjusted the reserve requirement with lower interest rates in response to the decreasing interest rates. Likewise, the insurance industry has introduced variable annuity products and annuity products with adjustment at the start of annuitization by reference to latest development in mortality rates.
9. The recent decreasing trend of interest rates has led the Indonesian insurance authority to consider redefining a sound interest rate assumption to be used in net premium reserve methods. To test the soundness of any suggested interest rate, a benchmarking against sound policy premium method reserves (PPM) was considered. The PPM reserve is considered to be more realistic as it considers also other key assumptions related to insurance portfolio not considered in net premium method such as lapse and expenses. It is important that the assumptions used under PPM should be developed soundly based on actual data and necessary judgment.

Shariah insurance

10. To satisfy demands from Moslem communities on insurance products compatible with their religious teachings, takaful products were introduced in 1970s in Sudan and 1980s in Malaysia. Several models have been used in the market. The first model, mudharaba, was used when the first takaful Malaysian company started to operate. Here, the takaful company (called 'the takaful operator') collects revenue from a share of investment profits and a share of underwriting surplus in exchange for setting up and managing the

takaful operation. The operator makes profits if its revenue exceeds management expenses. Therefore, the operator bears some management (or labor cost) risks but bears no risk in investment and underwriting. An alternative model, wakala (means 'agents'), was introduced in 2003 in Malaysia. Under this, the operator gets revenue from a percentage wakala fee against total contributions, another percentage against total investment fund and a share of underwriting surplus. Takaful model has a unique ability to tap into the potential of long term savings and investments, as well as in handling life risks, both for Moslems as well as non Moslems.

11. One method to derive a suitable contribution for takaful contracts is the stochastic method. A stochastic model is developed to model future investment returns as well as mortality experience. Then, a suitable and competitive premium rate can be determined which, under likely future experience over the policy lifetime, will cover the promised benefit for a given risk tolerance. The usage of stochastic methods can be extended to reserve valuation as well as solvency measurement.

Risk management at company level

12. One of vital components of an integrated risk management is an assessment of economic capital. Economic capital is a sufficient surplus to cover potential loss at a given risk level of tolerance over a specific time horizon. A probabilistic approach in assessment of economic capital has become a new trend and increasingly important and adopted by regulators worldwide. A successful capital management should have a realistic risk tolerance level, risk measures tailored to the business, clearly articulated risk management policy, a suitable (able to answer key questions but not necessarily over complicated) quantitative model, combination of technical and business knowledge, organizational infrastructure to promote risk management, and a well-informed senior management capable of using new tools. [See Robert Chen]
13. One problem in capital management is achieving a balance between the interests of major stakeholders in the insurance industry, namely: policyholders, shareholders and regulators. While their interests seem to move in opposite directions, they can be aligned to meet and thus produce an optimal solution. As an example in designing and pricing an insurance product, products must be designed and priced which are affordable to policyholders and yet give adequate return to shareholders after meeting the cost of the risk-based capital required by many regulatory regimes. The process involves modifying liability or asset risk profiles. The modification of liability risk profiles can be done by changing product designs or benefits or risk transfer as in reinsurance. The alternatives would be for consumers to accept the additional costs of safer prudential regulation; or to accept less stringent regulation at lower costs but at increased risk of insolvency. Managing risk profiles effectively under efficient management control naturally leads to lower level of capital requirements and costs.
14. While seen as a way-out to control risks, unit link products contain some risks that issuers have to be aware of. One of such risk is the way customers may interpret the promise in future which is likely different and controversial from the way it is seen and accepted now, called as 'time-bomb'. The 'time-bomb' risk is present through different stages of contract management: product

design, sales disclosure, selling method, and customer management. In the light of the bad press experienced by Investment Link Products in Singapore recently, insurers can learn how to minimize such “time bomb”.

15. Risk Adjusted Performance Measurement is a system of performance measure which considers various risks. There are five major risk types to consider: market and ALM risk, credit risk, life liability risk, business risk and event risk. Different RAPM measures are used for different management purposes. And, each measure is applied for different business units such as product development, asset management and product distribution units.
16. Managing risk of capital cost is a forward-looking, dynamic and interactive process. It is crucial to align the different and often contradicting interests of stakeholders involving consultation and responsiveness. Optimality could be achieved by changing risk profiles via product design and reinsurance transfer.

