Actuarial skills in risk management

The history of actuaries in financial services

For over 250 years actuaries have been quantifying mortality risks in order to calculate life assurance premiums and reserving requirements for insurance companies on a scientific basis. In recent years actuaries have greatly expanded the range of risks to which our skills have been successfully applied, not only in life and general insurance (where many Chief Risk Officer roles are filled by actuaries) but also in other financial services (such as pensions and banking) and more widely.

Actuarial science was initially developed to quantify mortality risks, using probability and statistics to understand the benefits of pooling of risks. With this initial work on mortality risks leading to the rise of life insurers with large funds to invest, actuaries then moved in to advising on these investment risks and the needs of life insurers to protect their solvency from fluctuations in market values. The mathematical expertise of actuaries enabled them to develop scientific techniques relevant initially for fixed interest investments, but now also for equities, property, derivatives and other classes. This has helped life insurers to survive the various financial crises of the last 80 years and the increasingly volatile conditions of recent years.

The development of the derivatives market has given actuaries further opportunities to use their mathematical skills, firstly for investment managers and banks, and also in the use of derivatives as risk mitigation instruments for insurers.

Since many actuarial techniques involve a great deal of computation, actuaries were quick to spot the potential of computers. As the power of computing has increased over the last 40 years, actuaries have used the increasing power not only to speed up existing calculations, but also to develop new techniques for measuring and managing risks. One example of this involves the use of Monte Carlo methods[1] to transform the understanding of risks that cannot realistically be modelled by deterministic formulae.

Over the last 30 years actuaries have increased their influence in general insurance as the combination of statistical knowledge, practical abilities and professionalism that actuaries provide is increasingly recognised. This has given actuaries the opportunity to develop techniques for a wider range of risks, ranging from low frequency/high impact catastrophe risks to mass market risks like motor insurance and household. This has also led actuaries to work in fields outside the financial services sector. A small selection of examples of actuaries' work includes:

- Analysing data and modelling fraud, systems failures and other operational risks
- Modelling natural catastrophes (hurricanes, flooding, etc.) and man-made catastrophes (e.g. terrorism)
- Construction risk, e.g. infrastructure projects including RAMP (Risk Assessment & Management for Projects: a joint publication with the Institution of Civil Engineers), and also work on social affordable housing

[1] a broad class of computational algorithms that rely on repeated random sampling to obtain numerical results; typically one runs simulations many times over in order to obtain the distribution of an unknown probabilistic entity.

- Modelling risks and risk drivers in the energy sector
- Undertaking an holistic risk assessment for a large bank
- Reverse stress testing for a Quasi-Governmental organisation

Taking an holistic approach to risk

The growing interest within insurance companies and within insurance regulators for ERM (enterprise risk management) is leading actuaries to develop techniques for all significant risks faced by insurers including some that have not traditionally measured. Techniques have been developed with the same degree of rigour as traditional statistical techniques to cope with the challenges that come from limited data. We have much experience in applying expert judgement to a wide variety of situations and recently this has become more formalised, to meet the standards of governance and documentation required by regulators in the insurance industry.

Actuaries have a detailed understanding of financial modelling which we use to build and analyse risk models. Frequently this requires not only that individual risks are modelled but also that many risks are aggregated together in one model. As well as skills in calibrating and modelling all these types of risk, actuaries have developed an understanding of the interaction between risks within a business, and developed techniques (such as copulas) to quantify the benefits of diversification.

Communicating risk

Through experience actuaries have developed the skills needed to communicate effectively complex, multi faceted issues in a business context. Not least, actuaries understand that effective risk modelling is only a core input to leadership's decision-making and behaviours in running an enterprise.

For example the Own Risk and Solvency Assessment (ORSA) is a document that aims to communicate to the Board of a life insurer the risks that the company is exposed to and the extent to which it can continue to accept these risks.

Managing and mitigating risks

The skills developed to identify and measure risks have naturally led actuaries to develop skills in managing risks. As well as evaluating capital requirements, we have skills in risk mitigation, including the use of insurance and reinsurance and the use of derivatives to hedge financial risks.

The training of actuaries

Risk Management and Communication are both fundamental to the training of actuaries. Risk management concepts are embedded throughout the practice specific examination subjects and educational material, including an examination specifically in Actuarial Risk Management (CA1). Furthermore, a dedicated examination (ST9) is available for actuaries wanting to specialise in enterprise risk and, in addition to the fellowship, the globally recognized Chartered Enterprise Risk Actuary (CERA) qualification. Actuaries also benefit from Continuing Professional Development and an active programme of member-led research, and many of these events and publications are sponsored by a flourishing Enterprise Risk Management community. All members of the profession adhere to a Code of Conduct, and to ethical and technical standards, enforced by the IFoA's disciplinary procedures.

The actuarial skills and knowledge described here seem ideal for businesses looking to meet FRC requirements on reporting risks and on reviewing their risk management functions.

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