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Chapter 2: A deep dive into auto insurance coverage, premium calculations, and automated claims management

2.1. Introduction to Auto Insurance

Vehicle insurance coverage provides financial protection against physical damage or bodily injury resulting from traffic collisions, and against liability that could also arise therefrom. It also offers financial protection against theft of the vehicle, and possibly damage to the vehicle caused by other events, such as fire, natural disaster, or vandalism (Lee et al., 2023; Ortega et al., 2023; Kwon et al., 2024). The insurance covers some part of the costs associated with physical injury and property damage resulting from traffic collisions, and the treatment of the injured, thus acting to avert the cost burden that these collisions would impose on both government and society. Automobile insurance premiums are determined at least in part by the motoring risk of the insured person, which makes automobile insurance unique among property and liability coverages. This is because it is overwhelmingly true that the person who is the named insured drives the insured automobile. In fact, in addition to the named insured, the applicants may also include their spouse, who presumably also drives the automobile, and household members who are likely to be occasional drivers. Thus, the motoring risk is that of these people, not of the automobile itself. However, unlike most other property and liability coverages, automobile insurance also covers damage to the property of people who are not the insured. This is true both under the property damage coverage and under the bodily injury liability coverage. These two factors combine to create unusual problems of risk classification that do not arise, or arise less acutely, in other lines of personal insurance (Rahman et al., 2024; Zhang et al., 2025).

2.1.1. Overview of Automobile Insurance Concepts

In the enactment of an automobile insurance policy, an insurance company promises to indemnify the insured against loss arising from any one of a number of risk exposures related to the ownership or use of an automobile. In exchange, the insured pays a premium to the insurance company. At the time of loss, a claim for payment is presented by the insured, and the insurance company investigates the loss and makes payment if the facts warrant. All auto insurance policies cover property and liability exposures, and many policies also cover personal injury exposures. The automobile insurance program evolved from a relatively simple contractual arrangement between companies and policyholders to become a complex array of insurance products offering a wide variety of coverages. These coverages vary according to the automobile rating territory, the type of automobile, the insured's accident record, the amount of exposure, and a variety of other considerations. For the insurance buyer, the selection process can be tedious and confusing. Selection of the appropriate company has public and private ramifications that extend well beyond the individual insured and the insurance companies. Because of the social importance of automobiles and the economic importance of automobile insurance, it is necessary for society and government to pay attention to the costs, availability, and structure of the automobile insurance program. The answers to the questions posed above about coverages, premiums, and claims management can provide considerable information on the automobile insurance product. Insight into automobile insurance is useful for policyholders who may need additional information to assist them in making decisions about this product.

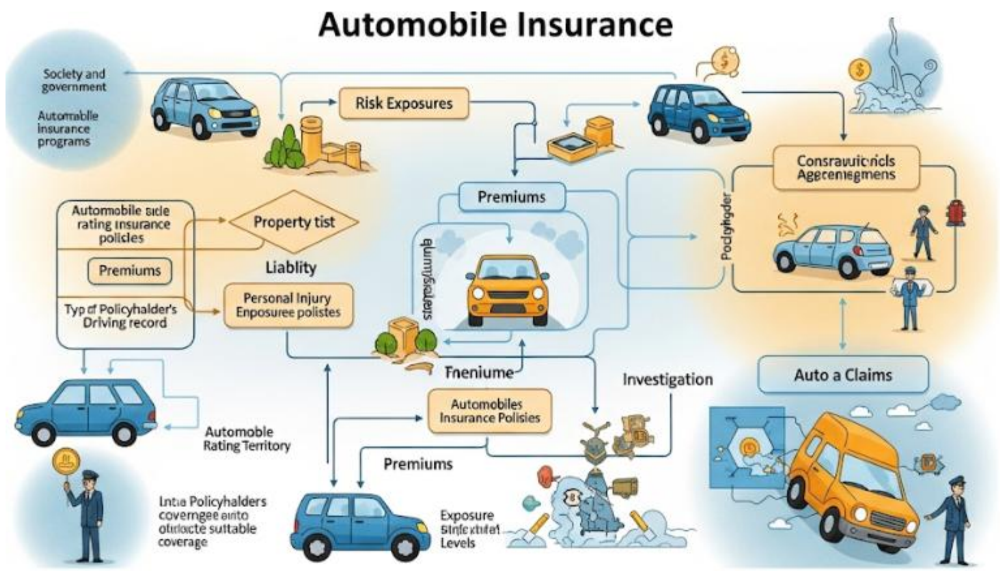

Fig 2 . 1 : Navigating the World of Auto Insurance

2.2. Types of Auto Insurance Coverage

Like homeowners and renters policies, an auto insurance policy provides two types of coverage. Liability coverage pays for damages to others; the remaining types of coverage pay for damages to your own vehicle and for your own injuries. The deductible is the amount you pay before the insurer pays benefits for a claim. The higher the deductible, the lower the premium; the lower the deductible, the higher the premium. The following sections discuss the types of insurance coverage you can buy and what is included or excluded in each. Particular emphasis is placed on the coverage options that will help protect you against being underinsured.

