Review Article

The Role of Statistics in Insurance Business

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ABSTRACT

The business of insurance is sustained by a complex system of risk analysis and this analysis involves anticipating the likelihood of a particular loss and charging enough in premiums to guarantee that insured losses can be paid and this is afforded by statistics to be used to determine what risk an insured poses to an insurance company, what percentage of policies is likely to pay out, and how much money a company can expect to pay out in claims. In this paper we highlighted the role of statistics in insurance business for instance to introduce and develop new products, statistics play a role in evaluating sample and collateral information. Linear regression models are essential tools in finding risk factors for premiums calculations. Time series methods are used in various ways to predict trends, and simulation methods are crucial to understanding the many models considered for anything from new products to revisions in rating schemes. Frankly speaking, many insurance business activities can be accomplished with statistics including deciding a new location, marketing the product, and estimating what the profit will be on a new product and so forth that is why we underline the irreplaceable role of statistics in all stages of insurance business.

Keywords: Insurance, Statistics and Role of Insurance Statistics.

INTRODUCTION

Financial sector is indispensable in an economy of any country as financial sector is the one that controls movement of money and currently money is good tool to measure wealth of the nation. Financial sector comprises both banking and non-banking activities that include insurance business whereby the business of insurance is sustained by a complex system of risk analysis. Generally, this analysis involves anticipating the likelihood of a particular loss and charging enough in premiums to guarantee that insured losses can be paid. It

is in this regard insurance companies collect the premiums for a certain type of insurance policy and use them to pay the few individuals and or corporate who suffer losses that are insured by that type of policy. To have a robust system of pricing (determination of premium to be paid for an insurance policy) of insurance products and reserving (putting money aside for losses likely to be incurred), insurance companies relies on available statistics and therefore the insurance industry is highly data centric and proper organization and analysis of those data serves in right decision making for not

only daily processes, but also for monitoring trends, managing customers, setting rates/prices, making reserves, detecting fraud and so forth. Noting that statistics is the science of learning from data; from collection of data up to ready for final utilization and inevitably, statistics plays an important role in all fields, some of which you might not have expected. Talking by examples statisticians apply statistical thinking and methods to a widespread variety of scientific, social, and business endeavors in such areas as insurance, astronomy, biology, education, economics, engineering, genetics, marketing, medicine, psychology, public health, sports, among many. In this paper we are going to concentrate on the role of statistics in insurance business.

Insurance Concepts:

An insurance refers to as the risk transfer from one party called Insured to another party called Insurer. The risk-transfer mechanism ensures full or partial financial compensation for the loss or damage caused by event(s) beyond the control of the insured party and this is described in the contract which an agreement between two parties known as Insurer and the Insured, whereby in consideration of payment of a sum of money known as premium by the Insured to the Insurer, the Insurer assumes the risk of an uncertain event which is not within his control and in which event the proposer has an interest, so that if the anticipated events should happen at any time during the period of insurance, the Insurer is bound to indemnify the Insured. Under an insurance contract, a party (the Insurer) indemnifies the other party (the Insured) against a specified amount of loss (the losses covered are listed in the contract, and the contract is called a policy), occurring from specified eventualities within a specified period, provided a fee called premium is paid. In general insurance, compensation is normally proportionate to the loss incurred, whereas in life insurance usually a fixed sum is paid.

Basically, when an insured suffers a loss or damage that is covered in the policy, the Insured can collect on the proceeds of the policy by filing a claim, or request for coverage, with the insurance company. The company then decides whether or not to pay the claim. The recipient of any proceeds from the policy is called the beneficiary. We should note that the beneficiary can be the Insured person or other persons designated by the insured or third party.

Parties that should necessarily appear on insurance contract are insured/policyholder, insurer and beneficiary.

Insured: Transfer the risk to the insurer and pay premium to the insurer for accepting risks;

Insurer: Accept the risk to pay claim once loss occurred and issue the insurance policy; and

Beneficiary: Recipient of compensation/indemnity; beneficiary can be insured or designated by the insured or third party.
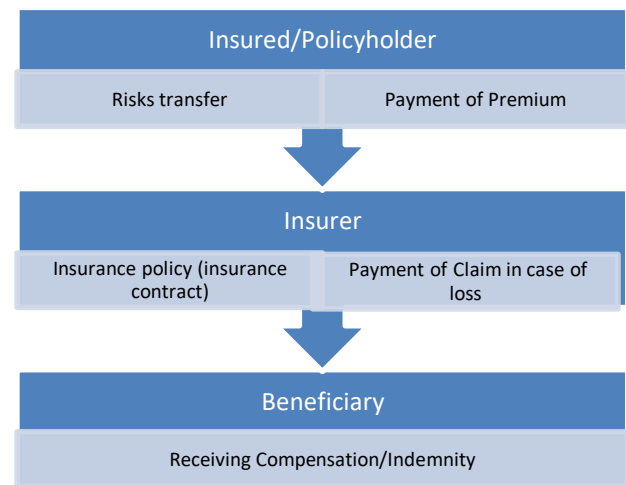

Diagram of Parties in Insurance Contract
Source: Constructed by Author

Insurance Statistics:

Knowing that statistics is the science of learning from data, so, better decision relies on quality data processed in right way responding the needs of end users.

We distinguish two branches of statistics; descriptive statistics whereby we explore and describe data and inferential statistics whereby consists of drawing inferences from samples and generalize to the whole population. In descriptive statistics we have central tendency statistics such as average/mean, mode and median, dispersion statistics such as variance, standard deviation, quartile, range…and shape statistics such as skewness and kurtosis. And for inferential statistics consist of running test to admit or reject hypothesis so, it helps in drawing inferences and predicting results.

