Risks faced by General Insurers

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Preface

The insurance industry is facing turbulent times and risk management is at the top of the agenda.

Pressure is mounting on insurers to implement and professionalize risk management practices. Needless to say, supervisors are encouraging risk management information to be more widely spread throughout organizations in order for it to be fully integrated into the day-to-day management of the business. Many companies are at this moment upgrading their risk management systems.

In this paper, which aims to improve standards of risk assessment, should be regarded as an opportunity for insurance companies to improve their risk management systems and will allow you to benefit from the risk management efforts in the context of supervision.

This paper will help you to quickly get to grips with risk management terms and techniques and how they relate specifically to the insurance industry.

The main benefit of Risk Management for Insurers is that it emphasizes the practical risk management concepts, rather than technical calculations and detailed theory, making it easier for a layman to understand. What's more, all concepts and terms are applied to clear illustrative examples and the regulation and supervision developments are simple to follow.

It is recommended for risk managers, actuaries, controllers, accountants, auditors, corporate finance managers, underwriting and reinsurance managers, investment managers, equity analysts and financial consultants.

1. Introduction

Centuries ago merchants were encouraged to take hazardous journeys by the existence of insurance: if they took the risk and disaster struck, then they would not be ruined if they were insured. The same social advantage is still there today. The exciting ventures have changed somewhat, but the ability to insure against various perils still enables individuals and companies to take on risks that they would not otherwise undertake.

Policyholders reduce uncertainty by passing risks to an insurance company. It is not surprising, therefore, that insurance companies themselves are subject to risk and uncertainty.

Most of the major uncertainties centre around how many claims there will be and how much the insurer will have to pay to settle them. These uncertainties have a big influence on how much the insurer will charge for the protection provided and how much the insurer needs to reserve for future claims payments. Other risks to the insurer include: recovery of fixed expenses, failure of other parties (e.g. brokers or reinsurers), falls in asset values and the insurance cycle. The size of the free reserves will influence the ability of the insurer to cope up with these risks as will reinsurance cover and the investment policy.

2. Risk

There are many different definitions of **risk**, some of them are given below:

Project Risk Analysis & Management Guide (PRAM Guide, 1997) defines risk as "an uncertain event or set of circumstances which, should it occur, will have an effect on achievement of objectives"

Risk is a concept that denotes a potential negative impact to an asset or some characteristic of value that may arise from some present process or future event. In everyday usage, "risk" is often used synonymously with the probability of a known loss.

Risk is the cumulative effect of the chances of uncertain occurrences, which will adversely affect project objectives. It is the degree of exposure to negative events and their probable consequences.

3. Key components of risk

In modeling risk, actuaries pay special attention to the following key components of risk for each peril. The modeling tools describe later will need to reflect the following components of risk resulting from each peril.

3.1 Volatility

Volatility refers to the amount of uncertainty or risk about the size of changes in a security's value. A higher volatility means that a security's value can potentially be spread out over a larger range of values. A lower volatility means that a security's value does not fluctuate dramatically, but changes in value at a steady pace over a period of time.

In general insurance, for some types of business the size of possible claims covers a very wide range, and there is consequent uncertainty as to whether the claims that have actually occurred can properly be regarded as typical of what might be expected to occur.

The variance of aggregate claim amounts will increase if there is non-independence of risks. Therefore accumulations of risk will increase the uncertainty relating to the variability in claim size.

The level of random variation will be higher, the smaller the portfolio of business. This problem is therefore greater for small companies (or small classes of business) where you would expect a larger variation from year to year.

3.2 Uncertainty

Uncertainty is the inability to predict the future with confidence. Because of the presence of uncertainty, we need to consider the effects of possible deviations from the projected figures. The greater the uncertainty, the greater the risk.
The uncertainties faced by a general insurer can be considered under two main headings:

- Uncertainty as to the outcome of the business already written
- Uncertainty as to the premiums the insurer needs to charge in future to achieve a desired financial result.

3.2.1 Business already written

At any given time, an insurer will have claims that have been reported but have not yet been settled, and there will be uncertainty as to when they will be settled and the amount for which they will be settled. Even for the claims that have been recorded as having been settled, there is a risk that they will be reopened and further payments will have to be made. In addition, there will be

claims that have been incurred but of which the insurer is unaware because they have not yet been reported; there will be inevitable uncertainty as to the number of such claims, their costs and the timing of the payments.

3.2.2 Premium rates required in the future

The natural starting point for assessing the premium rates that an insurer needs to charge in future is an assessment of the adequacy of the rates that have been charged in the past. This is subject to all the uncertainties that affect the measurement of the financial outcome of the existing business, together with further uncertainties as to:

- The extent to which past experience will be relevant to the future
- The extent of any adjustments that need to be made to the experience of the recent past to allow for exceptional claims that have occurred or failed to occur
- Possible changes in assumptions required as projections have to extend even further into the future
- The appropriate choice of rating factors and premium relativities, i.e. the relationships between the premiums quoted for different rating cells.

4. Types of risk

4.1 Underwriting risk

Underwriting refers to the process that a large financial service provider (bank, insurer, investment house) uses to assess the eligibility of a customer to receive their products like equity capital, insurance or credit to a customer. The name has been derived from the Lloyd's of London insurance market in London, United Kingdom. Financial bankers, who would accept some of the risk on a given venture (historically a sea voyage with associated risks of shipwreck) in exchange for a premium, would literally write their names under the risk information which was written on a Lloyd's slip created for this purpose.

