Improvements in mortality

The last century has witnessed very significant improvements in mortality. In the first decade of the twentieth century the life expectancy at birth for males in England and Wales was 48.5. The figure in 2000 was 75.9!

For life assurance companies this means that their death claims are less; for pension schemes it means that pensions are payable for longer. For nearly 20 years the CMI has produced tables which allow for mortality improvement. In other words instead of a table showing q_x the table needs to show $q_{x,t}$ where x represents age and t represents the calendar year of the projection and

$$q_{x,t+1} < q_{x,t}$$

To show the significance of the changes in mortality rates, using the A 1967/70 table which is the table used in the class sheets $q_{[53]} = .00376288$. Using the latest table produced by the CMI $q_{[53]} = .002115$

Another example of this is found in a speech I gave three years ago:

> *Ten years ago, if you were 60 you could have bought an index linked pension of £10,000 per annum for £135,000. To do that today would cost you nearly £200,000. Or, to put it another way, the £135,000 buys a £10,000 index linked pension for a man aged 70."*

Laws of Mortality

The 2 straightforward "laws" were covered last term:

Gompertz' Law: $\mu_x = Bc^x$

Makeham's Law $\mu_x = A + Bc^x$

The CMI is now exploring the use of stochastic models to forecast future mortality rates. This is covered in their Working Paper 15 which can be found at

http://www.actuaries.org.uk/files/pdf/cmi/wp15/wp15.pdf

In it they describe the Lee-Carter model where:

$$\log \mu(x,t) = a(x) + b(x)*k(t) + z(x,t)$$

where x is age and t is calendar year. And z(x,t) is a random error term (or stochastic innovation).

Insurance Contracts