

# The actuary

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Actuaries form a clearly defined profession. In Great Britain the professional status of the actuary is granted by a Royal Charter, in many countries laws define the role of the actuary, and everywhere actuarial organizations have almost monopoly power to determine, who is an actuary and who not.

For centuries, the role of the actuary –being the expert for risk and uncertainty in insurance operations (particularly in life assurance)– has been hardly contested. Only in the very recent years, where competition is globally encouraged as a guarantee for economic efficiency, accountants and financial specialists have partially intruded into the actuarial domain, but also today, the actuarial profession is world wide accepted and its activity is appreciated to a great extent.

Of course, one can not talk about the actuarial profession without saying something about the economic role of insurance. Probably, most of us here in this auditorium are in one or the other way related to insurance.

Still, the question which role insurance plays in economics, will probably be answered quite differently by those here present (do not be afraid, I am not going to give you an examination on this!). Here is my answer:

Insurance is closely tied to the system of money economics, a system in which you can exchange goods and services against one or several world wide accepted and convertible currencies. This economic system is –everybody agrees on it– by far more effective than any system of direct exchange of goods and services. Mathematically speaking, the main reason for this lies in the simple fact that economic values are expressed in *one single* scale. Imagine for a moment: The reduction of the empirical world to the c-g-s-scale (everything was reduced to length, mass and time) must

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be considered as the great historic unifying role of physics. If you count 3 dimensions for space, this means a description using 5 dimensions. But money economics reduces everything to a one-dimensional scale (Hfl, Sfr, \$, etc. are just different multiples for this one abstract unit).

Of course, this reduction of all economic values to dimension one is an extreme abstraction. You may realize this in practice, when you deal with figures on inflation. These figures try to readjust continuously the real economic values to the abstract money scale. It is very obvious that, depending on our personal preferences among economic goods and services, the inflation rate is different for you and me. But officially only *one* inflation rate is valid. Things become even more complicated if you and I express our preferences over time or contingently on the events which possibly may happen over time. Nevertheless, the fact that –in spite of the just mentioned difficulties– we actually do express everything in one single money unit, is absolutely essential for the functioning of the modern world economics.

As a mathematician, I like to think of the money world as an image of the full economic world. In this image everything is linearized, but obviously, the world of economics is too complex for being reflected by this unique linearized mapping. In this oversimplified money world new needs arise. Insurance –similar as banking– takes up these needs and permits the individual (or the individual economic agent) to adapt the universally fixed money scale closer to his preferences and needs. Traditionally, banking has mostly concentrated its efforts on providing opportunities for shifting the value of money in time, whereas insurance has above all guaranteed the availability of money contingent on the happening of certain events. Both these two functions are necessary for modern economics. They both strongly reinforce the international money system. I firmly believe that the importance of these functions will even grow in the future. The more complex the reality of economics is, the more they will be needed to assure individual welfare. This remark is independent of the observable trend, which indicates that the borderline between traditional banking and traditional insurance may soon become less rigid.

In any case, the actuary of the future will face a tremendously increasing demand for new financial and insurance products.

Another development seems also clearly indicated: Our world becomes more and more abstract. My father was a saddlemaker, I am a mathematician. In Switzerland –the traditional country of cheese, chocolate and cows– we have only 6% of the working population left in the agricultural sector and we pay tremendous subsidies to keep them economically alive; only 35 % of the working population remains in the secondary sector. The highest percentage of economic activities is to be found in the field of the services, which for Switzerland means banking, insurance, tourism. Even among academics there is a clear tendency towards higher abstraction. In all industrial countries governments cry out for more engineers. But the reality shows that engineers get less paid than lawyers, economists, and MBA'S. Top managers in industry are above all experts in finance and marketing and quite often they are only vaguely familiar with the engineering side of their production plants.

The actuary fits very well into this picture. Potentially, he/she has all the ingredients to make him/her successful in the more and more abstract future. His/her activity puts him/her at an essential and increasingly important spot in modern economy, at the spot, where financial products and insurance cover for an increasingly complex world are created. Two questions however, arise:

- Is he/she well prepared for this task?
- Will other professions carry out this task in the future?

I believe that the actuary has a good chance to be accepted –also in the future– as the reliable expert for financial and insurance risk. But if we want this to be so, we must

- A) understand the actuarial profession in a broader sense than we have done in the past.
- B) adapt the actuarial education programs to the just described future needs.

A: *Understand the actuarial profession in a broader sense than we have done in the past.*

Until the middle of this century the actuary –at least in Europe– has basically been involved in life assurance. Sickness insurance and pension insurance were seen as possible areas of extension but they were essentially treated by the same statistical techniques as those used in life assurance since almost 300 years. This should not be seen in a negative way. On the contrary, the classical paradigm of the life actuary –the deterministic description of the laws of mortality coupled with an assumed fixed interest rate– had proved to be an incredibly successful tool. But, let us face it, at the same time the success was also the trap for the actuary. As the profession could –or at least thought it could– rely on a well defined successful model, the actuary became less creative in his daily work –and even worse– the subject called life insurance mathematics as presented to the students in university courses was mostly not very inspiring.

