

Once an Actuary, Always an Actuary

By Alvin Soh



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TIME AND UNCERTAINTY

We never know what will happen tomorrow. The future is brimming with uncertainties, inviting us to penetrate its mystery. Whether we realize it or not, we are expecting countless uncertainties to happen in the future. When things happen to favor us, we may say that we are blessed or that luck is with us; when things happen against our favor, we may say that we are cursed or that luck is not with us. Regardless of how we might describe the daily scenarios we experience, we know that the world does not always move as we expect it to. When what we expected in the past is not realized, and if the actual experience that we had negatively impacted us, we call it *an accident* at the time of occurrence. When this accident is discounted to the time before it occurs, it is known as *risk*.

Risk is practically everywhere. Risk exists even when we are crossing a one-way street. Imagine that the stream of traffic flows from your left to the right. Will you cross the road when there are no vehicles coming near at a high speed from your left? Or will you still look to the right to make sure it is safe to cross? If you practice the former, you assume that there is no vehicle coming from the right. Implicitly, you are taking a risk that some drivers exist who do not abide by the road regulations. Risks can be as “simple” as this. If you practice the latter, you actually mitigate that risk. Risk management techniques can be as “simple” as this, too.

Consider another scenario in which you are the managing director of a firm that specializes in data processing. To ensure that the data processing is smooth and time-saving, you invest a colossal amount of money in a high-performance super computer. Thanks to this highly efficient super computer, your firm is making \$1 million in profits every month. After six months of usage, you are told that one of the components of the super computer is causing some problems, and that the replacement cost of the component is \$6 million. If the component bursts, it will spoil your super computer and your firm’s operations will have to be halted until you get a new super computer.

The current price of a super computer is around \$12 million. The firm currently has only \$6 million in cash and no other assets besides the current super computer. Will you replace the component immediately? Or would you wait until the super computer breaks and replace it with a new super computer?

If you choose to replace the component now, it implies that you are pessimistic about the lifespan of the component. You implicitly believe that the component will burst within 12 months. If the component bursts, say, in the fourth month, you will need another \$2 million to get a new super computer (you have \$6 million in cash, plus the \$1 million that your firm earns every month for four months) which is beyond what you can afford. If you choose to leave the super computer working until the component breaks, it implies that you are optimistic about the lifespan of the component. You implicitly believe that the component will still be working after 12 months. If the component bursts in the 15th month, you will still have additional cash of \$9 million (you have \$6 million in cash, plus the \$1 million that your firm makes every month for 15 months) in that month.

The decision-making process in such a scenario requires much more analysis than it seems. For instance, whether or not to replace the component now does not only depend on what your view is on the lifespan of the component. It also depends on your view of other risks, which include liquidity risk (there might be a need for cash in the business after the \$6 million in cash is spent), market risk (the super computer might be priced at more than \$12 million after 15 months), income risk (the monthly income might be less than \$1 million) and other risks and uncertainties that might have an impact in the decision-making process. The point that is worth pondering is this: since the view on the significance of these risks is rather subjective and therefore subject to individual biases, is there any way by which the decision-maker can make an objective decision based on more concrete facts with minimal subjectivity? How do the decision-makers take action to minimize the



risks taken and maximize the value of the objects that they want?

This type of situation should be familiar to actuaries. Since we have identified that time is the main source of risk, we may assume that the lifespan of the component is a random variable following certain distributions. Next, we may use either the historical experience that we have or some proxy of the lifespan of the component to estimate the parameters of the probability distributions. Subsequently, various statistical tests can be applied to ensure the fitness of the parameters and the distributions. With the fitted distributions, we can then perform sensitivity testing, scenario testing and simulations to find the solution with a certain level of confidence.