Collecting and organizing data in readable format, analyze data and interpret the results are key tasks in other to produce reliable statistics. In insurance business, practitioners collect much more data both qualitative and quantitative at primary level and are varying according to products and cases whereby personal data like names, age, address etc. and claim description, involved parties etc. are collected as primary data and data/information collected helps in premium determination, reserving, planning for future and so forth. At secondary level, practitioners collect data through daily processes, what are already recorded in the systems or registers like details of:

- ✓ Policies issued;
- ✓ Sum insured on domestic policies;
- ✓ Premium paid;
- ✓ Annual premium totals;
- ✓ Claims reported;
- ✓ Amount paid out from claims;
- ✓ Outstanding balance in claims;
- ✓ Incurred cost of claims;
- ✓ Etc.

Role of Insurance Statistics:

Roles of insurance statistics are countless but in this paper we are going to deepen some of them mainly giving picture of a company business, pricing, reserving,

forecasting and decision making. Even though statistics is important in many types of business, it is particularly essential to the insurance industry. Integrally to what we mentioned in first paragraph that insurance is sustained by a complex system of risk analysis involving anticipating (reserving and forecasting) the likelihood of a particular loss and charging (pricing) enough in premiums to guarantee that insured losses can be paid and this where irreplaceable role of sound statistics come in. Statistics is used to determine what risk an insured poses to an insurance company, what percentage of policies is likely to pay out, and how much money a company can expect to pay out in claims.

Role of Insurance Statistics in Giving Picture of the Business:

From data provided one can come up with a number of statistics depending on needs including but not limited to:

- ➢ Total number of domestic polices
- ➢ Total number of domestic claims
- ➢ Average insurance premium
- ➢ Average sum insured
- ➢ Claim frequency
- ➢ Average size of insurance claim
- ➢ Cost per insurance policy
- ➢ Loss ratio
- ➢ Etc

With statistics above among others combined with other factors insurance practitioners get insight to decide on running the business smoothly.

Statistics is crucial in business management; insurance practitioners look at statistical data and make a best guess at what the data is telling them. For instance, a loss distribution can give insurance practitioners a picture of claim behavior over a certain period or show how categories of claims stack up against each other. This is possible by constructing a histogram, a type of bar graph that compares categories. The bar

graph might show how claims relate to age groups for life insurance. The insurance practitioners will be able to look at trends and see if higher premiums for certain age groups are warranted, etc.

Additionally, insurance business is a data-driven industry, and insurance companies employ large numbers of analysts to understand claims data. No one likes to lose, and in particular we need to model both the frequency and size of losses and claims. Techniques in exploratory data analysis such as histograms, quintile plots, and summary statistics including sample estimates of skewness and kurtosis can be very useful tools in obtaining a feeling for the typical claim size. Relatively large claims, which may be infrequent, are of particular concern and hence the need to find and use distributions with relatively fat tails likes the Pareto, Weibull and lognormal distributions (Boland, 2006). Although the empirical distribution function can be a useful tool in understanding claims data, there is often a natural desire to "fit" a probability distribution with reasonably tractable mathematical properties to claims data and this were inferential statistics come in.

Role of Insurance Statistics in Decision making: Pricing, Reserving, Forecasting:

Statistics is vitally important in insurance business in all levels of insurance business for instance insurance statistics help insurance companies to modify insurance policies so that insurance policies are affordable to all, not only that but also play a significant role in analyzing market, setting prices, reserving, forecasting, etc.

Using statistics, you can plan the production according to what the customer likes and wants, and you can check the quality of the products far more efficiently with statistical methods. In fact, many insurance business activities can be completed with statistics including deciding a new location, marketing the product, and estimating what the profit will be on a new product and so forth.

In making an effort to analyze insurance losses arising in association with insurance policies sold, it is domineering to understand that a portfolio of insurance business is very complicated in terms of the nature of its past and future risk-based behavior. There are many deterministic and stochastic influences at play, and the precise prediction of the future claims experience necessitates that all such influences and their effects be identified. The role of statistics and probability is vitally important in this regard, not only in terms of providing the required statistical methodology to properly analyze any data collected by the business, but also in assessing whether a quantifiable model is able to accurately predict the claims experience of a portfolio of insurance business.

As we discussed above that the bar graph and frequency distribution help the insurance practitioners to be able to look at trends and see if higher premiums for certain age groups are warranted, etc. Not only that descriptive statistics are important but also statistical models play a significant role for instance a linear model and time series model. A linear model can be used to see if one category or item is related to another for example about how age, gender, salary and other characteristics relate to claim size. A time series model is where an insurance practitioner looks at how a particular item performs over time. For example, they may look at how policyholders' claims history changes over time to determine how much to charge for specific policyholder characteristics or they may study the performance of investments over a period of time to determine rates to charge for whole life insurance policies. The simulation of time series models may be useful in estimating losses over time. Simulation can

also be a useful tool in studying convergence and stability in various experience rating systems such as no claim discount schemes and so on.

CONCLUSION

Insurance business is important in all economies and to sustain in financing sector needs to know the essentials of decision making by relying on valid, reliable, complete, accurate and timely statistics. To efficiently determine premium to be paid for a certain risk, settling claims arisen from policy taken and proper reserving, an understanding of statistics is necessary to engross and assess the risk. To introduce and develop new products, statistics play a role in evaluating sample and collateral information. Linear regression models are essential tools in finding risk factors for premiums calculations. Time series methods are used in various ways to predict trends, and simulation methods are crucial to understanding the many models considered for anything from new products to revisions in rating schemes. It is no doubt statistics play irreplaceable role in lifecycle of insurance business for both life and non-life insurance.

REFERENCE

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