Insurance underwriters evaluate the risk and exposures of the prospective clients. They decide how much coverage the client should receive, how much they should pay for it, or whether to even accept the risk and insure them. Underwriting involves measuring risk exposure and determining the premium that needs to be charged to insure that risk. The function of the underwriter is to acquire—or to "write"—business that will make the insurance company money, and to protect the company's book of business from risks that they feel will make a loss. In simple terms, it is the process of issuing insurance policies.

Underwriting decisions would typically be influenced by **PML** (Probable Maximum Loss) evaluations, and the amount of reinsurance ceded on a risk would normally be predicated on the PML valuation. PML is the anticipated value of the largest loss that could result from the destruction and the loss of use of property, given the normal functioning of protective features (firewalls, sprinklers, and a responsive fire department, among others, in the case of a fire loss). This number is usually smaller than the maximum foreseeable loss, which assumes the failure of all protective features.

At the most basic level, managing catastrophe risk involves ensuring that insurers and reinsurers are able to remain viable following losses from a 'probable maximum' event. For the most part, insurers and reinsurers approach PML management by planning for the eventuality of a large natural catastrophe, and have quantified their risk accordingly.

A PML Bust could result from the accumulation of risk as in the case of attack on the Twin Towers, the PML was taken to be the Sum insured of one tower and the 9/11 attack was considered to be two events by the insurers. But when the final court verdict came it was taken to be a single event and there was a PML bust which led many insurers to insolvency.

WTC has showed just how necessary it is to perform a worst-case accumulation analysis encompassing all property and Business Interruption (BI) losses, despite the fact that calculating all potential BI exposures is a difficult task.

4.2 Credit risk

Credit risk is the risk due to uncertainty in a counterparty's (also called an obligor's or credit's) ability to meet its obligations. In assessing credit risk from a single counterparty, an institution must consider three issues:

- **Default probability**: What is the likelihood that the counterparty will default on its obligation either over the life of the obligation or over some specified horizon, such as a year? Calculated for a one-year horizon, this may be called the expected default frequency.
- **Credit exposure:** In the event of a default, how large will the outstanding obligation be when the default occurs?
- **Recovery rate:** In the event of a default, what fraction of the exposure may be recovered through bankruptcy proceedings or some other form of settlement?

4.3 Market risk

This is the risk to an institution's financial condition resulting from adverse movements in the level or volatility of market prices of interest rate instruments, equities and currencies. Market risk is usually measured as the potential gain/loss in a position/portfolio that is associated with a price movement of a given probability over a specified time horizon.

Market risk is the risk that the value of an investment will decrease due to moves in market factors. The three standard market risk factors are:

Equity risk, Equity risk is the risk that one's investments will depreciate because of stock market dynamics causing one to lose money.

Interest rate risk, Interest rate risk is the risk that the relative value of an interest-bearing asset, such as a loan or a bond, will worsen due to an interest rate increase. In general, as rates rise, the price of a fixed rate bond will fall, and vice versa.

Consider a ten year and a twenty year zero coupon bond. If the spot rate for all terms is 5% then the prices of the bonds are 1.05-10 =61.39% and 1.05-20 =37.69% respectively.

If the interest rates rise to 6% then the price of both bonds will fall:

The ten year bond price falls to 55.84%, a 9% drop.

The twenty year bond price falls to31.18%, a 17% drop.

Longer dated bonds are more sensitive to interest rate movements than short dated bonds. It is assumed that risk averse investors will require compensation (in the form of higher yields) for the greater risk of loss on the longer bonds. This might explain some of the excess return offered on long-term bonds.

Currency risk, Currency risk is a form of risk that arises from the change in price of one currency against another. Whenever investors or companies have assets or business operations across national borders, they face currency risk if their positions are not hedged.

4.4 Operational risk

Operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. The committee indicates that this definition includes legal risk but excludes systematic risk and reputational risk.

During the early part of the decade, much of the focus was on techniques for measuring and managing market risk. As the decade progressed, this shifted to techniques of measuring and managing credit risk. By the end of the decade, firms and regulators were increasingly focusing on risks "other than market and credit risk." These came to be collectively called operational risks. This catch-all category of risks was understood to include,

- Employee errors,
- Systems failures,
- Fire, floods or other losses to physical assets,
- Fraud or other criminal activity.

The concept of operational risk has primarily emerged from banking industry. In banking industry thousands of transactions are processed each day therefore the amount of data in respect of losses arising from operation failures is more abundant. This naturally lends itself to the development of frequency and severity models to evaluate the aggregate loss distribution and hence the capital requirement.

Operational risk has been recognized as an important risk for insurers as well as for banks. But a challenge for insurer's in assessing operational risk is to separate this risk from the loss experience data typically collected for the other underwriting, credit and market risk. For eg , insurer will need to examine the portion of their underwriting losses that are really due to ineffective or faulty underwriting processes or client management.

It is therefore recommended that insurance supervisors, the insurance industry and the actuarial profession work together to develop appropriate research to measure operational risk.

4.5 Liquidity risk

The risk that arises from the difficulty of selling an asset. An investment may sometimes need to be sold quickly. Unfortunately, an insufficient secondary market may prevent the liquidation or limit the funds that can be generated from the asset.

