

METHODS OF CALCULATING DEFINITION RATES IN LIFE INSURANCE

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Abstract: The life insurance studied in the article is a set of insurance types that provide insurance protection against events related to human life, i.e., his life expectancy (living) and death. In order to take out life insurance, it is necessary to calculate its price, that is, the rate of definition. Definition rates are calculated by different methods for each type of life insurance. If the object of life insurance is the property interests related to a person's life, the subject is a person's death, reaching a certain age, illness, accident, birth of a child, marriage and other situations. In this article, based on the demographic statistics about population death and age structure, which is the source of the calculation of the definition rates, the table of death developed using a special methodology for the last years on the scale of Uzbekistan is presented. With the help of this table, a switching table has been created that can be used to calculate the desired interest rate of life insurance in insurance companies. Also, for the sake of convenience, a copy of this table in Excel is provided for wide use in practical issues.

Key words: Life insurance, life insurance definition rate, switching table

Introduction: Life insurance is the basis of personal insurance networks, which provides protection against all events that may occur throughout a person's life, including illness, accident, reaching a certain age, marriage, It is an activity that consists of covering the existing insurance amount by the insurer according to the contracts voluntarily concluded between the parties in case of child birth and even death, with the purpose of material benefits from various such situations.

Life insurance to the insurer

1. when the policyholder lives to the end of the insurance period or to the age specified in the contract;
2. provides for the obligation to make payment upon the death of the insured.

Distinctive features of life insurance:

1. Analysis of insurance risk in life insurance, the method of calculating the definition rate is based on the "death table".
2. Making a long-term prediction of the expected life expectancy of the insured is the basis for calculating the definition rate.

3. Formation of insurance reserves in life insurance is carried out during the term of the contract (10, 15 and more years) according to a specific contract.
4. Since accumulation of insurance reserves is long-term, it gives the insurer the opportunity to invest free funds.
5. When calculating the rate of definition in life insurance contracts, it is assumed to calculate the amount of income in the form of interest.
6. Life insurance contracts are long-term contracts.
7. The cost of the insurance payment will be a pre-agreed exact amount, not compensation. In this case, the insurance amount is determined only according to the wishes and financial capabilities of the insured.
8. The insurer knows in advance the price and probability of the insured event, but does not know the period of occurrence of the insured event.

The life insurance type of life insurance is the life of the client of the insurance event for the specified period, that is, the individual is insured for the specified sum insured and for the specified period. In this type of insurance, in order for an insured event to occur, the insured person must have lived until the end of the specified period, then he will receive the sum insured specified in the contract. If the insured person (or beneficiary) dies within the period specified in the contract, then the amount will not be paid and the contribution will not be returned. Such is the condition of the contract. Now we determine the current value of the insurance payment at the time of concluding the insurance contract. Let's say that a group of insured persons of x age and l_x number signed a life insurance contract with the insurer for a period of n years. Insureds who survive to the end of the term will receive sum assured of S amount. It is known that if the insurer pays S amount to each of the l_{x+n} number of policyholders who have lived to the age of $x+n$ at the end of the term, the total insurance amount will be paid in the amount of $S \cdot l_{x+n}$. The present value of this amount at the time of the contract is equal to $v^n \cdot S \cdot l_{x+n}$, where $v = \frac{1}{1+i}$ is the discount factor, i is the interest rate, or the annual rate of return. In that case, to each insured person

$$P = v^n (l_{n+x}/l_x) = v^n \cdot n p_x \tag{1}$$

corresponds to the amount. This is the value of the insurance premium that each policyholder must pay at the time of signing the contract. The amount on the right side of the formula (1) is called the actuarial current price of sum insured S or the expected current price of S .

The insurance premium of one unit sum insured ($S=1$) is called the definition rate or definition, i.e.

$$T = v^n (l_{n+x}/l_x) = v^n \cdot n p_x \tag{1} \quad \text{is written in the form.}$$

If the client of the insurance company dies within n period, the life insurance premium is non-refundable and this amount is distributed to the surviving policyholders. In non-life risk insurance types, in all contracts, the value of the insured loss is always equal to the value of the sum insured and the sum insured is paid at the end of the term, unless discounting is applied in life insurance, then the premiums for both types of insurance would be equal. So, even in this case, the life insurance premium will be smaller than the risk insurance premium due to discounting.

In order to provide a single, uniform approach to solving actuarial issues in life insurance, unified (general) actuarial definitions were adopted at the second International Congress of Actuaries held in London in 1898. These designations are still used today. The capital letter A of the Latin alphabet is used to designate one-time payment contributions of various forms, and the lower case letter a is used for regular (permanent) periodic payments. According to this accepted notation, formula (1) is written as

follows:
$$A_{x:n}^1 = v^n (l_{n+x}/l_x) = v^n \cdot n p_x$$

In other words, (3) formula 1 p.p. amount from x+n period is the expected (since $n p_x$ is the probability) current value at period x. Here $A_{x:n}^1$ is called the actuarial discount factor. Adding the word actuarial to discounting means that there are $n p_x$ probabilities. In other words, the process of finding the insurance premium is actuarial discounting of the insurance sum S.

Switching functions. Commutative functions To simplify actuarial calculations, functions called commutative functions are often used. Special tables are made for switching functions. Here are the important switching functions with their designation:

$$D_x = v^x \cdot l_x$$

$$N_x = D_x + D_{x+1} + \dots + D_\omega$$

$$C_x = v^x \cdot d_x$$

$$M_x = C_x + C_{x+1} + \dots + C_\omega$$

Based on these notations, for example, $A_{x:n}^1$ via commutation function

$$A_{x:n}^1 = \frac{D_{x+n}}{D_x}$$

can be expressed in the form.

From the mortality table, it is possible to create a commutative function table for all ages at a given interest rate, then for actuarial calculations, without referring to the mortality table, only the commutative function table can be used. That is why switching functions are widely used in actuarial calculations.

Summary. The source of the calculation of definition rates is the statistical data on the death and age structure of the population, and the tables of death and average life expectancy developed by the demographic statistics department using a special methodology. Such tables are used by insurance organizations to calculate the definition rates of life insurance and to compile a table of values of switching functions. Definition rates are dependent on the rate of return of switching functions, which is constantly changing. If this change is not taken into account, the calculations will be incorrect.

REFERENCES:

1. O.T. Yuldashev, Sh.A. Zakirkhodjayeva, Life insurance. Study guide, - Tashkent-Finance,-2020, p123-128
2. I.Kh. Abdurakhmanov Theory and practice of insurance, Tashkent "Economy-Finance" 2018, p. 140
3. Фалин Г.И., Фалин А.И. Введение в актуарную математику. М., 1994 г.
4. Фалин Г.И. Математические основы теории страхования жизни и пенсионных схем. – Издание 2-е, перераб. и дополнен. – М.: Анкил, 2002 г.
5. Касимов Ю.Ф. Введение в актуарную математику (страхование жизни и пенсионных схем). – М.: «АНКИЛ», -2001, 176 с.
6. Кагаловская Э.Т., Попова А.А. Страхование жизни: тарифы и резервы взносов (финансовые основы страхования жизни) Практическое пособие- М.: АНКІЛ, 2000. 231с.