Reinsurance

17. Recent court action in US by the New York Attorney General and the US Securities and Exchange Commissions concerning finite reinsurance transactions presents a concern on the actuarial profession. A growing number of companies including consulting actuaries are likely to be held responsible in relation to the transactions. The regulator concern has been that these transactions were not genuine reinsurance transactions, but they have been used to distort the ceding insurers’ balance sheet, smooth earnings and sometimes to conceal impairment of assets which mislead users of insurance financial statements by increasing apparent strength. This case suggests that serious actions should be taken to promote professional conduct both by individual actuaries and the professions.
18. As the world moves towards a risk-based capital system with increasing emphasis on company-specific risk analysis and control, the Asian countries are expected to follow this trend. Under the new regulatory approach, good solvency and financial risk management will become the focus of many life insurers in Asia. S. L. Zhang shows how even traditional reinsurance contracts provide a simple, flexible, and effective capital and risk management tool that is available to any life insurer, large or small. Despite the apparent reduction in expected profits, buying reinsurance actually makes good economic sense. The reduction in capital and capital cost generally outweighs the cost of reinsurance. Life insurers in other markets such as the USA and Canada have long been relying on reinsurance extensively to support their overall capital and financial risk management strategy. For example, over 80% of mortality risks in the USA are reinsured on quota share basis because of the capital and reserve requirements as well as the very competitive rates offered by reinsurers. In Asia, so far only a few large multinational life insurers are taking advantage of reinsurance. According to the regulatory filing, 30% of gross premium of the Hong Kong operation of one large multinational life insurer and 50% of business of two multinational reinsurers were reinsured in 2003 for capital and financial risk management purposes. For most other life insurers, the full potential of reinsurance has not been fully explored. But this situation is changing. With companies striving for continued profitable growth and regulators moving to a risk-based capital system, many life insurers in Asia are beginning to realize the benefits of reinsurance. Reinsurance, as a flexible and

effective capital and risk management tool, will definitely play a more important role in the overall capital and financial risk management strategy of many Asian life insurers in the coming years.

General insurance

19. A generalized linear model is a statistical approach useful to understand the risk behaviors of insurance portfolios. Generalized linear models identify systematic and random components of events suitable for a wider range of error structure such as Normal, Binomial, Poisson, and Gamma distribution with both linear and nonlinear predictor model. GLM is an efficient tool in dealing with a large dataset and multiple risk factor parameters. One common application is in identifying risk factors for auto-insurance claim frequency. An application software such as EMBLEM help users to conduct GLM modeling much more efficiently and quickly even for those with less statistical training. However final judgment is very important and the capability to make sound judgment can be improved by more modeling experience.
20. A sound determination of reserve for outstanding claims is one among critical problems in general insurance. Outstanding claims occur from Incurred But Not Reported (IBNR) claims or Incurred But Not Enough Reported (IBNER) claims. Some classical and common methods for the estimation of outstanding claims are Chain ladder method and Bornhuetter-Fergusson. More recently, stochastic methods have been developed which provides better insights into the degree of uncertainty embodied in such estimation. They are stochastic chain-ladder, credibility approach, Fully Bayesian Approach using Markov Chain Monte Carlo (MCMC) Simulation, and Generalized Linear Model (GLM). One is looking for methods which produce more accurate estimation.
21. As Japanese non-life insurance companies carry huge investment risks by writing long-term contracts they have been working on the development of new risk management methods to manage investment risks. In line with this, the developments of international solvency standards and the insurance International Financial Reporting Standards [phase 2] have demanded even further developments in terms of risk management as well as management of impact on financial statements. Especially, these international standards require an implementation of valuation methods of fair value and measurement methods of fair value based risk (with respect to both assets and liability), enforcement of ALM, and development of valuation methods of embedded derivatives. In Japan non-life actuaries continue to play a great role in insurance risk management.
22. There is an increasing frequency of natural catastrophic occurrence in the last decade: 17 out of 20 large catastrophic events by insured loss occurring in 1970-2000 occurred after 1990. Japan, due to its geographical and social environmental factor, is among a few countries with highest frequency of cats events. In response, the Japan's insurance authority has modified its reserve and solvency requirement to anticipate such increasing tendency, including wind and flood disasters. Non-life actuaries play an important role in promoting research and development of risk evaluation methods.

23. Most recent changes in the international regulatory framework has allowed for the use of internal stochastic modeling to set capital requirement. In line with this, most medium to large UK insurers have made significant investment in Dynamic Financial Analysis (DFA) and capital modeling. More advanced insurers use capital models for their business decision. Most European insurers are beginning to develop capital modeling capability.

Regulatory

24. In dealing with financial risks, the international community has launched a drive to implement a single worldwide accounting standard such as IFRS. This standard demands some actuarial capability related to the measurement of embedded derivatives which is consistent-to-market and liability adequacy testing (including stochastic test for uncertainties). For Asian countries, this should be applied to listed companies, at least in China and Hong Kong, and subsidiaries of European companies.