

Actuarial Science Hilary Term Lecture 7

Premiums and Reserves

Last week we looked at life assurance functions A and a and the relationships between them.

We go on this week to look at the calculations of premiums for various insurance contracts and the reserves that an insurance company needs to hold in respect of its insurance contracts.

Premiums

There are 2 main ways of paying premiums:

Single premiums where one premium is paid at the start of the contract and no further premiums are payable.

Regular premiums where premiums are paid at regular intervals (yearly, half yearly, quarterly, monthly) for a specified term – often the length of term of the contract.

Single premiums are straightforwardly the Expected Present Value of the future payment of the sum assured. Thus for a whole life assurance to an individual aged x , the single premium is merely A_x .

For the rest of the lecture we will concentrate on regular premium policies and furthermore, we will look only at annual premiums. We will also consider level premiums (i.e. the premium does not change year to year). Premiums are always payable in advance with the first premium due at the commencement of the contract.

Net Premiums

Net premiums (also known as pure premiums or risk premiums) make no allowance for any expenses. They are calculated using only a given mortality table and interest rate.

In the following cases we are looking at policies issued to a life aged x . Where relevant the term of the contract is n years:

The net premium notation is P .

Thus for a whole life assurance:

$$P_x = A_x / a_x$$

For a term assurance:

$$P'_{x:n} = A'_{x:n} / \ddot{a}_{x:n}$$