

MAS224, Actuarial Mathematics: Life Assurance Glossary

Life assurance policy: this is a contract which pays a specified amount of money (called *benefit payment* or sum assured) on the death of a specified person (called *life assured*).

We will consider 4 types of life assurance policies.

(1) Whole life assurance: this is a life assurance policy which pays on the death of the life assured at any future time (i.e. the policy remains in force for the whole life of the assured person).

(2) n -year term life assurance: this is a life assurance policy which pays on the death of the life assured only if the death occurs within a within n years from the start of the contract (i.e. the policy remains in force only for a fixed term of n years).

(3) Pure endowment policy: this is a contract which pays a benefit on the survival of the life assured to a certain age/ date.

(4) n year term endowment policy: this is a policy which combines an n -year term life assurance with a pure endowment policy, i.e. it provides for a benefit either on the death or on the survival (of the life assured) to the end of the n -year term whichever event occurs first.

The benefits may be level (constant) or they may decrease or increase in the way specified in the contract.

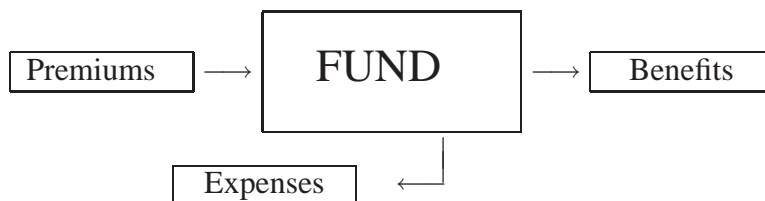
With profit policies: the benefits may be increased by additions called bonuses.

Without profit (non-profit) policies: the benefits are completely specified in money terms in the contract.

Premium(s): one-off payment or payment in regular installments made to the insurance company (the life office) in return for payment of the benefit.

In this course, we consider non-profit policies with level benefits only.

Normally, the life office invests collected premiums into a fund. This fund earns interest and is used to pay out benefits.



Premiums normally include charges. The charges are used to cover for the life company's expenses. Premiums are worked out by applying the equation of value: when invested into the fund they should generate a return which then will be used to pay out the benefit and to cover the company's expenses.

We assume no expenses (for simplicity). Under this assumption we should equate the present values of benefit and premiums. However, these present values are random variables, as they depend on the survival of the life assured: the benefit is paid on the death of the life assured and the premiums are normally paid whilst the life assured is alive.

As the exact time-until-death for the life assured is unknown, the premiums are worked out by equating the expected present values (E.P.V.) of the benefit and premiums:

$$\text{E.P.V. of benefit(s)} = \text{E.P.V. of premiums}$$

Have to learn:

- how to calculate the E.P.V. of benefit(s);
- how to calculate the E.P.V. of premiums.

Payment of premiums can be regarded as a life annuity. We shall calculate the corresponding E.P.V.'s later on in the course.

During the next two weeks we shall be calculating the E.P.V. of life assurance benefits.

We shall consider three modes of payment of the death benefit:

- death benefit payable on the moment of death
- death benefit payable at the end of the year of death
- death benefit payable at the end of the month (quarter, week, etc.) of death.