

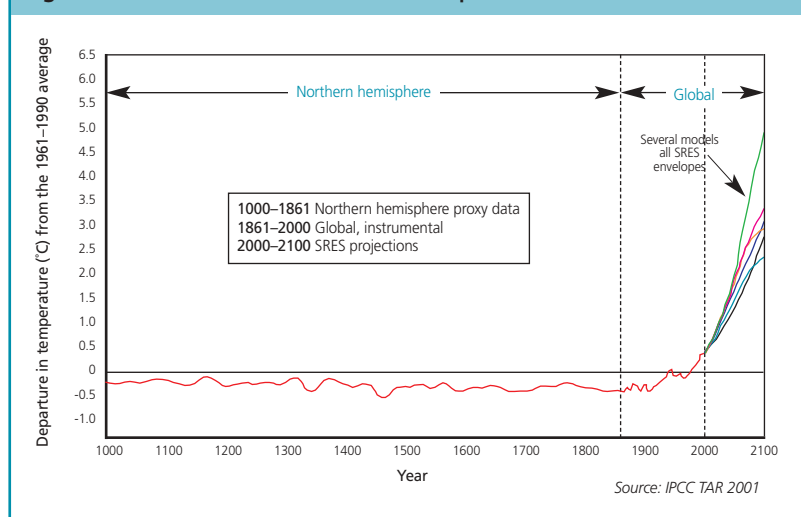
Saving the planet

Nick Silver asks how actuaries can save the planet (and make a healthy profit).

WHILE I WAS WRITING THIS ARTICLE, I noticed what a lovely day it was and so I took my laptop off to Primrose Hill to finish writing the article in the beautiful sunshine. It therefore seems churlish to complain that London should be cold and wet at this time of year. However, the price we will have to pay for sunshine in March is rather high.

In my previous article in last month's *Actuary*, I introduced the problem of human-induced climate change, emphasising that this is something happening now and that it affects us all: where we go on holiday, where we live, and even what actuarial assumptions we use.

Figure 1 Variations in the earth's surface temperature – 1000–2100



As a reminder of the discussion, figure 1 shows how average temperatures in the northern hemisphere, which have been approximately constant for the last thousand years, have seen a dramatic increase over the last half-century. It is generally agreed that this warming has been caused by human activity, and that the trend is set to continue over the next century.

In this article, I shall outline how actuaries can help reduce this problem through their activities in investment and general insurance, and in so doing open up exciting new business opportunities.

General insurance

The insurance industry will be the first to be hit by the effects of climate change. We can already see this happening: figure 2 across shows the frequency of billion-dollar weather disasters. The frequency of these has progressively increased through the 1980s and 1990s (although much of the increase is not the result of meteorological factors at all, but increasing property values in hazardous areas).

The UK Chartered Institute of Insurers predicts that, assuming these trends continue, weather-related damage will be larger than economic growth by the year 2065. It is sobering to note that even in developed countries, 50% of economic loss resulting from extreme events is borne by the victim. This proportion rises to nearly 100% in less developed countries. In addition, these extreme events will cause damage to business which is far in excess of physical damage (for example think of the tourism industry), a loss that is currently barely covered by insurance. So, although the insurance industry will bear a large proportion of the impact of climate change, society as a whole will face the majority of the cost. There therefore exists a potentially large market as yet untapped by the insurance industry.

Insurers can reduce risks in four ways.

- 1 Exclude risks** – for example by not writing certain risks or by writing exclusion clauses.
- 2 Mitigate risks** – working with other parties to avoid damage (for example building flood defences) and helping the customer after the damage has happened.
- 3 Transfer risk** – either by reinsurance, or by legal action if it can be shown that the claim was caused by negligence.
- 4 Adjust product price** – increasing premiums and excess and reducing maximum liability per claim.

The above could be classified into taking positive action (mitigation, helping customers) and negative action (increasing premiums and excluding risks). The former will involve insurance companies cooperating with others, for example working with clients or lobbying governments for better flood protection.

It is not in the interest of the insurance industry to overuse the negative actions – these do not lead to good relationships with clients, regulators, or governments and can result in costly disputes. Furthermore, excluding risk also means excluding premiums and potential business. A better solution would be to price these risks more accurately and to widen the product base to meet the actual needs of the client, for example by selling insurance for loss of business owing to climate change.