Liability Coverage

Auto liability coverage provides protection against substantial financial loss for damages you cause to the property or person of others. In exchange for paying a termination fee, usually a small percentage of the annual premium, many insurers will agree to extend your auto liability coverage to certain situations even when you do not own your car or truck. For example, if you regularly borrow a car from a relative or friend, or you lease a truck, this coverage may help protect you against loss. Your auto liability coverage includes payment for the medical bills of the injured person, for his or her lost wages due to the injury, for money to compensate the person for pain and suffering, and for damages to their car or other property. However, it does not cover your damage to your own vehicle; nor does it cover your own medical bills or lost income. You can purchase supplementary medical expense coverage for your own injuries; some insurers may provide this coverage as a rider on your policy.

2.2.1. Liability Coverage

Liability coverage is the anchor of almost every auto insurance policy because all states except New Hampshire and Virginia require proof of it. Furthermore, liability coverage is the option chosen most often by consumers. Depending on the state and the insurance company, liability coverage takes two different forms. The most common is split liability coverage, in which the insured buys specific dollar amounts for bodily injury per person and per accident as well as property damage. The other form is combined single-limit liability coverage, which combines bodily injury and property damage together, covering both areas under a single amount.

Liability coverage is also the option that is limited most severely by state regulations. In general, most states set minimum limits. However, insurers typically offer higher limits for policyholders who want that extra assurance. And many drivers go for higher amounts — not just to comply with legal requirements, but also as an additional measure of financial safety. Why? Liability claims can easily reach six figures, and some individuals have lost their savings and even become unable to keep up mortgage payments as a result of being limited to the minimum required amounts. Fortunately, that's a rarity. Most people do carry more coverage than that. For instance, figures show that in 2001, 28 percent of all drivers carried 100/300, while 19 percent carried 250/500. Furthermore, many states offer higher minimum limits for liability insurance — in those that require them.

2.2.2. Collision Coverage

Collision coverage applies to a driver's own car when involved in an accident. This coverage is used to repair a car's damages after a collision or, in a total loss, to repay the car's actual cash value. Collision coverage applies when a car collides with another automotive vehicle or with a stationary object like a tree or lamppost, regardless of who was at fault. Collision coverage is vehicle specific. The deductible is the amount the insured pays out of pocket before the insurance company covers damages. If the damages are less than the deductible, the insurance company pays nothing. When a car has a high actual cash value, collision coverage can be expensive, especially if it has a low deductible. In this case, insured parties sometimes request the collision loss be paid as follows: 1. For damages less than the deductible, no loss is reported to reduce the chances of a premium increase. 2. For damages greater than the deductible, insured parties absorb an amount equal to the deductible and the insurance company pays any remaining losses. Although collision coverage is an option for vehicle owners in most states, nearly all lenders require some form of collision insurance during the loan's term. Lenders want to make sure their collateral is protected in the event of an accident. If the owner defaults on the loan, the lender can repossess the vehicle but is unable to recoup its losses if the vehicle has been destroyed in an accident and is not insured. Lenders require this coverage for the duration of the loan to minimize their risk.

2.2.3. Comprehensive Coverage

Although collision and comprehensive coverage overlap in the type of damage to the insured automobile that they offer coverage against, comprehensive coverage can be purchased only in conjunction with a collision coverage endorsement. Comprehensive coverage is generally purchased by persons having special interest in a vehicle's preservation. Collision coverage is generally purchased for financial protection from the cost of repairing or replacing a vehicle that is damaged in an automobile accident. This chapter will use the term "auto insurance" when speaking generally, but will refer to "collision coverage" when discussing the level of coverage that typically applies to a vehicle that is being operated without experiencing any damage-producing event.

Collision coverage would typically also apply when the vehicle is parked and occupying a space at a public or private location, but could potentially affect the costs to the driver or passenger of being driven, if it is damaged while doing so, either by the driver or by another vehicle.