An institution might lose liquidity if its credit rating falls, it experiences sudden unexpected cash outflows, or some other event causes counterparties to avoid trading with or lending to the institution. A firm is also exposed to liquidity risk if markets on which it depends are subject to loss of liquidity.

In an insurance context, liquidity risk is exposure to loss in the event that insufficient liquid assets will be available, from among the assets supporting the policy obligations, to meet the cash flow requirements of the policyholder obligations when they are due.

5. Risk Measures:

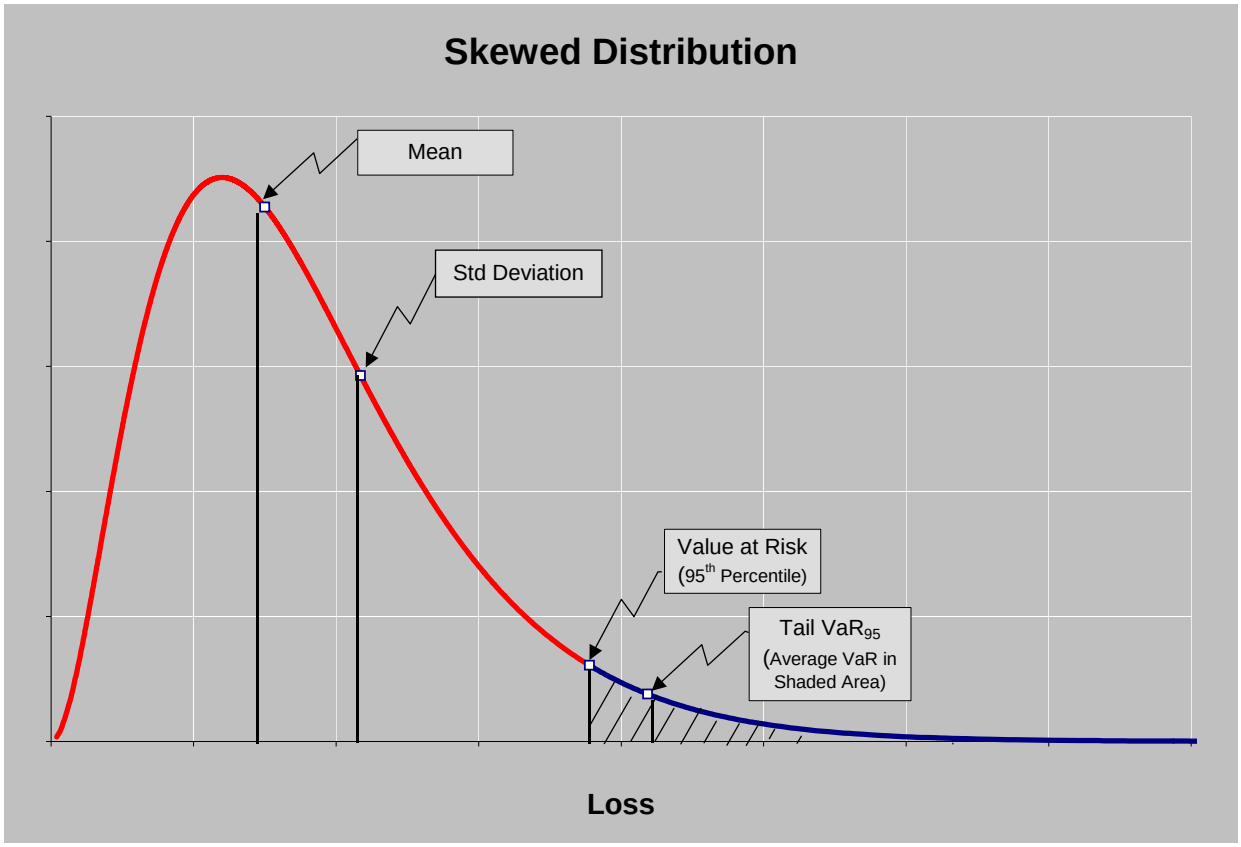
Insurance Risk management

Risk Management is a very important for insurance industry. Insurance means that insurance companies take over risk from customers. Insurers consider every available quantifiable factors to develop profiles of high and low insurance risk. Level of risk determines insurance premiums.

Generally, insurance policies involving factors with greater risk of claims are charged at a higher rate.

5.1 Statistical Risk Measures:

The following diagram shows some of the Risk Measures for a skewed distribution:



Normal distribution is usually not useful as a distribution for losses. According to normal distribution losses are symmetrical but this is not the case in reality as losses are asymmetrical i.e. losses are positively skewed. By positively skewed we mean that most of the losses are greater than zero.

To elaborate Risk Measures further we have some other definition, which are given as below:

5.1.1 Mean: 'Mean' means average.

For a data set, the mean is the sum of the observations divided by the number of observations. The mean is often quoted along with the standard deviation: the mean describes the central location of the data, and the standard deviation describes the spread.

5.1.2 Variance

The (population) variance of a random variable is a non-negative number which gives an idea of how widely spread the values of the random variable are likely to be; the larger the variance, the more scattered the observations on average.

Stating the variance gives an impression of how closely concentrated round the expected value the distribution is; it is a measure of the 'spread' of a distribution about its average value.

Variance is symbolized by V(X) or Var(X) or σ^2

The variance of the random variable X is defined to be:

$$V(X) = \sigma^2 = E\left(X - E(X)\right)^2 = E(X^2) - E(X)^2$$

Where E(X) is the expected value of the random variable X.

