

## EDITORIAL

BY M. R. HARDY

*There's nothing so practical as a good theory.*

Kurt Lewin, 1952

Technology transfer is a popular buzz phrase around universities currently, particularly universities with strength in science and technology. It refers to the process of transferring products and ideas from academe to industry. Originally it was used to describe spin-off companies, often selling hardware or software, developed as far as the prototype stage within the university. These days the phrase encompasses all the ways that ideas developed in universities are translated to the world outside the universities. Spin-off companies are not the most common method of technology transfer; there are other, very important ways that ideas move between academic theory and industry practice.

One method is through publication in scientific journals, and it is here that the *Annals of Actuarial Science*, a joint venture of the Institute and the Faculty of Actuaries, has a major part to play in the increasingly complex world of financial risk management. Our aim is to attain a significant role in the development of actuarial theory and, consequently, practice. It is widely perceived that theory and practice are somehow in conflict, or that the divide is so wide as to be practically unbreachable. This perception needs addressing.

Technology transfer through scientific research is rarely a single step process. Commonly, a paper will be published with an original idea which, perhaps, only a few specialists understand. It may be in response to a known industry issue, or may be more speculative. One or two people might take the idea a bit further, adapting or applying it to a more practical situation, or devising the numerical techniques to do so. Still, the work might be understood by only a relatively small number of people. The difficult step, at least in actuarial science, is the step to implementation. In my experience, there are two ways for this final step to occur. Each method requires an agent of change, a practitioner who has the openness and insight to see the value in an idea which she or he may not even fully understand. Perhaps a software developer sees a new idea and implements it in its software. The idea becomes widely used, even though most users do not even know it; or a 'change agent' may be, in practice, perhaps a consultant, or a research actuary for an insurer or a reinsurer. The agent becomes the medium for spreading a message to the industry, either through private consulting or by writing another scientific paper specifically designed for practitioners to read

and implement. We know such agents in actuarial practice — I would suggest Andrew Smith as a prime example in the United Kingdom.

Although technology transfer is generally used in terms of the movement of ideas from university to practice, in a profession such as ours the traffic is by no means one way. Many of the most important research ideas in actuarial science have come from practising actuaries, such as Redington, or by actuaries with one foot in industry and one in academe, such as David Wilkie. Gompertz, Makeham, Thiele, Lundberg and Cramer all developed important theoretical advances in actuarial science, and each worked as a chief or senior actuary for an insurance company. The perception of a divide between theory and practice is, apparently, a modern phenomenon in actuarial science, and one which we need to dispel; modern insurance products are becoming increasingly complex, and their risk management demands the technical advances emerging from research. In a few steps, a paper which looks impenetrably abstract or foreign to a practising actuary may lead to important practical developments.

Here is an example. The topic of risk measures — a function applied to a profit or loss distribution to assess economic capital — began to take on a new urgency as banks and insurers were required to undertake risk-based calculations of economic or solvency capital. Some academics started to look at risk measures in greater detail — in particular, and most famously, the joint academic-practitioner team of Artzner, Delbaen, Heath & Eber (1999). Their paper in mathematical finance is quite a demanding read. Many readers would not classify this as a practical paper, and yet it has had an enormous practical impact. Meanwhile, Shaun Wang was working on new approaches to premium principles (Wang *et al.*, 1997). A few researchers, recognising that premium principles are risk measures too, combined the areas. Several researchers came to the conclusion that a good balance of attractive characteristics, intuitive application and theoretical soundness was achieved by the risk measure variously known as Tail-VaR, the conditional tail expectation (CTE) and the expected shortfall (the plethora of names comes from the fact of concurrent research by different researchers). This risk measure — the average loss, given that the loss lies in the worst part of the distribution — is now widely accepted in practice. A major factor on the step from theory to practice was the involvement of academics and industry researchers in the development of solvency standards for Canadian equity-linked insurance (SFTF, 2002). The research does not rest, however. Technical discussions continue on the precise properties of different risk measures, on whether the coherence characteristics are actually necessary, and on developing more sophisticated multi-period solutions.

Of course, some work never makes it to practice. The problem is that we cannot know which papers will be developed and which will not. Some highly theoretical work in number theory which is several decades old is now hugely important in developing efficient quasi Monte Carlo

simulation methods, implemented in many actuarial and financial software products.

Our aim for the *Annals of Actuarial Science* is to publish good theory and good practice and all the steps in between. We hope to be read by both researchers and practitioners and by the people who combine research and practice. We will publish research which is theoretical as well as research which is meant for immediate practical implementation. An idea from industry may be refined or honed by technical experts. We will publish papers from around the world; some will have more British resonance than others — with globalisation, a narrow geographical focus no longer makes sense. This variety is fully represented in this first issue. We have papers on financial economics, financial engineering, pensions, ruin theory, mortality and life insurance practice. Our authors are writing from six different countries. Some of the papers contain more advanced theory; some do not. Some of the authors are academics and some are practitioners. This first issue augers well for the future of this journal. If the *Annals of Actuarial Science* can become a lively forum for problems and solutions to be passed between industry and academic actuaries, we will have achieved something very useful.

#### REFERENCES

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