Comprehensive coverage applies to unscheduled damage that occurs to an insured vehicle while parked at a location and no damage-producing event is occurring. These are included as being potential damage-producing events by language found in the standard definitions typically found in comprehensive coverage endorsements. Comprehensive coverage also applies while the vehicle is being driven, but only in the following limited circumstances; namely, if it is rendered inoperable or is not able to be operated safely immediately following the event. Damage from fire is typically covered by comprehensive coverage, and would also generally be covered by collision coverage but not by any third-party liability coverage. This type of property damage is not usually addressed by the vehicle's repair or replacement coverage, because the interior of the vehicle would generally be excluded as irreparable but also not replaceable if the entire vehicle were to be declared a total loss.

2.2.4. Personal Injury Protection

Insurance coverage for motor vehicle accidents is divided into property damage coverage and bodily injury coverage. The former helps pay for physical damage to another person's vehicle as a result of an accident for which you are at fault, including losses of use such as rental car or taxi expenses, and the latter pays for other losses incurred by a third-party individual who has been injured, including medical bills, pain and suffering, lost wages, and loss of consortium. Because most states require proof of liability insurance, such insurance is widely in force and available. However, what happens to you and your passengers if you are injured in an accident caused by another driver? Because of the frequency with which such accidents occur, personal injury protection coverage was invented to afford assistance in settling your own claims while waiting for payment to be received for any amounts owed by the other driver. PIP is a type of no-fault insurance.

The argument in favor of this type of insurance is that it reduces the expense of bringing a claim. Because of the large sums involved, hiring a lawyer to help you with your claim may be necessary, and those sums could be reduced by either handling your claim yourself or using the services of an insurance adjuster on a first-come, first-served basis. By agreeing to limit the amount you claim, you can have the satisfaction and relief that comes with being paid what is owed to you promptly. Another advantage is that if you need immediate medical assistance, this coverage places more responsibility for quickly arranging for that assistance on the person who caused the accident. This type of coverage also exists to pay for the time of any relatives at home who must provide care for you if you are injured and cannot care for yourself.

2.2.5. Uninsured/Underinsured Motorist Coverage

Uninsured/underinsured motorist (UM/UIM) coverage is an umbrella term for several types of coverage: it protects you against damage done by uninsured motorists; underinsured motorist coverage protects you against damage done by underinsured motorists; and also motorist property damage (MPD) coverage, which protects against property damage done by uninsured motorists. The distinction between uninsured and underinsured motorist coverage comes from the fact that certain states allow drivers to drive with minimum coverage limits, which can sometimes be woefully deficient. In some cases, state and local laws have so-called “minimum policy limits,” which can leave claimants without recompense because the at-fault party lacks adequate insurance to cover their losses. If you are involved in an accident with an uninsured/underinsured motorist, UM/UIM coverage is designed to provide you with an alternative source of funds to help cover your losses. Importantly, this coverage is not optional in many cases: many drivers have little idea that such policies even exist, but most drivers should carry this coverage, particularly if they live in an area with high rates of uninsured and underinsured drivers. States differ with respect to whether UM/UIM coverage is optional, but generally speaking, when you obtain a policy, the insurer must offer it. In many cases, it is compulsory, because states tend to make it a covered option under their regulated auto liability policies. If you do not want to carry this coverage, you must typically formally decline it when you obtain the policy and thereafter carry proof that you have done so.

2.3. Factors Influencing Premium Calculations

While you cannot control how, where, and when you drive, there are a number of factors which may affect the premium you pay for auto insurance. The most significant influence on the price of your insurance policy is consideration of the risk the company has underwritten on your behalf. But declining consumer confidence in the insurance market is also seen, as companies become less sensitive to price and competition for business decreases or is balanced by the need for profits. Take a look at some of the more common factors which are taken into account in calculating your premiums. 3.1. Driver's Age and Gender. The typical accident-free driver is a fifty-year-old resident of a rural community driving an average car. Drivers in their teens and in their late sixties or early seventies have more accident claims per mileage driven than other age groups and tend to pay higher premiums. Young drivers are more expensive to insure than all others because they lack driving experience and have more accidents. Men are statistically more likely to have accidents and pay a higher premium than women. 3.2. Driving History. More important than the actual number of accidents or the total cost of damage is whether they occurred in the recent past. If you have had a serious accident, received multiple citations for different offenses, or received multiple moving violations within a relatively short period of time, your premium is likely to be higher. Traffic violations and accidents are evidence that the driver has a higher risk than she would otherwise be expected to have. If an insurance company has paid any of your claims, your premium will usually be higher. 3.3. Vehicle Type and Model. The initial cost of the vehicle, the vehicle's safety record, depreciation, accident rates, theft rates, and the relative costs of parts and labor used to repair it are among factors that are considered in determining the vehicles that will be the most expensive to insure. For both the buyer and the seller, predicting a vehicle's future insurance costs is difficult. In general, as a vehicle ages insurance costs drop.