Notes

the larger the variance, the further that individual values of the random variable (observations) tend to be from the mean, on average;

the smaller the variance, the closer that individual values of the random variable (observations) tend to be to the mean, on average;

taking the square root of the variance gives the standard deviation, i.e.:

$$\sqrt{V(X)} = \sqrt{\sigma^2} = \sigma = s$$

The variance and standard deviation of a random variable are always non-negative.

5.1.3 Standard Deviation:

Standard deviation is a measure of the spread or dispersion of a set of data.

It is calculated by taking the square root of the variance and is symbolised by s.d., or s. In other words

$$\sqrt{V(X)} = \sqrt{\sigma^2} = s$$

The more widely the values are spread out, the larger the standard deviation.

5.1.4 Coefficient of Variation

The coefficient of variation measures the spread of a set of data as a proportion of its mean. It is often expressed as a percentage.

It is the ratio of the sample standard deviation to the sample mean:

$$\frac{\mathbf{s}}{\overline{\mathbf{x}}}$$

There is an equivalent definition for the coefficient of variation of a population, which is based on the expected value and the standard deviation of a random variable.

5.1.5 Value at risk and tracking error

Value at Risk (VaR) generalises the likelihood of under-performing by providing a statistical measure of downside risk. Value at risk can be determined as:

VaR(X) = -t where P(X <t)= p

VaR assesses the potential losses on a portfolio over a given future time period with a given degree of confidence.

For example, if we adopt a 99% confidence limit, the VaR is the amount of loss that will be exceeded only one time in a hundred and we would need to find the loss in value

t such that P(X <t) = 0.01 .

5.2 Other Measures:

- Insurance Risk Factor Profiling
- Insurance Predictive Modeling
- Insurance Scoring

5.2.1 Profiling of Risk Segments

Profiling is to identify factors and variables that best summarize the segments.

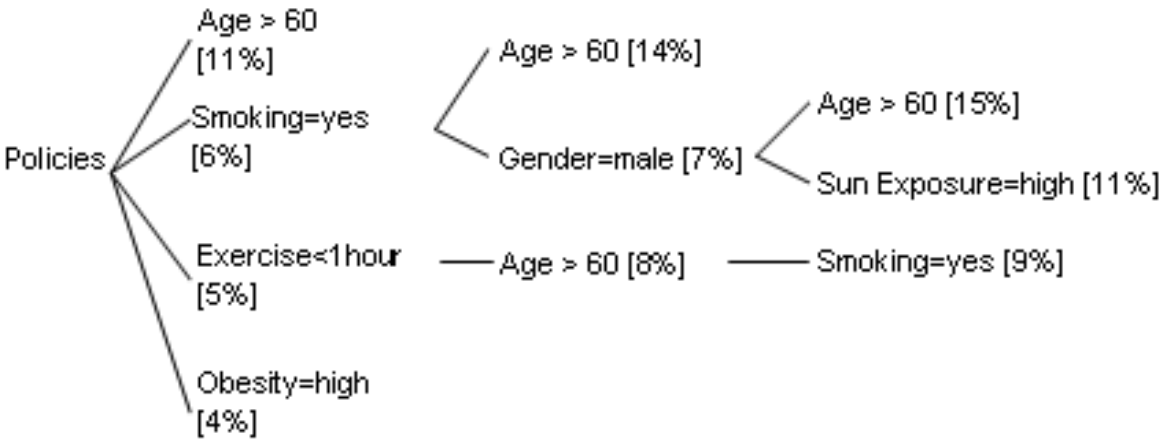
Profiling insurance risk factors is very important. The Pareto principle suggests that 80%-90% of the insurance claims may come from 10%-20% of the insurance segment groups. Profiling these segments can reveal invaluable information for insurance risk management. Insurance providers often collect a large amount of information on insured entities. Policy information (such as automobile insurance, life insurance, general insurance, etc.) often consists of dozens or even hundreds of variables, involving both categorical and numerical data with noisy information.

Here are some of the examples:

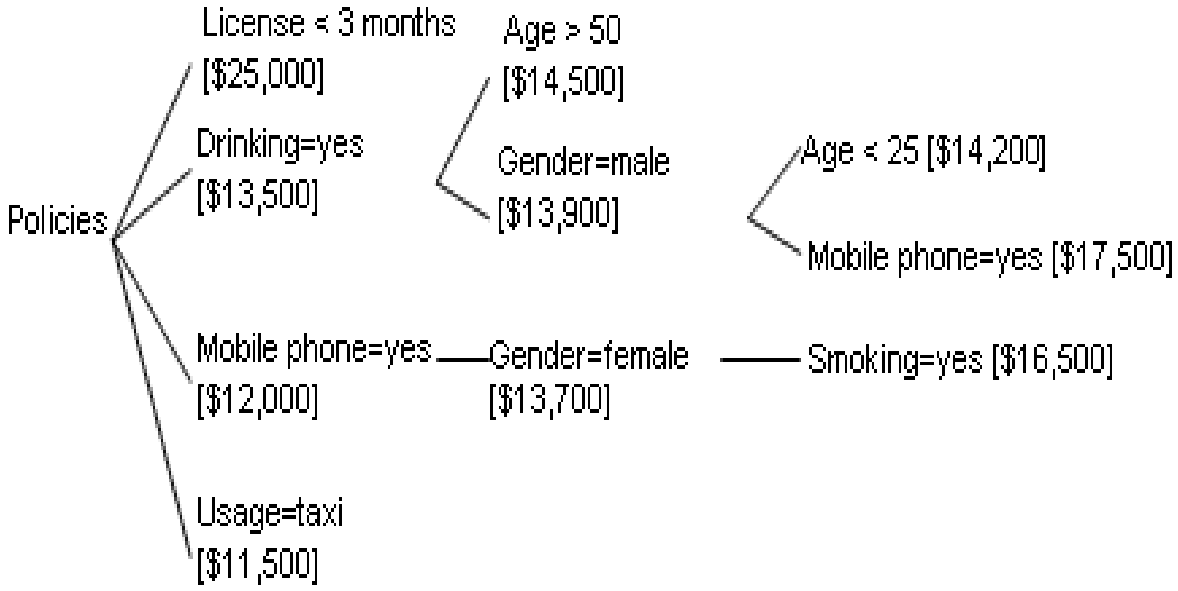
High risk healthcare coverage risk factor profiling:

