

EDITORIAL AND ANNOUNCEMENTS

GUEST EDITORIAL

SOLVENCY CONTROL OF INSURERS — A CHALLENGE TO ACTUARIAL SCIENCE

Solvency of insurers is a highlight of actuarial study in our time. The topic is regularly discussed in the actuarial literature and at actuarial conferences. Even monographs and special meetings are entirely devoted to it, and a number of working parties—national as well as international—have been commissioned to work out practical solvency requirements and routines of solvency control. Some general reasons for the prominence of the topic are obvious: to an insurance company, like any other business, prevention of negative results is of vital importance — preferably profit should be produced, and supervisory authorities conducting public affairs must ascertain that the insurers are maintaining their part of the social security system.

Special reasons for the evergrowing prominence of the topic nowadays are to be found in the rapid changes in the market. Modern economic life is characterized by the emergence of progressively bigger decision making bodies — firms and organizations. In particular, their role as purchasers of insurance is quite different from that of yesterday's typically smaller decision units: they have the capacity for selfinsurance by e.g. captives or pension funds or simply by not buying insurance; they often possess know-how in risk assessment; and being buyers of insurance on a large scale, they are able to compare premium expenses to benefits and thereby judge the fairness of the prices of insurance products. These changes on the demand side have enforced increased competition between insurers. The globalization of the insurance business pulls in the same direction. In their struggle for shares in a competitive market, the insurers launch myriads of new products designed for progressively more specific—hence smaller—groups of risks, and they quote premiums close to, and sometimes even below the net premium. It is a dilemma that the need for more accurate risk assessment is accompanied by a deterioration of statistical databases. With the dissolution of the former cartel-like cooperative bodies of insurers and the shut down of their joint offices of statistics, one important advantage of large-scale business gets lost. Not surprisingly, there has been a number of recent instances of failures of insurers. In fact, far more than the number of eventual wind-ups since many of them were hushed up by mergers.

In these circumstances the solvency issue faces the actuarial profession with a number of challenging tasks. The appearance of actuaries of the third kind is a response to the problems associated with assets risk. In a sense these problems are harder than those associated with insurance liabilities: assets risk is rooted in political, social, and economic phenomena of great complexity, whereas the

fluctuations of insurance liabilities to a greater extent are governed by technical, physical, and demographic mechanisms that lend themselves to the well established methodology of the “exact sciences”. This does not mean that the analysis of the liabilities is of secondary importance. Just look at the classical life insurance mathematics. Through decades it was widely held to be a largely perfect structure. However, it was not the mathematics that was perfect, but rather the idyll of the insurance companies in a situation where uniform premiums with substantial safety loadings built into them created great surplus. The insurers were prosperous and praised their actuaries. The actuaries were flattered and praised their techniques. No development of theory was called for. Lately also life insurers are forced to compete, and suddenly the imperfection of the classical techniques is brought to light in confused discussions of how to determine appropriate premiums in different risk classes and how to redistribute surplus to them, in short, how to measure the risk. Fresh thinking is required from all kinds of actuaries, first, second, and third, in order to meet the need for more accurate assessment of all kinds of risk in insurance. In the present situation the only superfluous actuaries are those of the zero kind, who claim that actuarial mathematics can be dispensed with in these urgent matters.

It may be appropriate to coin the term “actuaries of the fourth kind” for those working in supervisory offices. They are not numerous, and most of them lead a shadow life pondering returns from the company accountants. Certainly, some very impressive work has been done in the field, but this fact alone could hardly justify a distinguishing mark. It is the characteristics of the field itself and its great potential for stimulation of actuarial research that merits emphasis. I shall list some items that hopefully will speak for themselves:

- The objectives of the supervisory authorities are not all the same as those of a company. Solvency and equity are the primary concerns. Business goals are balanced against the welfare of the insured, the efficiency of the insurance industry as a whole is considered, and its operations and organization can be influenced by statutory regulations. Regardless of the market situation and the level of theoretical justification of the practices of actuaries of the three first kinds, the actuary of the fourth kind must employ models and methods that can serve these objectives (recall the life insurance situation). And when adequate theory does not exist, it must be created.
- The data available to a supervisory office are different from those collected by the insurers. Typically they are more aggregate and call for development of models at macro level and statistical methods based on these. However, in our era of efficient data processing it is clearly possible to gather detailed statistics on policies and claims experiences for supervision purposes. If this cannot be done on a large scale, an interesting possibility would be to study detailed data in carefully selected small samples from the insurance portfolios. Then one can model at micro level, and derive the needed distributions for the totals determining the solvency state.

- The combination of data from several companies would presumably require employment of heterogeneity models to account for the unobservable differences between them. The same goes also for the description of random fluctuation in collective risk factors. Combining the two sources of variation leads to studies of two-way random effect models, not necessarily the standard linear ones.
- An important and difficult problem is the analysis of the impact of the size of the portfolio, its composition, and the reinsurance programme, which may be involved.
- Yet another prominent problem is the projection of outstanding claims of all categories.

The list of challenging actuarial and statistical problems could be extended far beyond this. Some clues to their solutions are key-words like stochastic processes, prediction and filtering, finite time ruin probabilities in complex models, non- or semiparametric models, optimal risk sharing, utility and welfare theory, computerintensive statistical methods, standardization of definitions, organisation of statistical data bases and communication between these, ... Let it suffice here to say that all lines of insurance business have to be analysed statistically, and all aspects that are judged to be of significance to the total risk must be moulded into the analysis. Not separately in ad hoc models, but simultaneously in one grand, comprehensive model, that must be sufficiently realistic and mathematically tractable to produce, on a large scale, reliable and efficient decisions in matters of major economic and social importance. That is a formidable task and a great challenge to the actuarial science and profession.

RAGNAR NORBERG