2.3.1. Driver's Age and Gender

One of the most significant factors that can influence a driver's insurance premium is their age. Generally speaking, older people will pay more than middle aged people, but younger people will pay even more because of their inexperience. Drivers aged between 17 and 21 pay the largest premiums, with costs usually falling by around 10% at 22 and further reductions made until the driver is about 25. After turning 25 and until the transition into retirement, this group will also see a significant reduction in their premiums. Insurance companies generally don’t believe that lower risk levels are achieved until a driver has had around 5 or 6 years of experience, or is 25. Factors that may be taken into consideration when looking at a person’s age is any specific licencing restrictions that they are subject to. Some drivers gain their full license at different ages, which may increase or decrease their premiums.

Gender is another key factor in the motor insurance premium calculation. Statistically, young male drivers have more accidents and pay higher premiums than their female counterparts of the same age. This may be partly due to the fact that young males are more likely to take risks, but it often leads to the insurance companies building penalties into their premiums because of this risk. However, while premiums are substantially reduced for male drivers at 25, they do not drop to the same level as female drivers and men remain liable to paying premiums that are on average 10% higher than women. Another factor is that young males are more likely to drive more powerful and expensive cars. However, by around 40 years of age, both men and women pay very similar premiums. After this age, although the level of claims by females decreases, the number of claims made by men goes up, and men are penalised for this. After retirement, insurers often encourage women to re-enter the market with a good driver discount, while at the same time increases are generally made for men in their 70’s and 80’s, who are statistically higher risk drivers.

2.3.2. Driving History

An important factor in determining how much your insurance costs is how much, if at all, you have claimed against it in the past. A driver who has been involved in three accidents in the previous three years, for example, will usually pay substantially more for insurance than a driver who has not claimed against their insurance in many years, or who has never claimed against it. This is sometimes called "claims history," and sometimes a "no claims bonus" applies.

Some insurance companies may not charge you extra for minor bumps and scrapes affecting only your own car, which they are covering anyway at that point. They may allow you one of these each, say, five years. Some companies run the "claims history" aspect pretty hard, however. Even if you are at fault in an accident, or even if it is disputed or your insurance company knows the other party is claiming against you, you may be required to disclose it when taking out a new insurance policy. If the event is not disclosed, you may find your insurance to be void, meaning that you would not only be liable for all damages, but would also have no coverage for any damage to your own automobile. In general, if you have relatively few at-fault accidents or property damage claims that can be tracked, you will pay less for your insurance than someone with many such claims, for the simple reason that historically the driver with the least claims is probably the safest, because they are least likely to have any more accidents in the near future.

2.3.3. Vehicle Type and Model

There are various parameters that insurance companies consider while calculating insurance premium, these include car's value, risk factors associated with its make and model, body type, etc. These factors decide insurance premium for both comprehensive and third-party coverage. The car insurance premium for comprehensive policies is calculated on the basis of car's IDV. This is the value the insurance company considers as the maximum amount it will pay you in case your car is stolen or damaged beyond repairs. In other words, IDV is the market value of a car that is claimed in your insurance policy. Most insurance providers go by the manufacturer's listed selling price minus depreciation to arrive at the IDV figures. The depreciation rate is fixed and varies with the age of the vehicle. It amounts to 10% for the first year, and reduces by 10% each year on a declining basis. For premium vehicle owners, it is advisable to get an estimate of the market value from a dealer, and to get it incorporated in the policy, as it will allow you to recover the cost of the car, in case of damage or theft. There are two aspects associated with car's type and model, which create an impact on car's insurance premium. First, it is the make of the car (a major manufacturer or a niche manufacturer). The cost of parts is significantly more for niche manufacturers, leading to higher respective premiums. In addition, with several significant engine configurations for premium cars, matching the car to its intended purpose sensibly can reduce premiums. Second, with regard to body type, whether the vehicle is a hatchback, sedan, station wagon, SUV, or MUV, insured value is a major component in the final premium computation for the dealer-related and imported cars, relative to niche manufacturers.