An insurance company keeps health care insurance coverage (or health insurance for short) or life insurance records in its database: gender, age, education, smoking, drinking, sun activity, height, weight (=obesity level), claim payment, etc., as well as other contact information. The company wishes to know which health insurance groups are at the highest risk, i.e., have the highest claim ratio. The following is a possible output of hotspot profiling analysis;

High risk auto insurance risk factor profiling:



An insurance company keeps records on motor vehicle insurance (or automobile insurance) information in its database containing driver and vehicle information: Gender, age, license experience, education, occupation, drinking, smoking, mobile phone use; vehicle manufacturer, type, model, year make, and so on. The company wishes to know which motor vehicle insurance is at the highest risk groups, i.e., highest average insurance payouts. The following is a possible output of hotspot profiling analysis;



5.2.2 Insurance Risk Modeling:

If past is any guide for predicting future events, predictive modeling is an excellent technique for insurance risk management. Predictive models are developed from past historical records of insurance policies, containing financial, demographic, psychographic, geographic information, along with properties of insured objects.

What is predictive modelling?

Predictive modelling is the process by which a model is created or chosen to try to best predict the probability of an outcome. Predictive models are developed from past historical records of insurance policies, containing financial, demographic, psychographic, geographic information, along with properties of insured objects.

If past is any guide for predicting future events, predictive modeling is an excellent technique for insurance risk management. Many successful insurers today know that predictive modeling can assist in better identifying and segmenting insurance risks, which can lead to improved underwriting, pricing, and marketing decisions. Predictive modeling can help companies manage the insurance business smarter. Leaders no longer have to manage on instinct or "gut feel", but can use factual data to assist in making better business decisions.

What Can Predictive Modeling Do For Us?

First, it can help insurers improve their rating plans by identifying mispriced risks. By analyzing distributional relationships in insurance databases in a multivariate Frame work, predictive modeling can show assumptions that can give misleading results. For example, when considering the relationship between insurance losses and age and the relationship between insurance losses and prior accidents, it is no surprise that younger drivers tend to cost more to insure, and that drivers with prior accidents cost more to insure.

Predictive modeling helps insurers define groups that are more homogenous for rating, underwriting, marketing, etc. For example, an insurance company may rate the city of Dallas and the surrounding areas in Dallas County the same. Predictive modeling may show that the risk of loss outside of the city of Dallas is considerably different than the risk of loss inside the city of Dallas.

By identifying new variables or new relationships between variables, predictive modeling can also identify new ways to segment risks. The most vivid example of this in the last decade has been the increasingly widespread use of credit history in generating insurance scores. Insurance scores have been used not only for rating, but also for tiering, underwriting and marketing.

Techniques of predictive modelling:

Ist Method: Decision Tree

Decision tree analysis is a predictive model that attempts to separate a group of risks into homogeneous groups based on an identified response variable. The process begins by taking the entire population, and then analyzes each independent variable to determine which creates the largest degree of separation in the dependent variable. The dataset is then "split," or branches off, into two or more groups based on this characteristic. Next, each branch is independently analyzed to determine which independent characteristic is most important in distinguishing between levels of the dependent variable for that branch.

Exercise: Our friend David is the manager of a famous golf club. Sadly, he is having some trouble with his customer attendance. There are days when everyone wants to play golf and the staff are overworked. On other days, for no apparent reason, no one plays golf and staff have too much slack time. David's objective is to optimise staff availability by trying to predict when people will play golf. To accomplish that he needs to understand the reason people decide to play and if there is any explanation for that. He assumes that weather must be an important underlying factor, so he decides to use the weather forecast for the upcoming week. So during two weeks he has been recording:

