ACTUARIAL TECHNIQUES TO ASSESS THE FINANCIAL PERFORMANCE. INSURANCE APPLICATIONS

MIHAELA BOTEA, MARINEL NEDELUȚ, CORINA IOANĂŞ, MIHAELA GRUIESCU [*]

ABSTRACT: *The XXI century was marked by the convergence and harmonization, this century is distinguished in that it lays the foundation of accounting actuarial, which is characterized by up to date values and actuarial calculations . Actuarial accounting is reflected best in insurance system. In the market economy, insurance system is on one hand a means of protecting the business and property of citizens, on the other hand a business that generates profits. From this context, we can say that the subject of actuarial accounting is the measurement and recognition of assets and result of the change in time value of money. Time is an important variable considered in any economic decision investing and financing.*

KEY WORDS: *present value; actuarial calculations; assessment; insurance; maximizing enterprise value; fruiting factor.*

JEL CLASSIFICATION: *C10; G22; M41.*

1. INTRODUCTION

Up to date value or capitalized is an estimate at the present time of the value based on future benefit flows that occur in the normal course of business, meaning updating a value that becomes available later. General appeal to the IASB, the up to date value is defined in terms of future cash flows at the present time, the basic principle adopted is "a penny earned today is worth more than a penny earned in the future."

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[*] *Assoc. Prof., Ph.D., Academy of Economic Studies, Romania, mihaela.botea@yahoo.fr*
 Assoc. Prof., Ph.D., Financial Banking University Bucharest, Romania, nedelut@yahoo.com
 Prof., Ph.D., Academy of Economic Studies Bucharest, Romania, corina_ioanas@yahoo.com
 Assoc. Prof., Ph.D., Romanian American University, Romania, mgruiescu@yahoo.com

In this regard, the company as an independent element of the economic system interacts with business partners, with budgets from different levels, capital holders and other subjects, a process that makes possible the emergence of financial relations. In these circumstances, the role of accounting is to provide objective and accurate information to all users, especially business owners and capital investors.

The actuarial accounting:
- measure and record possible variations of interest rates and inflation;
- quantify in monetary terms the risk of economic activity;
- estimation using actuarial calculation, measurement and recognition of assets and profitability
- using actuarial calculation to maximize enterprise value

The concepts of up to date value, present value and future value, insurance premiums, annuity factor of fructification, mortality tables, switching numbers, technical reserves, mathematical reserves, solvency, solvency margin, the insured risk, risk management, actuarial calculations, accounting hedging, time periods, immediate/deferred payments-collections, anticipated/ordinary annuity payments-collections from accounting of commitments to the accounting for treasury, the capital adequacy rules, all forms the actuarial accounting content. To these are added the following structure: assets as strategic investments, working capital needs as functional investment, treasury investment that equilibrium equity financing and equity financing raised.

2. ACTUARIAL ACCOUNTING MODEL FOR ESTIMATING, RECOGNIZING AND ASSESSING LIFE INSURANCE PREMIUMS

In life insurance the insurer's concern is to ensure the stability of the financial results of their activity. He must work in order to fully cover on account of premiums received, the obligations assumed to policyholders. Premiums must cover the costs of contracting, purchasing insurance premiums collected, and so forth. For this reason the technique of setting insurance premiums and mathematical reserve is particularly important.

The calculation of life insurance premiums is the loss distribution principle of a person who has suffered as a result of insurance where, among many policyholders who have not suffered any damage. If payments are made from the fund arose format all insured as a result of payment of the insurance premium. The amount of the insurance premium is the expected value of insurance payments accruing to an insured person for the duration of the insurance. Insurance payments in the form of sum insured, the insurance company back and are made if life insurance as a result of death of the insured during the period of insurance or its survival until the expiry of that period.

Thus, to calculate insurance premiums need to be known: number of deaths, the number of survivors and the present value of the amount to be paid in the future (the amount required to be collected by the insurer from the insured to cover future payments death or survival to a certain age, provided that the proceeds are invested, for example capitalized). It follows that, in determining insurance premiums, start to

fructification data obtained from insurance funds and the data in the tables of mortality in the country analyzed.

3. FRUCTIFICATION INSURANCE FUNDS

To satisfy its obligations to policyholders, the insured sum payment on death or on expiry of insurance (survival) insurer creates the account premiums received from policyholders, a fund, capitalized as bank deposit in circuit economic or other investments, produce income. Of insurance proceeds by leveraging these funds are taken into account in calculating insurance premium size and depend on the amount of premiums paid into the fund, the retention time in the economic cycle and fruiting factor.

3.1 Determination of final value using the exploit technique

A sum of money paid to fruition over a period of n years, at the end of that period is:

$$S_n = S_0 (1 + i)^n \tag{1}$$

S_n - the amount obtained after fructification;

S_0 - Amount deposited to fruition;

$(1 + i)$ - Factor of fructification;

n   - the number of years the amount is deposited to fruition.

Example:
A person aged 25 years insure that is to receive over 10 years, if alive, the amount of 15,000 lei. The interest rate is 10%.
• To ensure survival with maturity over 10 years single net premium is as follows:

$$P_{nu} = S \cdot \frac{D_{x+n}}{D_x} = 15.000 \cdot \frac{D_{35}}{D_{25}} = 15.000 \cdot \frac{3.311,70569}{8.777,62631} = 5.660 \; lei \tag{2}$$

• If appropriate premium amount would be deposited in the bank for the same rate of interest and the same time, then at maturity would get the following amount:

$$SF = 5.660 (1 + 0,1)^{10} = 14.680 \; lei \tag{3}$$

Amount obtained from capitalizing bank deposit is less than that obtained from purchase to ensure survival. As a result, that person is more advantageous to conclude ensuring survival.