2.3.4. Location and Zip Code

Factors for Insurance Premium Calculations

Quite a few insurance companies and state governments have shown interest in your social activities. Especially the insurance companies want to know where do you go most of the times? Are you staying alone or with your family? For example, research has shown that people who have kids spend a lot of their time at home. This is not the case for those who live alone. It has also been seen that people who are single tend to drive their cars more while going for work etc. With all this data in hand, companies have concluded that people living in certain areas are good drivers. They have set lower premiums for them. On the other hand, areas where householders are always on the road dealing with jobs, school dropouts, etc. have been classified as risky areas for insurance. The idle person in society, who doesn't have a job to do, might find it happening to steal from the people who are on the roads and whose cars are left idle. For all such reasons, the companies charge higher premiums for these people. The area or zip code given by the policyholders while applying for the insurance has a significant impact on the area. For those who live in areas where population density is high, more accidents tend to happen. In such areas, the company has to pay more concerning the amount they have received as a premium. For this reason, the companies charge higher premiums for people living in such localities.

The people living in lower crime rate areas and also lower population density areas can avail of the reductions in premiums. In these areas, the chances of accidents happening are very low. The chances of the vehicle being destructed due to theft are also very low. Hence lower premiums, in this case, people living in good enough environments might find it safe with a lower amount of premium to be paid. Thus, the area where the vehicle owner is applying for the policy with its zip code is a key factor that is considered while calculating the amount of premium.

2.3.5. Credit Score Impact

Numerous factors can affect the price of your auto insurance, including the type of policy you select, the amount of coverage you choose, and any discounts that might apply. However, there are certain overriding characteristics of a driver – often referred to as underwriting characteristics – that can generally drive the price higher or lower regardless of the type of insurance selected. Among these underwriting characteristics are the age and sex of the driver, the driver's driving record, the type of car being driven, where the driver lives, and the credit rating of the driver (and in some states, when the other members of the household also have requested or currently have a policy).

Of these underwriting characteristics, the influence of credit ratings is the most recent on the scene and possibly the most controversial. At present, a credit score is often used as a substitute for predictive information about the driver. The problem is that one could argue that credit scores are an inadequate substitute for actual driving records or other personal history data, and that the true test of a rating characteristic is not how well it can predict claims behavior for the average person falling into a risk class, but how well it can predict claims behavior for every person falling into that risk class. This is especially relevant for automobile insurance, where the level of rating dispersion can be large (e.g., a 60-year-old woman living in Florida with a perfect driving record could be rated at 95 percent or less and a 22-year-old male living in the same state with numerous speeding and careless driving violations could be rated at 400 percent or more). While credit ratings are available on a continuous basis and come from an experienced source, and while it has been shown that they, along with a "new to file" variable, do help to predict claims behavior, there are also some serious drawbacks to using them as a substitute for more traditional measures of risk.

2.4. Understanding Premium Calculations

Automobile insurance is required by law. States regulate insurance companies, which facilitate the sale of insurance through dozens of agents and subsidiaries. States usually do not regulate the rates charged for property insurance, which means that insurance carriers can charge whatever the existing market will bear. However, auto insurance is usually a company's biggest expense. So unlike most types of property insurance, automobile insurance is almost always heavily regulated, and premium calculations involve several complex processes.

While companies will negotiate premiums within the confines of regulations, in situations where there is no peer competition, insurance carriers that are overly aggressive in developing their own base rates will end up with either a loss or a surplus of premium income. A base rate provides a starting point for excess incidence rates for a certain group of policyholders of a specific insurance company based on collective underwriting for the various risk assessment characteristics. The actual premium is then arrived at by adding other influences like coverages, deductible amounts, discounts for favorable factors, and surcharges for unfavorable factors to this base rate. This section will focus on base rate determination, how risk assessment models are built, and how discounts and surcharges are incorporated into the final premium. We will not deal with the other aspects of auto insurance, which deal with risk acceptance and loss alleviation.

2.4.1. Base Rate Determination

Establishing a base rate poses a considerable challenge for an insurer, given that loss and expense experience relies on paid claims data, which for all but the largest writing companies can contain substantial statistical error. Additionally, the conclusions drawn from paid claims experience on the existing policy limits and coverages may not accurately reflect future expectations. Partly as a result of these difficulties, but primarily to make rate increases or decreases more palatable, insurers make an effort to smooth out major shifts in claims or expense experience frequently importing a version of formulas sometimes applying an initial risk distribution or method to lessen the influence of annual data variability for a given insurer. A standard way to determine an auto physical damage base rate is as follows: The base loss cost is equal to the expected loss ratio multiplied by the sum of the primary and excess margin loading divided by the auto physical damage expected loss. The expected loss ratio can be predicted using the frequency of bodily injury/property damage claims and the average bodily injury/property damage loss ratio applied to the expected frequency and loss ratio of the combined writing company. The primary and excess margins depend on the loading entered into the expected loss ratio for accident-year reserves and reinsurance. Subsequently, the base loss cost is used to determine the base rate using the premium and the loss of the combined writing company.

