An Actuarial Perspective of NSERC Funding

Actuarial science is a rather unique mathematical science in that its roots are of both an academic and a professional nature. The technical analysis of relevant insurance related problems involves the use of a wide variety of mathematical, statistical, and computational tools. As such, the field is highly multidisciplinary in nature, ranging from the very theoretical to the very applied. There are strong ties to disciplines such as statistics, mathematics, operations research, demography, mathematical economics, management sciences, and accounting. In recent years in particular, closer ties have developed between the actuarial and the banking and investment fields, and more generally to the mathematical finance discipline. Perhaps as a result of this multidisciplinary nature, actuarial science tends to "fall between the cracks" within the NSERC structure.

There are very strong ties between the Canadian actuarial research community and professional organizations including the Canadian Institute of Actuaries (CIA), the Society of Actuaries (SOA), the Casualty Actuarial Society (CAS), and the International Actuarial Association (IAA). There are also very strong ties to the insurance industry itself. The current research funding culture is such that there is not strong financial support for academic actuarial research from the insurance industry in North America, however.

There are other demographic aspects of the international actuarial research community that are relevant in the present context. First, this community is small in numbers and also very diverse in terms of research interests, as well as from a geographic standpoint. Moreover, it is a not an exaggeration to state that the Canadian academic actuarial community is large in numbers (relative to the worldwide community) and is also very prominent in terms of international influence. Consequently, decisions impacting research funding for the Canadian actuarial community are extremely important entities affecting such influence.

The demographic composition of the actuarial science community is also an issue. The discipline is growing, so that there are proportionally more new researchers than established ones, and this is becoming problematic in view of the increasing difficulty in obtaining funding to support such research.

While it is obviously impossible to accurately predict future research patterns and trends, it appears to us that future actuarial research will continue to be highly interdisciplinary, with relatively more emphasis on computational and numerical solutions to problems of interest. Modelling techniques which have already begun to have been employed now often involve a hybrid of analytic and numerical techniques, and may consequently be referred to as semi-analytic in nature. Simplifying modelling assumptions, which were traditionally employed for the sake of mathematical

convenience, will now be replaced by carefully constructed assumptions involving dependence relationships and process controls which allow for numerical solution, typically with the assistance of some analytic input. These new avenues of thought will bring an increased need for computational resources, as well as an increased amount of collaboration with other disciplines as a result of increased borrowing and lending of such technical arguments. We also envisage a continued broad range of research approaches in actuarial science from the very applied to the very theoretical.

In light of the present actuarial research environment described above, we will now describe our views as to NSERC funding of actuarial research.

Given that the program that currently funds the 3 research institutes (CRM, Fields PIMS) will be phased out, this is an opportunity for the Canadian mathematical sciences community to revisit if and how to fund these institutes in the future, assuming that the envelope currently devoted to such funding is given back to our Evaluation Group (EG-1508) for Discovery Grants. This envelope is currently of about 3.5 million per year (1.2 for each of CRM and Fields, and 1.1 for PIMS). At this juncture the actuarial science research community does not benefit from these research centers to the same extent as many other mathematical sciences. The CRM does not have an actuarial laboratory, and previous attempts to set up such a laboratory were unsuccessful because additional funding was not generated by the actuarial community. The centers rarely organize summer schools or other such thematic sessions which are close to our actuarial research interests, and we are normally unable to manage to secure funding for our postdoctoral students, or for seminar series designed to help train our graduate students and other highly qualified personnel (HQP). If the centers were to be kept at a funding level of 3.5 million then that would not provide money for an actuarial laboratory, nor would our current Discovery Grant envelope for EG-1508 have extra funds for the actuarial community. Thus, from an actuarial vantage point, we would strongly prefer to have such funds available for research support on an individual basis such as with the Discovery Grants program as well as for postdoctoral support and research workshops, rather than for funding research institutes of this nature.

In all fairness, the redistribution of resources among the different mathematical sciences, including those of an actuarial nature, needs to be revisited. Our research community needs to steer the infrastructure at NSERC to increase collaboration between the established strong research groups in the country, rather than to continue to divide them into 3 central focal points (research centers). Increased opportunities for the mutual exchange of ideas between graduate students and other HQP would also be beneficial to a small research community such as ours. This would be particularly advantageous to us by virtue of the fact that from a mathematical standpoint, actuarial research ranges from highly analytic to essentially numerical in nature.

The international outlook of NSERC should also be reexamined. Current funding of

their scholarship program is for national students, whereas in the actuarial discipline we attract primarily international students, many of whom remain in Canada after completion of their training. Increased individual research grants (both in number and size) such as those resulting from the Discovery Grant program would serve the actuarial community better by allowing us to provide improved financial support for international students, rather than by investing equivalent funds in the research institutes.

As described above, the actuarial research community in Canada is still relatively small as compared to other mathematical sciences and is geographically quite dispersed. In that respect, the new model that has resulted in fewer, more geographically concentrated Discovery Grant recipients with larger grants is actually counterproductive to actuarial training of HQP. This problem is exacerbated by the current demographic situation alluded to earlier involving a somewhat disproportionate number of young actuarial researchers. Currently there are 12 actuarial groups training graduate actuarial students across Canada. Many of these groups have only one or two funded researchers able to provide financial support for their graduate students. This is particularly problematic in those situations where there is only one such group in a large geographical area such as a province, and in such situations the NSERC support plays a vital role for training of HQP. A lack of diverse funding of this nature necessarily forces a concentration of actuarial graduate training into a disproportionately small number of universities in Canada, and does not facilitate improved actuarial research and HQP training. To summarize, less concentration of research funding by individual and by geographic area would serve the Canadian actuarial research community better.

Jose Garrido and Gord Willmot