Outside the realm of mathematics, proof is nothing more than probability. There is definitely no way we can prove that one decision is definitely better than the alternatives. Nonetheless, if all the risks and uncertainties can be quantified and made comparable to each other on a consistent basis, it can definitely provide a great insight in every decision-making process. In principle, the rational decision-making process should consider the advan-

tages and disadvantages of every alternative, along with the risks and opportunities embedded in them to achieve the optimal result. The required knowledge and skills to perform these tasks are actuaries' area of expertise; it is never too much to say that actuaries are professionals who are equipped with the most rigorous training to measure and manage risks. This is not adequately appreciated by most people, including actuarial students.

IN PRINCIPLE, THE RATIONAL DECISION-MAKING PROCESS SHOULD CONSIDER THE ADVANTAGES AND DISADVANTAGES OF EVERY ALTERNATIVE, ALONG WITH THE RISKS AND OPPORTUNITIES EMBEDDED IN THEM TO ACHIEVE THE OPTIMAL RESULT.

THE PERCEPTION OF ACTUARIES

Sometimes, even we (actuarial students or actuaries) do not know how to define actuary and explain what an actuary does. There are plenty of myths that people have about this profession which sometimes devalues the real strengths of actuaries. Some common misunderstandings of actuaries include:

- Actuaries are a group of people with white hair and white shirts who are obsessed with mathematics;
- Actuaries are basically accountants who apply more calculations in their work;
- Actuaries are very keen in mathematics and need to take a lot of mathematical exams;
- Actuaries are the same as financial analysts and investment analysts who care only about stock prices;
- Actuaries are statisticians who analyze data with weird mathematical theorems.

These commonly heard comments reflect that the real abilities and expertise of actuaries are still hidden and have not gained the full appreciation that they deserve.

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THE REAL ACTUARY REVEALED

Indeed, actuaries are mathematicians who play around with numbers. We are experts in probability and statistics, who utilize our programming skills to analyze data objectively. From simple addition to integration, from estimating parameters to simulating results, from central-limit theorem to Girsanov theorem, we are able to apply various mathematical theorems to transform data into meaningful results. In fact, actuaries are not just mathematicians; we are applied mathematicians.

Second, actuaries are economists who see beyond the numbers. It is not enough to just produce error-free results. In this competitive business world, actuaries are professionals who are able to interpret the results and therefore have a deeper understanding on the experience and the condition of a business entity. Hence, being equipped with a strong mathematical background is just a foundation for analyzing the intrinsic meaning of the figures; actuaries apply those skills in getting data, processing data and presenting critical information in coherence with the needs of the business. In fact, actuaries are not just economists, we are businesspeople.

Third, actuaries are professionals who develop strategy from the numbers. With the deeper comprehension of a business entity's situation, we take action to enhance, improve and upgrade the present situation. As such, actuaries possess knowledge not only in mathematics and economics, but also finance, marketing, investment, psychology and even religion (in the emergence of Islamic finance). We strike a balance in various aspects in strategic planning for a better tomorrow. In fact, we are strategists.

CONCLUSION

Risk is opportunity. Since risk is everywhere, opportunity is everywhere. The knowledge and skills that we possess is more than what others perceive, sometimes even more than we know. Irrespective of which career or business an actuary is in, our profound understanding of uncertainties, risks and opportunities can always be of great assistance to make rational and justifiable decisions in many aspects of our daily lives, careers, businesses and investments. The "actuarial" characteristics and personalities will follow us and be demonstrated in the countless situations we encounter. Once an actuary, always an actuary. ☆

AoF Seeks Section Council Intern

Recognizing that the Actuary of the Future (AoF) has a growing proportion of affiliate (non-credentialed) members, the AoF Council recently agreed to add the role of a Section Council Intern (SCI) to its roster for the upcoming program year. This role will be filled by an affiliate member and assist us in ensuring that the needs of this cohort continue to be addressed. The SCI will serve a one-year non-renewable term and participate as a non-voting Friend of the Council. An application process was designed to reach out to current affiliate members as well as those who may be interested in joining the AoF as an affiliate, such as university students. We're looking forward to the participation of the SCI on our monthly calls and their leadership in one of our key projects! Questions about the SCI position can be addressed to Jennie McGinnis at Jennifer_McGinnis@swissre.com.