2.4.2. Risk Assessment Models

When calculating insurance premiums, an insurer has to use its judgement about the risk represented by a customer, typically based on considerations of the insured vehicle, insured loss history, the policyholder’s driving history, and his/her characteristics. The ability of an insurer to assess risk is only as good as the quality and accuracy of the quantitative models developed to conduct risk estimation. Most auto insurers use a multifactor rating system that utilizes a set of risk assessment models to make this determination; with each factor making a contribution to the final premium.

A rating factor identifies the characteristics of a policyholder which is correlated with losses. Rating factors currently used by auto insurers mainly include an insured’s geographical location; the make, model, and age of the insured vehicles; whether a vehicle is primarily used for pleasure or business; the number of years the insured has had a policy; prior claims; vehicle usage and annual mileage; the age, gender, marital status and prior driving record of the insured; and the credit score of the person being insured. A rating factor-based risk assessment model then estimates the relative probability of the insured drivers being involved in accidents or causing losses relative to the average driver in the population.

Insurers use historical claims loss data to determine which rating factors are correlated with losses and to what degree. A loss distribution is then developed for the underlying population of insureds which permits the comparison of the modelled cost of an insured driving with certain characteristics to the total underlying estimated cost of all insureds combined. If the modelled cost is a given percentage greater than the average from the entire population of insureds calculated using the historical loss data, the insurer then applies a corresponding "rate factor" to multiply the premium.

2.4.3. Discounts and Surcharges

The base rate is only one dimension of the pricing equation. A company may wish to give discounts to certain groups of insureds – for example, early retirees or customers insuring multiple cars – to foster goodwill, encourage wider coverage, or promote increased customer retention. On the other hand, a company may wish to impose surcharges either on special risk categories or as a means of discouraging certain virtually uninsurable activities, such as drinking too much or committing certain traffic violations too frequently. In either case, discounts and surcharges are presented in the form of multipliers, that is, factors used to scale the basic premium. A multiplier of 0.9 would reduce the premium by 10 percent, and a multiplier of 1.5 would increase it by 50 percent.

Discounts and surcharges have an important purpose. In many instances, the original basic premium is gotten without much confidence that it will be proportionate to risk. One notes that while there are geographical factors that will scale all New York homeowners’ premiums, no statewide scaling factor is given. This is explained by the fact that each company has its own set of insureds, with characteristics unique to itself. As a result of this “market mix,” premiums for different companies may not be proportionate to loss costs. Hence, whatever risk characteristics are being examined by the model used to derive the basic premium are merely a subset of the total number of important risk characteristics. The surcharges, discounts and multipliers account for the remaining characteristics.

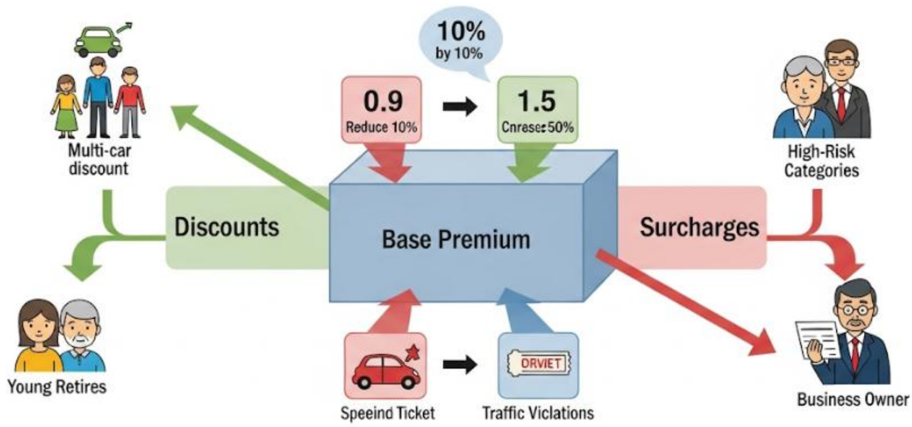

Fig 2 . 2 : The Price of Risk: How Insurance Premiums are Calculated

2.5. Automated Claims Management Systems

In any business, cost-cutting is one way of trying to work towards increasing business profits. One area where the costs can be particularly limited is the reduction of operational costs. Insurance companies rely on automated claims management systems to efficiently manage the business of examining submitted claims for fraud and eligibility and helping claimants through an often-complex and bewildering process. These systems start with first notice of loss, and thereafter requests for additional documentation and the required approval process completed by the back office staff managing the claim file. Premium collections and claims processing are the two basic activities upon which the insurance company exists.