3.2 Determination of present value technique using update

In insurance the interest is to determine the present value of amounts to be paid or received over a number of years. In other words, we can calculate the amount to be

deposited to fruition now, at a certain interest rate, so that over a number of years to reach the level expected.

The present value is calculated by updating technique as follows:

$$S_0 = S_n \cdot \frac{1}{(1 + n)^n} \tag{4}$$

$v = \frac{1}{(1 + i)^n}$ is the discount factor so the formula to update the monetary unit is:

$$S_0 = S_n \cdot v^n \tag{5}$$

v^n - represents the present value of 1 lion will pay or receive over n years, under an interest rate *i*

Discount factor indicates how much must be invested with an effective interest rate *i* and over a year to get the 1 leu.

Example:

An insurance company wants to have the amount of 1,000 lei over five years, by depositing an amount X to a credit institution where the interest rate offered is 5%.

For this it is necessary to determine the present value of the amount of 1,000 lei (lei):

$$S_0 = S_n \cdot \frac{1}{(1 + n)^n} = 1.000 \cdot \frac{1}{(1 + 5\%)^5} = 784 \ lei \tag{6}$$

Therefore, the company must submit to fruition today the amount of 784 lei with interest at 5% over 5 years to have the amount of 1,000 lei.

4. MORTALITY TABLES AND SWITCHING NUMBERS

Mortality tables include a number of demographic indicators determined based on the number of survivors and deaths, by year of birth and age for men, women and both sexes can also be prepared on demographic region or socio-professional categories. For some needs, starting either from general mortality tables (complete) or using estimation functions are constructed abbreviated tables, means tables for different intervals between ages (for example from 5 to 5 years). To facilitate the study and use of the mortality table to calculate insurance premiums, actuarial science Actuarial use an International System of Symbols.

Insurance premium calculation in life insurance requires demographic indicators of mortality table and data update factor values obtained from financial tables updated. In practice it is desirable to estimate the actuarial premium rates for each age and duration of insurance accepted by the insurer, which contributes to the enormous performance of arithmetic operations based on large data sets.

To simplify calculations premium rates, life insurance technique uses a number of auxiliary quantities called **switching values** that are part **numbers switching table.** These values are obtained by combining indicators included in the financial tables of

mortality tables and updating. Thus, substitution occurs (switching) figures in these two tables with different values and their aggregation into a single table.

Calculations predetermined switching table numbers, taking into account the sum insured base equal to one.

Table 1. Switching values obtained with the number of survivors (l_x)

Formula	Explanation of the formula
$D_x = l_x \times v^x$	Present value of the product of the number of survivors to age x and sum insured unit.
$N_x = D_x + D_{x+1} + ... + D_\omega = \sum_{t=x}^{\omega} D_t$	Present value of the product of the number of survivors and the sum insured unit.

Table 2. Switching values obtained with the number of deaths (d_x)

Formula	Explanation of the formula
$C_x = d_x \times v^{x+1}$	Up to date value of the product of the number of deaths by age x and sum insured unit.
$M_x = C_x + C_{x+1} + ... + C_\omega = \sum_{t=x}^{\omega} C_t$	Up to date value of the product of the number of deaths and the sum insured unit.

5. CASE STUDY ON ASSESSMENT, RECOGNITION AND MEASUREMENT OF PREMIUM LIFE INSURANCE

A person under the age of 30 years makes a life insurance, the insurance company "AVIVA" SA by insurance agent, which is to receive the end of each year the amount of 2.000 lei lifetime. Insurance agent contract between the insurance company and agent commission set was 10% of premiums earned. In these conditions:

• First single net is as follows:

$$P_{nu} = S \cdot a_{30}^P = S \cdot \frac{N_{x+1}}{D_x} = 2000 \cdot \frac{N_{31}}{D_{30}} = 2.000 \cdot \frac{50.418,87600}{5.403,27964} = 18.663 \ lei \qquad (7)$$

According to legal provisions, the insurance agent commission due, the company calculated, withheld and remitted state budget a 10% advance tax accounting (18,663 x10% = 1866.3 lei).

6. CONCLUSIONS

Underlying problem that appears in the literature in Romania is caused by the fact that at present there is no up to date accounting, customized for system evaluation, recognition and calculation. Therefore, the value of the work is to develop a new

concept - the actuarial accounting - that would help improve the methodological basis of accounting insurance companies in Romania, which will:

➢ inclusion in income of insurance companies only portions of the first obtained from direct insurance and reinsurance won so will exclude cases of distortion of information in the financial statements set for those operators;

➢ better estimation of insurance risk, which makes the information presented in the financial statements is closer to the principle of true and fair view;

➢ stability of the financial results of activity due to the full coverage premiums received on account of obligations to policyholders and costs related to signing contracts and premiums collected;

➢ fructification and updating techniques in determining the final value and the actual value;

➢ taken into account in determining insurance premiums in the number of deaths, number of survivors, the current value of the amount to be paid in the future (the amount required to be collected by the insurer from the insured to cover future payments on death or survival to a certain age, provided that the proceeds are invested, for example capitalized);

➢ use mortality tables and numbers switching to a better estimate of premiums;

➢ use the method "pro rata" in calculating unearned premium reserve at the end of the reporting period by insurance organizations in Romania . Using this method raises the level of accuracy of calculation of actual income earned from insurance business during the reporting period, excluding cases where the insurer, in the period of the insurance contract, has no means the unearned premium reserve and guarantee the performance by it the obligations assumed under the conditions stipulated in insurance

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