



## Net Premiums for Elementary Types of Insurance in Life Insurance Processes

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**Abstract:** The article examines insurance premiums for several types of insurance, widely used in the processes of life insurance of people, and also provides formulas for calculating their types and values.

**Keywords:** Life insurance, insurance rent, insurance fund, ordinary life annuity, postnumerando, insurance contract, insurance payments, insurance period, premium amount.

### Introduction

Insurance is an important element of society as a system for protecting the property interests of citizens. It ensures the continuity of all types of social activity and the preservation of people's living standards and incomes in the event of insured events as a result of certain events. Calculations in the insurance process are complex mathematical calculations based on the methods of probability theory and statistics, as well as financial and economic analysis of macroeconomic and microeconomic indicators. Insurance calculations are based on long-term forecasts of the state of the economy and its development, the political situation, and an assessment of the expectations of society.

### RESEARCH METHODOLOGY

Currently, life insurance is becoming increasingly popular. Life insurance is a social and financial protection that covers many events: for example, illness, death, or survival to a certain age. There are several elementary types of insurance in human life insurance, and these concepts are widely used in life insurance processes.

### RESULTS AND DISCUSSIONS

Pure life insurance: Let us first consider the simplest case, where there is no waiting period and the premium is paid for the entire term of the insurance contract. At the insured's age, the insurance period is equal to the premium payment period in years.  $P = \frac{A}{\ddot{a}_{x:\overline{n}|}}$  According to the

formula, the amount of the insurance premium with a unit of insurance is equal to the sum insured divided by the corresponding extension fee coefficient:

$$P_{x:\overline{n}|} = \frac{A_{x:\overline{n}|}}{\ddot{a}_{x:\overline{n}|}} \quad (1)$$

The premium payment period may either coincide with the contract period or be shorter than it. In the latter case, the policy will indicate the age of the insured at which the policy will be fully paid.

If the premium payment period is equal to a year,

$$\text{Then } P = \frac{A}{\ddot{a}_{x:\overline{m}|}} \text{ the annual contribution amount according to then is } P_{x:\overline{1}|} = \frac{A_{x:\overline{1}|}}{\ddot{a}_{x:\overline{m}|}} \quad (2)$$

**Annuity insurance:** Annuity insurance is a type of life insurance that provides for a series of regular insurance payments over a period of time or for life (subject to survival until the end of the payment period) instead of a lump sum payment until the end of the contract. Therefore, in addition to the premium payment period and the expected period provided for in life insurance, the period of insurance payments during which the insurer performs its financial obligations to the insured is also distinguished. Let us first consider a simpler case, where there is no expected period. Suppose that a person reaches a certain age and a lifetime annuity payment period begins, and the insurance contract provides for a period of payment of contributions during the year. In this case, the expected present value of the annuity extended for this year is

$${}_m|\ddot{a}_x = \frac{N_{x+m}}{D_x} = \frac{N_p}{D_x} \quad (3)$$

The extension coefficient corresponding to the payment period of the given insurance premium is

$$\text{equal to } \ddot{a}_{x:\overline{m}|} = \frac{N_x - N_{x+m}}{D_x} = \frac{N_x - N_p}{D_x} \quad (4)$$

(3) divided by (4)

$${}_m|P_x = \frac{{}_m|\ddot{a}_x}{\ddot{a}_{x:\overline{m}|}} = \frac{N_{x+m}}{N_x - N_{x+m}} \quad (5)$$

If the contribution period is less than the extension period, then the annual contribution amount is

$${}_{p-x}|P_x = \frac{{}_{p-x}|\ddot{a}_x}{\ddot{a}_{x:\overline{m}|}} = \frac{N_p}{N_x - N_{x+m}} \quad (6)$$

is determined by the formula: for a year-long quick rent

$${}_{p-x}|P_{x:\overline{n}|} = \frac{{}_{p-x}|\ddot{a}_{x:\overline{n}|}}{\ddot{a}_{x:\overline{m}|}} = \frac{N_p - N_{p+n}}{N_x - N_{x+m}} \quad (7)$$

we get.

**Life insurance for the event of death:** Unlike whole life insurance, there is no waiting period in life insurance, i.e. the insurance premium has been paid in full, and the insurer has not yet started to make insurance payments. The insurance event that obliges to make this payment is the death of the insured, which can occur at any time after the conclusion of the contract. Let us consider the simple case of insurance where the insured is initially a life insured, the premiums are paid over the insurance period, and the insurance payment is made immediately after death (i.e. the premium payment period is lifelong). The unit sum insured is equal to the sum insured divided by the corresponding extension coefficient of the policy value paid at the same time.

$$\bar{P}_x = \frac{\bar{A}_x}{\ddot{a}_x} = \frac{i}{\ln(1+i)} \cdot \frac{M_x}{N_x}. \quad (8)$$

If the period of payment of contributions in whole life insurance in the event of death is limited (up to the age of 18), then the extension coefficient

$$\ddot{a}_{x:\overline{p-x}|} = \frac{N_x - N_p}{D_x} \quad (9)$$

The annual contribution amount from the unitary insurance fund

$$\text{is } \bar{P}_x = \frac{\bar{A}_x}{\ddot{a}_{x:\overline{p-x}|}} = \frac{i}{\ln(1+i)} \cdot \frac{M_x}{N_x - N_p} \quad (10)$$

is determined by the formula: for life insurance for a period of one

$$\text{year } \bar{P}_{x:\overline{n}|} = \frac{\bar{A}_{x:\overline{n}|}^1}{\ddot{a}_{x:\overline{p-x}|}} = \frac{i}{\ln(1+i)} \cdot \frac{M_x - M_{x+n}}{N_x - N_p} \quad (11)$$

We will have.

### Conclusion

Mixed (Combined) Life Insurance: This type of insurance is a combination of term life insurance and endowment insurance for a specified period. It is commonly referred to as endowment insurance. The insurance benefit is paid to the insured if they survive until the end of the term, or to the beneficiary in the event of the insured's earlier death. The single premium for such insurance is equal to the sum of the single premiums for both the term life and endowment components:

$$A_{x:\overline{n}|} = A_{x:\overline{n}|}^1 + A_{x:\overline{1}|} \cdot \frac{1}{n}. \quad (12)$$

The amount of periodic premiums in the payment of extended insurance premiums is equal to

$$P_{x:\overline{n}|} = \frac{A_{x:\overline{n}|}}{\ddot{a}_{x:\overline{n}|}} \quad (13)$$

Sometimes, when a mixed life insurance is taken out with unequal insurance amounts, the death benefit is chosen to be greater than the survival benefit. In such cases, the survival insurance reserve is taken as the basis for calculating the premiums, and the single premium for one unit of insurance reserve is equal to

$$A_{x:\overline{n}|} = \gamma A_{x:\overline{n}|}^1 + A_{x:\overline{1}|} \cdot \frac{1}{n}, \quad \gamma = \frac{S_d}{S_s} \quad (14)$$

where  $k$  denotes the ratio between the death benefit and the survival benefit reserves.

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