The claims management system typically uses configuration rules in its automated routing processes that evaluate claim characteristics including dollar size exposures, location, handle and the involvement of special teams for catastrophe management, claims adjusting, both pre-loss and post-loss or recovery from subrogation, litigation and salvage processing. It may also contain business decision rules that help it determine which claims require special handling either on a manual basis by an individual adjuster or on an expedited basis. Other decisions often contained in the claims system are whether the claim can be paid prior to formal closure, the timing of payment, the reopen decision process, the system automation such as the availability of electronic data interface connectivity to state departments monitoring the insurance pools for ongoing claims and the frequency with which reserves must be updated and reported.

2.5.1. Overview of Claims Process

Insurance claims management is the process of managing and handling claims filed by insured individuals or businesses covered under a specific insurance policy. During this process, an organization assesses whether an insured loss occurred and determines how much of a claim should be paid or collateralized in accordance with relevant insurance contracts. The primary aim of an organization in claims processing is to control operational costs while ensuring speedy redressal of claims of policyholders. The claims department is costly and critical to the long-term viability of any insurer. Claims are frequency of events that insurers must deal with. The size and quality of the claims payout must also match the natures of the insurance products offered by the insurers. Careful management of the claims function reduces future policyholder providing necessary resources to the claims department. Insurers must balance the avoidance of inappropriate claims denials with assessments of whether a claim should or should not be covered under the provisions of the policy, while being careful to not make the claims process some simple at a disservice to policyholders who experience costly events. In the general insurance industry average claim settlement ratio has remained only around 50%, meaning that the company is able to settle only half of the total claims registered with any company. Claim settlement is a sensitive part of service and requires understanding the emotions around the loss, in many cases loss that may take years for the family to recover from. Claim processing requires a prerequisite of a customer and service when grief stricken and in many cases not receptive to interaction with business. Companies continually strive to reduce the expense of settlement and make it more automated. The utilization of new technologies leveraged by innovative business processes is making strides toward this goal.

2.5.2. Role of Technology in Claims Management

The willingness on the part of the insurers to invest in technology, like middleware to facilitate interfacing between legacy systems, ongoing development cycle, business-focused computing skills, and the ability to integrate heterogeneous data into centralized systems could help make claims processing more efficient. This, in turn, enables claims to be evaluated quickly and the rightful claim paid out, allowing the insured and the insurer to rest and preserving the insured's trust in the insurer. The intelligent use of technology helps in reducing the cycle time, speeding-up the process, lowering fraud, and optimizing resources through analytical models while positively contributing to the bottom line. Auto insurers can handle the majority of claims without an inspection of vehicles or other property. Automobile total loss claims do not necessarily require detailed and time-consuming visual inspections if the right technology is used.

Although the technology tools are now widely available, insurers have been hesitant in using technology to its full potential, primarily because of the need to interface the existing legacy systems, which may continue to be inefficient but highly reliable. Technological advances now allow online servicing of most customer service functions by third-party processors. Processing allows for remote data entry and direct payment, minimizing paper trails and overall processing expense. Further, empathy about the tragic circumstances leading to a claim is burned into the industry psyche. Properly mapping the technology across legacy and populating the knowledge model can enable the benefits of consumer-centricity, no-paper processing, and intelligent call center information support.

2.5.3. Benefits of Automation

In this chapter we provide an overview of Automated Claims Management Systems (ACMS) by discussing the claims process, the role of technology in claims management, the benefits and challenges of automation. We explore different types of automation including triaging, estimating, routing, and processing. Claims processing and management is usually at the heart of an insurance company. It is a labor-intensive, high cost, and low return business activity. In many instances, a policyholder would evaluate the performance of the insurance company based on the ease and speed with which a claim is processed. With the ever-increasing dependence on and offerings from technology, insurance companies are increasingly looking at ways to expedite and improve the claims processing through automation. Compared to traditional and manual methods for claims processing, technology can assist in remotely recording and reporting of claims related data, estimating damages using fast and easy to use technologies, fast-tracking claims by effective routing of claims for review and approval, and automating decision making on claims settlements.

