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Probability Theory in Financial

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The purpose of this research is to determine whether parts of probability theory may be applied to manage economic processes in life insurance companies.

Introduction. Nowadays, the application of the theory of probabilities that establishes the relationship between random parameters is becoming more and more important in order to generate trustworthy values for economic indicators.

This aids for decision-making when managing company development.

Those opportunities help for the simplification or mathematical transactions and provide tremendous economic use.

The probabilistic technique is applied in multiple stages, including:

1) shift away from the economic, managerial, and technological sindicators; models of something like the control system are then developed while taking probability and decision approval activities into account;

2) doing out calculations and approving numerical mathematical conclusions;

3) a justification of the right answer and an illustration of something like the mathematical analysis of the current case.

This authors of the study findings. Let's use this approach as an illustration for how to resolve issues with creating business procedures for insurance businesses.

Since we can never predict with absolute certainty whether an insured event will occur or not, it is a random variable. In order to examine the demographics of the occurrences of covered occurrences, insurance companies also consider the circumstances in which they occur. You must determine the likelihood of an insured occurrence before determining the insurance premium amount.

Occur, indicated by p, won't take place $-q=1-p$. The probability of protective mechanism for only X_i- one, $i-$th, insured is therefore distributed randomly according to a binomial rule, whose quantitative expectation and variance are equal to np and npq, respectively.

With each policyholder contributing npK rubles of both the insurance premium, the insurance firm will often be required to pay pK protection indemnities. As a result, the insurance company's balance will typically be zero. The sum of premium indemnities is determined at random. They may be significant, causing the business to lose money, or they may be minor,

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generating a profit. The contribution amount needs to be more carefully assessed to enable the insurance firm to operate without incurring losses.

The genuine wager is represented by $-p > p$. The sum will thereafter be equivalent to npK rubles from of the nth quantity of policyholders. The likelihood that there will be no more insured occurrences than np: $P(x < xp) = q$, where $q-$ is the likelihood that the business will operate without incurring losses.

The Mouavre-Laplace theorem states that the coefficient of determination principle of the normalized frequency in the limit transforms into perfectly natural with the identical mathematical expectation and variance with nothing but an unbounded increase in the number of n tests. The likelihood that event A will occur for n trials between aa and bb times can then be determined using the formula below:

$$P(\alpha < X < \beta) = \Phi\left(\frac{\beta - np}{\sqrt{2npq}}\right) - \Phi\left(\frac{\alpha - np}{\sqrt{2npq}}\right) \qquad (1)$$

where

$$\Phi(x) = \frac{1}{\sqrt{2\pi}}\int_0^x e^{-\left(\frac{z^2}{2}\right)}dz - \qquad \text{Laplace function}$$

Let $q = -0,95$ denote the confidence that the insurance provider won't fail. The likelihood of an insurance contract is then $p = 0,05$. $n = 1500$ people make up the consumer base.

We compute and used the formula (1) and the characteristics of the Laplace function.

$$P(X < n\tilde{p}) = P(-\infty < X < n\tilde{p}) = \Phi\left(\frac{n\tilde{p} - np}{\sqrt{2npq}}\right) - \Phi(-\infty) = \frac{1}{2} + \Phi\left(\frac{n\tilde{p} - np}{\sqrt{2npq}}\right)$$

By circumstance $q = 0,95$ then

$$\frac{1}{2} + \Phi\left(\frac{n\tilde{p} - np}{\sqrt{2npq}}\right) = 0,95 \Rightarrow \Phi\left(\frac{n(\tilde{p} - p)}{\sqrt{2npq}}\right) = 0,45 \Rightarrow \frac{n(\tilde{p} - p)}{\sqrt{2npq}} = 1,65$$

Determine the interest rate for insurance.:

$$\frac{1500 \cdot (\tilde{p} - 0,05)}{\sqrt{2 \cdot 1500 \cdot 0,05 \cdot 0,95}} = 1,65; \Rightarrow \tilde{p} - 0,05 \approx 0,0131; \Rightarrow \tilde{p} \approx 0,0631$$

Conclusion. We can infer from the data that the insurance premium will be higher the higher the risk is to the insurance firm. This is because the corporation anticipates additional costs. The average cost of an insured incident ought to be lower than the income received from policyholders' insurance premium payments.

Finding the best answer is made possible by the application of mathematical techniques, which give the chance to qualitatively examine economic events and aid in understand the concern and market uncertainty values. Fundamentally, differential equations enable one to

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conceptually comprehend a variety of scenarios with comprehensive evaluation of the outcomes in the choice of remedies.

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