It must be seen as a lucky coincidence that in the middle of this century automobile insurance was doing very badly and that the actuaries were given a chance to propose new systems for putting automobile insurance on a sound basis. Actuaries, who had been transferred from their tasks in life assurance to the new challenges in the automobile sector developed excellent ideas and they were indeed successful in designing BonusMalus-systems of the type, now used in most continental countries. Why could this happen? Certainly the fact that the European actuary has traditionally profited from a high level of abstract training in his university studies, must be seen as the primary cause of this intellectual flexibility. It is easy to name other examples: the system of pension insurance designed by the Finnish actuaries, the many attempts to modernize fire tariffs, the success stories of Ove Lundberg in sickness insurance, of Hans Ammeter in group life insurance who both turned abstract ideas into financial success, may just serve as an illustration.

Of course, the latest enlargement of actuarial activity looks even more challenging: Financial risk comes within reach of our methods! Indeed, the purely financial risk, which we have considered to be uninsurable –and which of course, remains uninsurable in the classical sense– becomes mathematically manageable. The old concepts of immunization and dura-

tion matching are enhanced by new abstract ideas. The new game is called hedging and derivative financial instruments. Again the well educated actuary will have no problems to work also in these areas. His abstract training in stochastic processes during his university years puts him right into the middle of these very powerful methods.

This brief sketch may convey to you what I mean by a broadly understood actuarial profession. The key to this breadth lies, of course, in the actuarial education programs. This brings me to point B, listed before.

*B: Adapt the actuarial education programs to the needs of the future*

With great pleasure I have read about the endeavours of your ‘Het Actuarieel Genootschap’ in this direction. Peter Kuys will speak about them in detail in his presentation. I had the privilege to receive a copy of his speech beforehand and I must say that I am very impressed by your initiative. Still, it might be helpful, if, as my personal contribution, I try to sketch those qualifications which I consider essential for the actuary of the future. Any good education program must aim at these qualifications:

- 1) The actuary of the future has a solid education in mathematics, actuarial science and econometrics. This does not mean that he/she has studied a great number of subjects in these areas. But he/she should be able –and hopefully enjoys– to learn any further new subject in these areas as the occasion arises (e.g. by reading books or articles in scientific and/or professional journals).
- 2) The actuary of the future is highly motivated to apply his/her knowledge and he/she has learned to develop –as the need arises– new methods to deal with new practical problems.
- 3) Obviously, the actuary of the future will have to specialize. We expect him/her to be the expert for
  - Premium calculation in life assurance
  - Valuation in life assurance
  - Asset matching in life assurance
  - Rating in nonlife insurance
  - Claims reserving in nonlife insurance

- Pension insurance funding
- Reinsurance rating
- Financial insurance products

just to mention a few possibilities. A single person will not be capable of doing all these things equally well. This necessarily means that the broader we understand the profession of the actuary, the more we will be forced to accept specialization. But let me emphasise: We must avoid with all efforts a specialization where actuaries of different types do not understand each other anymore. Hence, points 1) and 2) of the required qualifications are the absolute prerequisites of any specialization.

These are ambitious goals, which I expect the actuary of the future to achieve. If we want to succeed, universities and the insurance industry and –as I see it– also the banking industry must join forces on the education sector. This does not exclude that insurance companies and banks still will continue to be economic competitors in the future as well; it only expresses the fact that in the years to come actuaries will also be more frequently working for banks. The French may be ahead of other continental countries in this respect: I have lately seen a program for actuarial studies at the Université de Paris, which after a common basic trunk leads to two possible specializations, one for the insurance actuary, the other for the banking actuary. Ladies and Gentlemen seeing the prominent topmanagers of the insurance sector of the Netherlands as well as the leading actuarial academics of this country participating actively in today's symposium, –and particularly, after having read Peter Kuys' text–, I am confident that also in this country you will find a successful formula to keep the future actuaries of the Netherlands at the forefront of our profession.

Let me finish with a complimentary aspect. If we agree that universities should play an important role in the education of future actuaries, then we should aim at having those universities involved, which emphasise academic quality. This is the most promising strategy allowing us to recruit a fair portion of top students among future actuaries. We Europeans do quite well in this respect but we must realize that only successful research will permit actuarial science to survive within the tough environment of academic competition. It is, hence, very dangerous, academically speaking,

to run an actuarial teaching program in a university without complimenting it with an appropriate research activity. Obviously, speaking about universities, I mean fundamental research. Applied research will happen in industry as well. I am extremely grateful to Prof. Goovaerts, who has taken a very special initiative to encourage actuarial research on an international level. Last September he has announced that the scientific committee for the Jubilee of the International Actuarial Association 1995 plans to create an International Actuarial Institute. I see this institute as a promoting agency of actuarial research and hence, a very fertile breeding place for future educators involved in actuarial teaching programs all over the world. Any profession needs several such institutions. If I should be able to convince the representatives of the insurance industry of the urgent need for such an institute also for the actuaries, I would be very happy.

Still, as I said, this more academic aspect can not have more than a complimentary character. The central issue is the future activity of the actuary in industry, in insurance and hopefully in banking. It will depend on the skills, the creativity and the devotion of these future actuaries, women and men, at the frontline of economic activity, whether our profession will be as successful in the centuries ahead of us, as it has been in those of the past. Right at the moment, we see very decisive developments: By the end of 1992 European actuaries will be acting in much larger geographical areas. But the actuarial domain is also widening methodologically: I believe strongly that the modern world of finance needs very much actuarial thinking. Successful modelling in this area has so far mainly concentrated on pricing but has hardly tackled the question of how to measure financial risk. This is where the actuary is absolutely needed. Even more than in the past the actuary will also be needed on the insurance side, as increasing competition will necessitate the use of more refined methods. No doubt, right now the actuarial profession has particular good chances to grow.

Let us all join our forces and seize these chances.