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GUEST EDITORIAL

ACTUARIES AND THE GREYING OF THE DEVELOPED WORLD

By J. C. Hickman

How are we doing? The world is now embarked on a new millennium. It seems therefore appropriate to ask how actuarial science is fareing.

The good news is, as actuaries, we can claim at least a partial intellectual victory. The basic actuarial principle is one for valuing future uncertain economic events. The principle prescribes computing the expected present value of the future random economic events and adding a risk-based component. Actuaries have developed and applied this idea over the past three hundred and fifty years. Within the past century, financial economists, using a combination of observations and theory, have established that open markets for financial instruments and commodities perform the same function. In fact, these markets use the same basic idea. This realisation has spawned a flood of technical ideas and business innovations. Alas, actuaries were not the pioneers in this extension of their basic ideas. They are now at work developing the implications of the new insights about financial markets in their traditional fields of application.

In looking through a glass darkly toward the future, perhaps we should try to make out new fields of applications for the updated set of actuarial tools. Social and economic changes have made some of the traditional fields of application less fertile. For example, dramatically improved mortality, extensions of social insurance, smaller families and multiple wage earners within families have slowed the growth rate of life insurance. Are there new and pressing business or social problems that are amenable to management using actuarial models? I believe that the answer is 'yes'. To support this optimistic response, I will turn to expert opinion.

In its one hundred and fifty six years of existence, the membership rolls of the Institute of Actuaries have listed a host of creative people and more than a few real characters. Augustus DeMorgan (1806-1871) belongs to the intersection of the set of creative mathematicians and the set of interesting characters, and he belonged to the Institute. He was the grandson of James Dobson, whose ideas provided a foundation for the Society of Equitable Assurances on Lives and Survivorships. DeMorgan entered Cambridge at age sixteen, earned a BA, but because of objections to a theological requirement, left without an MA.

It is easy to dismiss DeMorgan as good in mathematics, but, in essence, a harmless pedant. Apparently he had no interest in politics. He never voted, and never visited the House of Commons, the Tower or Westminster Abbey.

Yet his burning passion for academic freedom entitles him to membership in the set of resolute characters. Twice in his academic career he resigned because of his objection to theological requirements for university appointments. Other professionals, including actuaries, can benefit from his example of foregoing personal advancement in support of a principle.

Today his name is associated with two innocent identities in set theory, or symbolic logic, that are of considerable value in designing computer circuits. He was an excellent teacher, and supplemented his meagre academic salary by contributing to encyclopedias.

I can give readers a sense of DeMorgan and some exercise of the little grey cells by repeating his response to an inquiry about his age: "I was x years old in year x^2." Please confirm that those born in 1980 will be able to make the same statement.

DeMorgan did not make substantial contributions to actuarial science. Yet, in the early volumes of the *Assurance Magazine* and the *Journal of the Institute of Actuaries* his papers appeared frequently.

He had an almost unbounded enthusiasm for insurance as a mechanism for managing human problems. He called insurance: "the most enlightened and benevolent form which the projects of self-interest ever took."

If insurance is such a great idea, what new and dominant problem is a candidate for its application? To answer that question, we turn to Peter Drucker. For over sixty years, Drucker has been one of the most perspective commentators on the passing business parade. When asked the biggest challenges facing the world in the twentieth first century, he answered: "The first is to adjust our society, especially in the developed countries, to the greatest change the twentieth century has wrought, which is the change in demographics."

Drucker's answer is not news to actuaries. The reform of social insurance and private pension systems, prompted by the demographic changes Drucker mentions, have been on the actuarial agenda for several years. Are these other insurance type programmes endorsed by Drucker? To provide a framework to answer this question, we turn to another expert, Adam Smith.

Smith is known as an economist, but he was much more. In fact, he has been called the greatest of all British philosophers. In 1776 Smith's influential *An Inquiry into the Nature and Causes of the Wealth of Nations* was published. In the Introduction and Plan of the Work, Smith wrote: "But this proportion must in every nation be regulated by two different circumstances; first by the skill, dexterity and judgement with which its labour is generally applied; and secondly, by the proportion between those who are employed in useful labour, and that of those who are not so employed." The proportion that Smith refers to early in the sentence is now called the per capita gross domestic product.

What can insurance systems, designed and managed by actuaries, do to improve the two circumstances identified by Smith as determining a nation's

wealth in the face of the demographic challenge singled out by Drucker? I suggest five possibilities:

— *Phased retirement*. The second of Smith's two circumstances, "the proportion employed in useful labour" can be improved by phased retirement. Phased retirement involves reduced working hours and an income that is a mixture of earned salary and pension income. A programme of phased retirement requires changes in pension regulation and income taxation. Even bigger changes will be necessary in work assignments, compensation and benefits to achieve a seamless programme. Such a programme, in Smith's view, would have a favourable economic impact. In addition, the programme would moderate adverse political and social consequences of a population sharply split between workers and retirees.

— *Long-term care*. The magnitude of the need for long-term care in the future in developed nations is awesome. Improved mortality, reduced family size and increased family mobility have escalated the problem. The initial response to the increasing need for financing long-term care has been to develop new special purpose insurance policies and to modify standard life insurance contracts to permit accelerated payments. How about modifying pension benefits? Income needs advance with age, as more services must be purchased. Perhaps initial benefits could be lower, in accordance with the need for phased retirement, with increases tied to losses in the ability to perform the activities of daily living. Such a pension plan would have a greater insurance element than current plans, but can we afford to finance long-term care as a new, uncoordinated benefit? Clearly this possibility is not independent of phased retirement.

— *Retraining*. Human capital, the skill, dexterity and judgement with which labour is generally applied, in Adam Smith's language, is now the principle determinant of national wealth. Because of the high rate of technological change, human capital developed in an earlier time soon becomes obsolete. No longer can a person work out his working lifetime using skills acquired before age twenty-five. Allen Greenspan, long time Chairman of the United States Federal Reserve Board, has said: "The major capital of the next century is going to be minds that produce ideas." The necessity for frequent retraining seems clear, but who will pay? Candidates include individual workers, employers or government. No matter which path is selected for funding, a new funding programme is required. The programme should be supported by an actuarial model.

— *Productivity*. A free economy depends on incentives rather than government directives to spur productivity. This fact generates a question about whether existing employee benefit plans inhibit the most productive use of our most valuable resources, our people. Do we have sufficient portability of benefits to create an efficient labour market? This question creates another actuarial opportunity.

— *Compensation*. In many industries it has been the expectation that real compensation will increase, and certainly not decrease, with age. As our society ages, this expectation could produce an upward slope in labour costs, reducing the living standards of the entire population. Can actuaries help measure productivity as a function of age to improve the match between productivity and compensation? The information could also be an input into a plan for phased retirement.

It is abundantly clear that these suggestions for actuarial action are not independent. The cosmic conclusion is that, to remain viable, the actuarial profession must remain alert to the forces that are changing the societies they serve. Actuaries must also have the intellectual tools to respond to these forces by designing appropriate insurance systems to mitigate the unfortunate consequences of these forces. If they can do this, actuaries will have an assured role in the future.

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