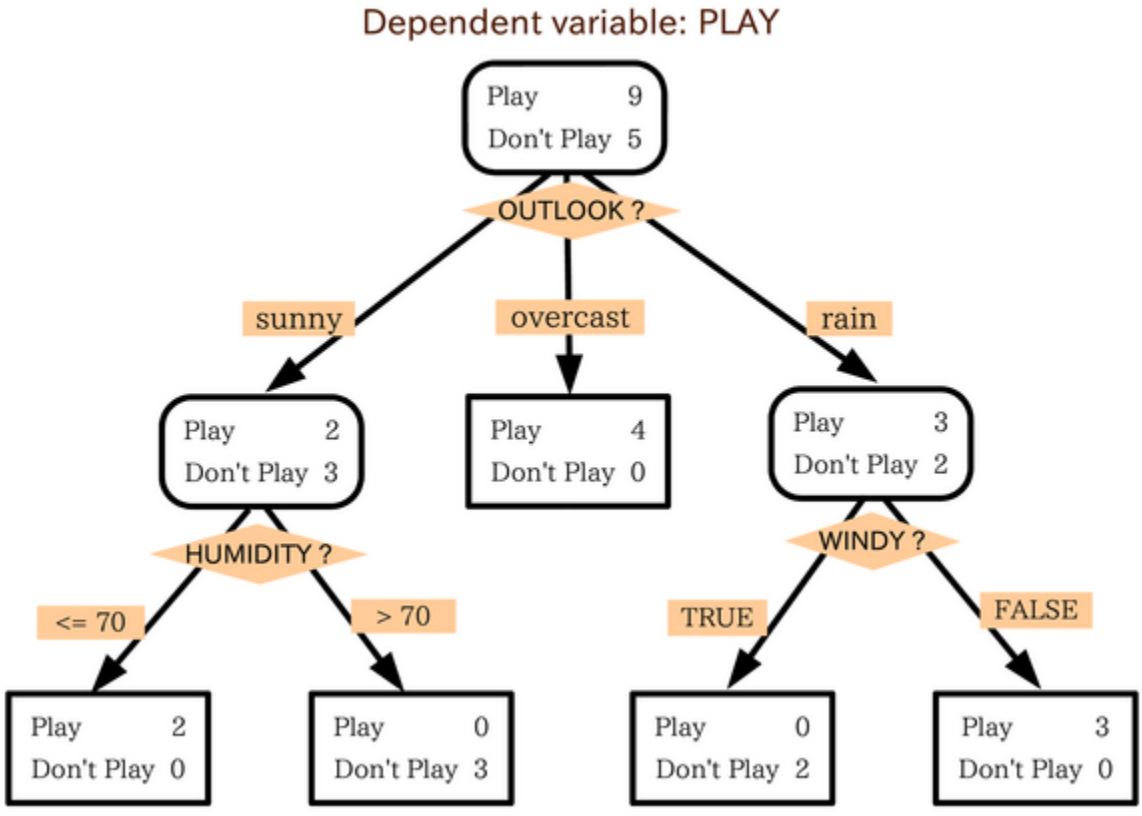
- The outlook, whether it was sunny, overcast or raining.
- The temperature (in degrees Fahrenheit).
- The relative humidity in percent.
- Whether it was windy or not.
- Whether people attended the golf club on that day.

David compiled this dataset into a table containing 14 rows and 5 columns as shown below.

Play golf dataset

Independent variables				Dep. var
OUTLOOK	TEMPERATURE	HUMIDITY	WINDY	PLAY
sunny	85	85	FALSE	Don't Play
sunny	80	90	TRUE	Don't Play
overcast	83	78	FALSE	Play
rain	70	96	FALSE	Play
rain	68	80	FALSE	Play
rain	65	70	TRUE	Don't Play
overcast	64	65	TRUE	Play
sunny	72	95	FALSE	Don't Play
sunny	69	70	FALSE	Play
rain	75	80	FALSE	Play
sunny	75	70	TRUE	Play
overcast	72	90	TRUE	Play
overcast	81	75	FALSE	Play
rain	71	80	TRUE	Don't Play

He then applied a decision tree model to solve his problem.



David's first conclusion: if the outlook is overcast people always play golf, and there are some fanatical who play golf even in the rain. Then he divided the sunny group in two. He realized that people don't like to play golf if the humidity is higher than seventy percent.

Finally, he divided the rain category in two and found that people will also not play golf if it is windy.

And lastly, here is the short solution of the problem given by the classification tree: David dismisses most of the staff on days that are sunny and humid or on rainy days that are windy, because almost no one is going to play golf on those days. On days when a lot of people will play golf, he hires extra staff. The conclusion is that the decision tree helped David turn a complex data representation into a much easier structure.

IInd Method: Generalized Linear Model

GLM allows users to fit a multivariate model with a flexible structure to a dataset, which enables a series of independent variables to predict the value of a dependent variable. This model is especially effective for determining the impact of class plan variables on loss costs, or the impacts of different claim characteristics on an ultimate claim settlement value. GLM also gives you a framework for discovering the interactions of variables in an automated way. Interactions occur when two independent variables in a model do not have a constant relationship with each other.

A GLM consists of an underlying distribution for the data which is assumed to be a member of the exponential family of distributions, a linear predictor and a link function.

A generalized linear model (GLM) may be regarded as an extension of the linear Models. The essential difference for GLMs is that we now allow the distribution of the data to be non-normal. This is particularly important in actuarial work where the data very often do not have a normal distribution.

GLMs relate a variable (called the response variable) which you want to predict, to variables or factors (called predictors, covariates or independent variables) about which you have information. In order to do this, it is necessary first to define the distribution of the response. Then the covariates can be related to the response allowing for the random variation of the data. The general form of distributions (known as exponential families) which are used in GLMs.

The exponential family is a broader class of distributions sharing the same density form and including normal, Poisson, Gamma, Inverse Gaussian, Binomial, Exponential and other distributions.

Exponential family has the following two properties:

The distribution is completely specified in terms of mean and variance.

The variance of Yi is a function of its mean.

The linear predictor is the quantity which incorporates the information about the independent variables into the model. The symbol η (Greek "eta") is typically used to denote a linear predictor. It is related to the expected value of the data (thus, "predictor") through the link function. η is expressed as linear combinations (thus, "linear") of unknown parameters β.

