Actuarial Career for Statistics Graduates

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Over the last several decades, especially the last several years, the world has seen a lot of changes in almost all areas in the financial, physical, political and technological fields. These changes are significant factors affecting the choice of career path for a lot of young graduates. One particular choice that has been very popular with statistics graduates is no doubt the actuarial career. The actuarial profession has been actively promoting the actuarial career which attracted a lot of attention when it was ranked as the top career in 1988 by the Jobs Rated Almanac in the United States.

Actuarial science is a discipline that uses probability and statistics in solving practical problems related to financial security. Before the proliferation of actuarial science programs in universities towards the end of the last century, most of the actuaries had received university education in mathematics or statistics. Over the last several decades, with greater recognition of the actuarial profession by the public as a rewarding career, many high quality students have chosen actuarial science programs as their university studies. As a result, employers looking for actuarial expertise can choose suitable candidates among graduates from these programs and university graduates majoring only in mathematics or statistics are usually not considered. However, the factors affecting the actuarial career environment have undergone some significant changes. In this paper, we will look at these changes and how they may allow statistics graduates some opportunities to increase their chances in entering the actuarial profession.

Greater emphasis in enterprise risk management ("ERM")

About three years ago, the world suffered from the impact of the financial tsunami and ensuing crisis. Since then, corporate governance has attracted more attention from senior management. One discipline that has emerged is the so-called ERM. According to the Casualty Actuarial Society in the United States, "ERM is the discipline by which an organization in any industry assesses, controls, exploits, finances and monitors risks from all sources for the purpose of increasing the organization's short- and long-term value to its stakeholders." The emphasis is that corporate management has to design a process to manage the risks of the organization on a holistic basis in order to create value.

The process of identifying, measuring, prioritizing, managing and monitoring risks requires significant expertise in statistical analysis. A large amount of experience data has to be collected to facilitate the refined process of risk management. This approach is applicable to all organizations, but so far, the actuarial profession has only started to have some success in the insurance industry and to a lesser extent in some financial services industries.

The emphasis and process adopted in ERM are different from those in traditional risk management which is more silo-based with each operational department head responsible for the performance of its own division. Actuaries entering into this field have to acquire new skills and develop new tools to identify and analyze the interaction of various risk factors affecting the performance of an organization.

Requirement for more vigorous scenario testing and stochastic analysis

Insurance companies and other financial institutions are subject to stringent professional and regulatory requirements. After the financial crisis, significant developments have occurred in solvency regulations and financial reporting requirements. For example, European insurance companies are required to comply with the new Solvency II requirements by January 1, 2013 and new International Financial Reporting Standards are being developed by the International Accounting Standards Board. Companies are

now required to test the impact of various adverse scenarios on their capital adequacy. Emphasis has been placed on the use of simulation to justify the determination of solvency margins.

Increasing focus has been brought to the tail distribution of profit. The traditional approach of adding a certain risk margin on the best estimate will no longer be acceptable. Projection of profit and solvency positions will require the collection of a large amount of historical data and subsequent statistical analysis. Deterministic calculations using expected values are gradually replaced by stochastic simulations based on distributional assumptions.

Regulators are also encouraging companies to develop internal models as standard rule-based requirements are more conservative. Larger companies have already allocated resources to develop internal models while smaller companies tend to rely on the help of consultants. In any case, this has created a great demand of skilled resources in the actuarial, financial and information technology areas. Statistical modeling expertise will become a necessary skill set for the development of integrated actuarial and financial reporting systems.

Shifts in demographic structure creating demand for different financial security products

Ageing of population has been an important issue affecting most countries around the world. The retirement of the baby boomers together with a drop in fertility causes an increasing burden on the working population to support the increasing number of retirees who also tend to live longer. Financial security products targeting the retiring populations must address their specific needs such as retirement income security and health insurance protection.

On the other hand, smaller family size and loosening of family tie imply that individuals can no longer rely on the extended family as a safety net. Each family has to manage its own risks more carefully. The risk of income loss due to severe sickness or permanent disability becomes more important for second generations from smaller families.

The impact of the changes in demographic structure has just started to be recognized and extensive statistical analysis and projection will be required to provide support for the design of product features and setting of pricing assumptions. Greater mobility of world population in terms of immigration and emigration has become a significant factor in population projection for many countries.

Climatic changes affecting the validity of financial security models based on historical information

Over the last several decades, the world has experienced significant climatic changes together with frequent occurrences of severe natural disasters such as earthquakes, floods, tornadoes and tsunamis. These events often cause massive property damages and loss of human lives. Insurance contracts covering these hazards are generally based on financial security models calibrated by historical information. There has been growing concern that climatic changes may be causing the frequency as well as severity of natural hazards to deviate significantly from historical norms.

Models may need to be revamped to incorporate more recent historical experience and even more importantly greater flexibility must be provided to reflect changes within reasonably short period of time. Large amounts of climatic data are collected almost every day and they need to be analyzed effectively and efficiently to provide inputs to more sophisticated financial security models.

The causes of climatic changes still have not been clearly understood. Although some people put the blame on air and water pollution caused by industrial waste, more research should be done in this area. However, air and water pollution definitely have significant impact on the health conditions of human populations. Again, collecting and analyzing climatic and health data can help to improve the validity of financial security models.

More demanding customers advocating higher levels of consumer rights

Nowadays, consumers are demanding to have greater rights to be informed when choosing products

and services so they can make educated decisions. From a regulatory point of view, ensuring prudential operation and solvency of financial institutions can enhance consumer protection for customers of financial security products.

In addition to guaranteed products which are supported by the solvency of the issuing company, there are now many financial security products that include discretionary features. A typical example is the participating (or with-profit) insurance policies which have bonus or dividend payments that depend on the profitability of the company. Potential customers are usually given illustrations of possible payment patterns.

In order to cope with customers' demand and to provide appropriate information according to consumer needs, financial institutions have to acquire more knowledge about their target markets. Market research using data mining, focus groups, sample surveys and other statistical techniques has been used as customer relationship management tools.

Technological advances leading companies to search for more effective distribution channels

Over the last several decades, advances in information technology have significantly affected the business world. In particular, actuaries can do calculations much more quickly and handle more complicated situations more efficiently. Some distribution channels can now be operated in a more effective manner and many financial institutions have started to explore new markets through these channels. For example, even with the very low response rates, direct marketing has produced profitable results through the use of automatic calling systems. Online marketing of simple financial security products is another distribution approach that is now being considered.

Following the initial success of some financial institutions utilizing the new distribution channels, the market becomes more competitive. However, market information about these channels is not readily available and the critical success factors for their operations are not well understood.

With the low response rates and high initial outlay, small deviation in assumptions can lead to serious financial consequences if they are not managed appropriately. More sophisticated statistical analysis and estimation techniques can be applied to reduce the probability of errors and monitor changes in environmental factors that may lead to reduction in profitability.

Conclusion

These changes have already posed significant challenges for practicing actuaries. However, as the background to these issues and the ensuing problems are usually not covered in standard actuarial science programs of most universities, there is a window of opportunity for statistics graduates to convince employers that their expertise in data analysis and statistical modeling can contribute to develop effective and efficient solutions to these new problems. Although the competition is still very competitive, statistics graduates can demonstrate that their training can also provide them with the prerequisites to be successful in these areas.

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