It is generally agreed that there will be an increasing probability and incidence of catastrophes. A simplistic approach to modelling, by projecting forward past data, would lead to a severe understatement of the risk. The latest developments in this field are to model likely hazards, and quantify the uncertainty. Crucial for insurers will be the future behaviour of extreme weather events. This could involve actuaries working closely with scientists to build weather incidence models.

The traditional method of passing on the risks

through reinsurance may no longer be viable: the capital available to reinsurers may not be large enough, and reinsurance premiums will need to increase dramatically. Market alternatives are currently being developed, such as catastrophe bonds and weather derivatives. These instruments securitise risk, and can be sold on financial markets; their attraction to investors is that they are not correlated with the business cycle.

Actuaries will need information provided by climatologists to model claims scenarios and hence assist in the pricing process. Only by understanding the science and potential risks can we really provide added value to insurers. In this way, the public interest will benefit, in that insurers will be left with an alternative rather than just having to exclude cover.

The insurance industry faces a choice. It can pull up the drawbridges and go into siege mode, insuring fewer and fewer weather risks and increasing premiums, thereby passing the problem onto society and governments. Alternatively it can be innovative, using sophisticated risk modelling to provide society with solutions to this global problem.

Investment

Climate change introduces a new area of risk into asset allocation decisions. This risk is not uniform across all asset sectors and countries. For example:

- ◆ particular geographical locations (Bangladesh or Florida, for example) will be susceptible to increased weather risk, so securities with exposure to these areas will have a higher risk associated with them;
- ◆ certain companies (for example insurance companies) will be heavily exposed;
- ◆ some companies carry high political risks, for example oil companies may have their activities curtailed or face litigation; and
- ◆ property portfolios may be at risk from extreme weather events and sea level rises.

The efficient market hypothesis implies that the market will adequately reflect these risks. However, this is not necessarily the case, given that markets are over-susceptible to short-termism, and are notoriously bad at pricing long-term risk. More specifically, actuarial liabilities (especially pension funds) have time frames comparable to climate change scenarios, whereas other investors are likely to have shorter-term liabilities. Insurance companies have a particular vested interest in not investing in companies with an impact on the climate. We are at the moment seeing a polarisation of insurers' investment policies; some companies are taking a lead on 'environmental' investments while others are ignoring the problem entirely.

Taking a wider definition of risk management, I personally think that actuaries have an extra duty of care. Institutions own a large proportion of corporate UK. It is clearly not in beneficiaries' long-term interests to have large pensions but lose their homes to flooding. Intergovernmental action to date has been wholly in-

adequate. It may therefore be in our enlightened self-interest to suggest to clients that they consider implementing carbon reduction investment strategies.

New opportunities

So far this article has been mostly doom and gloom. However, in a world of increasing uncertainty, the profession 'making financial sense of the future' should be in a relatively strong position. I have already alluded to the opportunities offered to actuaries in the general insurance field – in catastrophe insurance and securitisation of risk, for example.

The debate over the cost of climate change is still raging. The argument often comes down to one of cost: is it cheaper to reduce carbon emissions now or clean up the hypothetical damage later? An actuarial insight should be crucial. We can rephrase the question of a relatively certain cost now against an uncertain future present value calculation. Pricing this sort of model is a key actuarial skill, and, working with other professionals, we could easily adapt current models to deal with this problem.

Another obvious area for actuarial input would be carbon emissions trading. The European Union has recently announced that it will set up a trading mechanism to meet its obligations under the Kyoto Protocol to reduce carbon emissions; companies and countries ('emitters') are allocated emissions licences. If emitters reduce their emissions by more than this amount, they can sell their unwanted licences on the market to emitters who have not met their target. As you can imagine, this poses large practical problems in terms of measurement and pricing, problems which have not yet begun to be resolved.

A choice for the profession

As this article shows, there are a number of pertinent questions, which require answers in the not-too-distant future. There is a huge need for further research, particularly into the financial and economic impacts of climate change, and the cost of the various associated risks. There will also be large commercial opportunities, should we choose to take a lead in this field.

The evidence strongly suggests that climate change will happen and will have a large impact on human socio-economic activity. This presents our profession with a choice: we can make provisions for the impact, take an active role in reducing the risks, and position ourselves to advantage from the commercial opportunities that will arise. Or we can bury our heads in the sand, and wait for the rising sea levels to wash us away. □



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Figure 2 Number of billion-dollar weather disasters