To elaborate further, consider an example:

In UK motor insurance business, vehicle-rating group is also used as a factor. Vehicles are divided into twenty categories numbered 1 to 20, with group 20 including those vehicles that are most expensive to repair.

Suppose that we have a three-factor model specified as age*(sex + vehicle category)

The linear predictor would be:

$\alpha_i+\beta_i x+\gamma_j+\delta_j x$

Age is a numerical variable. However, vehicle group is really a categorical variable. So

denote age by **x**.

α_i and β_i are functions of the policyholder's sex, and γ_j and δ_j are functions of vehicle grouping.

It is necessary to connect the mean response to the linear predictor. In general we take some function of the mean response and this function is called the link function. The link function provides the relationship between the linear predictor and the mean of the distribution function.

5.2.3 Insurance Scoring:

Managing your credit-borrowing money and paying your bills is the part of daily life. The use of credit information by the financial services industry has long been widespread practice, and credit has now become a key tool for insurers.

Home and auto insurers use credit insurance to produce an "insurance score", which helps them to more accurately assess an applicant. Research has shown a strong correlation between credit history and the likelihood of loss in both auto and homeowners insurance. Insurance Score, then provide an objective, accurate and consistent tool that many insurance carries.

But insurance scores are only factor in the underwriting decision. Insurers also years of driving experience, previous accidents and violations, type of car and home construction type for example.

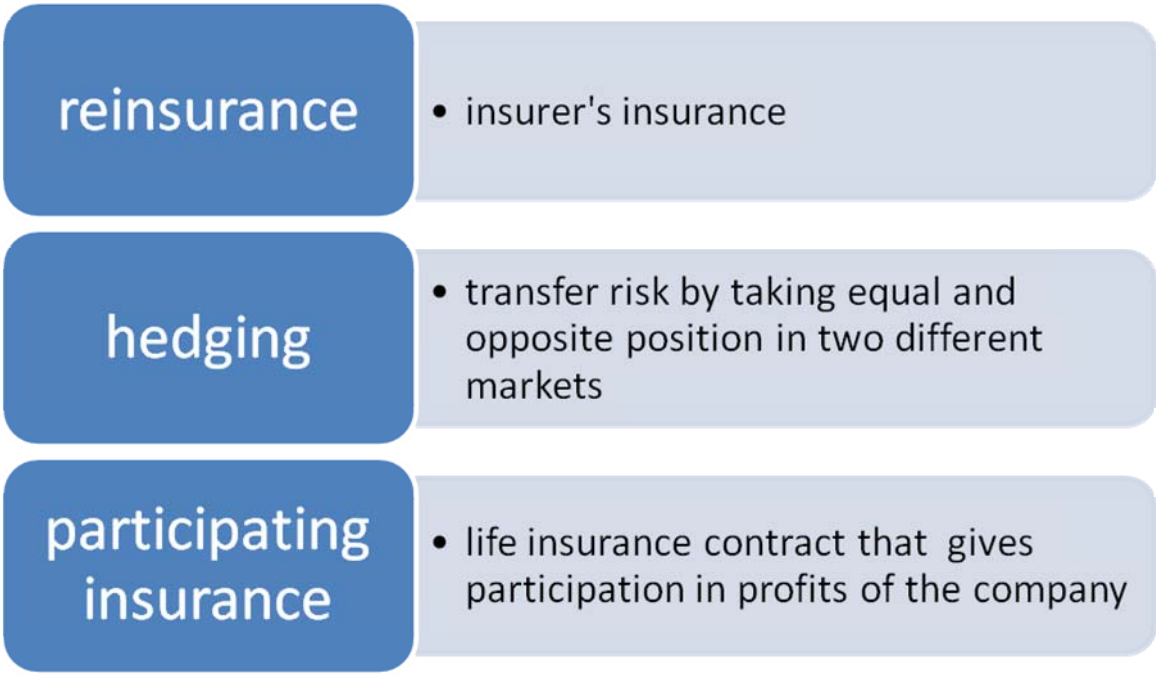
What is an insurance score?

Insurance score are numerical ratings developed from certain attributes of a person's credit history. For example, an insurance scoring consider primarily…

- New application for credit
- Amount of outstanding debt
- Types of credit in use and length of credit history
- Payment history
- Bankruptcies
- Collections

6. Risk management mitigation and transfer

An insurer can take a number of steps to lessen the risk associated with its business. These include the purchase of reinsurance, securitization of a portion of it's asset or liability portfolio, hedging of financial guarantees using derivative instruments, use of product design to pass on the risk to policyholder as well as active risk management to the extent that these measures effectively reduce a company's risk, they should be given appropriate recognition in the calculation of a company's required capital. The difficulty lies in properly assessing the actual degree of risk that has been transferred from the insurance company in these arrangements.



6.1 Reinsurance:

Reinsurance is an insurance company's own insurance. The insurance company passes on some of its risks to another party – a reinsurer.

Reinsurance is primarily a means of reducing an insurer's underwriting risk, allowing it to expand the scope of its business. The cost of transferring risk to a reinsurer is lower than the solvency capital cost the insurer would bear if it retained the risk in it's portfolio, because reinsurer benefit from better risk diversification than a primary insurer.

Reasons for using reinsurance:

- An avoidance of large single losses
- Smoothing of results
- Availability of expertise
- Increasing capacity to accept risk
- Financial assistance.

Avoidance of large single losses (e.g. liability claim):

What is large to an insurer will depend on the size of the free assets available. Many risks in insurance have very high payout limits; some may even offer unlimited cover. Many small to medium sized insurance companies will cede a top slice of potentially large payouts to reinsurers, as cover against this eventuality. This is especially true in liability lines of business where excess of loss reinsurance is commonplace. A simple example of such use of reinsurance is motor insurance. Liability claims can be very large, running to millions of pounds, euros, dollars etc. Insurance companies may want to limit or cap their exposure to such claims to help control the impact on the free reserves or profits.

Smoothing of results:

The principle whereby reinsurance covers the larger risks or accumulation of smaller risks above certain limits helps to achieve a smooth development of accounts year-on-year especially when the portfolio is relatively immature. A premium is paid to mitigate these fluctuations and the net result is more predictable for the insurer, a predictability that may also be more acceptable to shareholders and regulators. Stop loss is a form of reinsurance that is used for these purposes.

Availability of expertise (new or unusual risks, new territories):

Such assistance is more likely to come from a reinsurance broker than from the reinsurer directly. For example, when an insurer is adopting a strategy that will take it into new risk areas where it has little previous experience, the reinsurance broker can sometimes help with rating, underwriting and claims management.

Increasing capacity to accept risk (singly or cumulatively):

Owing to insufficient capital backing, an insurer may be reluctant to accept, or incapable of accepting, particular risks by sector or by volume. An insurer may also be reluctant to accept a particular risk if it would be exposed to an accumulation of risk as a result. Reinsurance cover can obviate this situation. The solvency requirements for a particular line of business are normally reduced in line with the proportion ceded, though this may be subject to an upper limit. Surplus treaty or excess of loss reinsurance might be used here

Financial assistance (new business strain, merger/acquisition, bolstering free-assets):

To a lesser extent than in life insurance, reinsurance funds are available to assist financially with particular business propositions. Where a particular distribution strategy would involve substantially more cash outflow in the initial stages than premium income, reinsurance commission may be available to "factor" future surplus streams, ie lend now against the predicted future flows of premiums less expenses and claims.

6.2 Hedging:

In finance, a hedge is an investment that is taken out specifically to reduce or cancel out the risk in another investment. Hedging is a strategy designed to minimize exposure to an unwanted business risk, while still allowing the business to profit from an investment activity.

A natural hedge is an investment that reduces the undesired risk by matching cash flows, i.e. revenues and expenses. For example, writing both life insurance and life contingent annuities for similar groups of policyholders may help to provide a hedge against the impact of improving mortality.

One of the oldest means of hedging against risk is the purchase of insurance to protect against financial loss due to accidental property damage or loss, personal injury, or loss of life.

Introduced in 2000 by the National Stock Exchange, derivatives are a different breed of financial products whose value is derived from an underlying instrument-such as an index, a stock, a currency or a commodity. Thus, instead of directly investing in a stock, you invest in an instrument whose value is dependent on the price of that stock. Futures and options are two popular and actively traded derivative instruments in the Indian stock market

In particular, we can use derivatives to reduce the exposure of our portfolio to the risk of adverse movements in the market price of the underlying assets. If, for example, we are concerned about falls in the investment market, we might buy put options. By guaranteeing the price at which we can sell our assets, this removes the risk of market falls. We will still, however, enjoy the resulting profits should the market instead go up.

Derivative contracts therefore give us more control over the market risks that we face; thereby increasing our opportunity set of possible risk and return combinations. Moreover, if we hold suitable derivatives and the underlying assets in appropriate combinations then we can sometimes eliminate almost all of the market risk facing our portfolio – though other risks such as lack of marketability or credit risk will remain.

6.3 Participating:

In a participating policy (also known as a with-profits policy), the insurance company shares the excess profits (variously called dividends or refunds) with the policyholder. The greater the success of the company's performance, the greater the dividend.

The premiums paid by with-profits, without-profits and non-profit policyholders are pooled within the insurance company's life fund or general account. The company uses the pooled assets to pay out claims and other settlements. A large part of the life fund is invested in equities, bonds, property and more complex financial instruments to achieve capital growth.

The insurance company aims to distribute part of their profit to the with-profits policy holders in the form of a bonus or dividend attached to their policy. The bonus rate is determined by complex actuarial calculations with reference to the return on the underlying assets, the level of bonuses declared in previous years and other actuarial assumptions (especially future liabilities and anticipated investment returns).

7. Conclusion

For over a decade, the insurance industry has grown increasingly sophisticated in its ability to understand and manage risk. Following a string of natural catastrophes from 1989 to 1994, insurers -reinforced by the activities of modelers, rating agencies, reinsurers, and the capital markets - made it a priority to quantify their risk and manage their exposures to acceptable levels. More recently, industry leaders have begun to take a more holistic view of risk, capital, and return

Data on extreme events are rare by definition, and the unprecedented level and breadth of loss is forcing in to the open the issues that have long been discussed largely only among specialists in the risk management community. What is a Probable Maximum Loss (PML)? What is the correlation between catastrophe claims and the value of assets needed to make the payments? To what extent is reinsurance recoverable in the aftermath of a super-CAT? And, is the industry adequately capitalized and prepared to support its risk accumulations?

In this paper we have tried to answer all such risk management issues and even highlighted the ways and means to manage such risks.

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