Automation of these activities can lead to: (1) better customer experience, (2) faster claims settlement, (3) lower administrative costs to process a claim, (4) better resource allocation for more complex claims which require manual intervention, (5) lower cycle times and increase efficiency of claim processing activities, (6) quicker access to management-level information about claims activities via dashboard display styles using Business Intelligence tools, (7) increasing mobility for claims staff by enabling them to access claims images from anywhere, anytime, (8) tighter integration of claims processing workflows with other back-office functions, and (9) lower indemnity and operating expenses due to careful claims management and monitoring.

2.5.4. Challenges in Automated Claims Processing

The vision of a fully automated claims process seems like a convenient option; however, as companies begin to probe the possibilities and practicality of automated claims processing, it is clear that implementation, to any great extent, is not as simple as it first appears. At one end of the spectrum, pure self-service concepts with no use of technology-assisted human intervention are viewed poorly, with simple claims being questioned for accuracy of policyholder-entered information. At the other end of the spectrum, automated systems are so rigid in their soliciting-narrowing questioning that the additional conversation and questioning that typically takes place upon receipt of a claim is not captured and addressed, often creating additional, near-term communication challenges that continue long after the original claim has been initiated. This leads to the reboot, if you will, of a claim that was originally pursued with efficient intent. Additionally, while there is an enormous appetite for shifting mundane tasks and/or time-consuming administrative burdens to technology, many companies believe that simply offloading functions to automation will be seen as a positive move by their policyholders. Rather, the trend seems to show that an improvement in overall policyholder experience and satisfaction is only achieved when an appropriate blend of self-service automation, technology-assisted service, and human-centric service is designed and implemented on a function-by-function basis. To help determine the right process automation mix, insurers must assess the various components that constitute an ideal balance.

2.6. Customer Experience in Auto Insurance

Consumer service in auto insurance has become a field that not only is key to creating differentiation and extra value to consumers, but it also represents a serious threat to compliance with pricing regulations. Insurance being a service industry where majority of capital and manpower are employed for the service related aspects of the business requires that insurance companies invest heavily and proactively in the service aspect of the insurance process. Long gone are the days when pickup your claim check process was considered sufficient. Technology has brought consumer service to the center stage of the insurance business arena. Pricing comparisons are conducted instantly and as costs of insurance become visible to everyone, service becomes the important lever of competition. Complaints to insurance companies are at an all time high. This has resulted not only in lost income but has opened the door to start up consumer friendly insurance companies who pledge to offer painless service processes and guarantee satisfaction or else suffer financial penalties. Marketing strategies which involved the use of having a killer price with minimum service are no longer useful.

Current start up insurance companies are all proclaiming a commitment to service excellence. Service levels with respect to collection and settlement of claims are no longer matters of internal interest and scrutiny. They have become an integral part of the advertising and marketing process. Complaint levels are subjected to intense scrutiny by consumer oriented organizations. New services such as direct access to insurance company's customer service personnel by consumers via email, phone and chat lines are now being offered to plaintive insureds to expedite resolution of their complaints. Insurance companies are being judged not just on the final resolution but on the time and ease to get to it. Since there have become no barriers to switching, companies must be ever vigilant in identifying and correcting service problems since they are also playing in a zero sum game where unhappy customers can translate into ill will and publicizing their bad experiences.

2.6.1. Importance of Customer Service

Insurance can be complex and challenging to navigate. Insurance companies are therefore expected to shorten response and resolution times, as poor service and unclear messaging can lead to confusion, frustration, and negative online publicity when people share their experiences. While it is impossible to regularly monitor customer service levels at all companies, the industry does have several benchmarks to assess general performance. Each annual study asks customers to score their insurers in five categories: interaction, policy offerings, pricing, billing process and policy information, and claims. As with other customer satisfaction rankings, high scores by respondents in these categories raise the score of an insurer.

Measurement of customer service during catastrophic events, such as a hurricane or wildfire, is crucial, as auto insurance companies often deal not just with the drivers of vehicles insured with them but also the drivers of vehicles in their region who may have policies with other insurers. General performance during such events does not just affect those affected by disasters but can also affect noncustomers who hear of how various insurers responded during the disaster. This impact has only increased in the past decade given the rise of social media and readily available online reviews. Bad experiences witnessed digitally may influence noncustomers when it comes to choosing which insurer to use later. In many cases, the mobilization of customer support, even if technology and digital platforms do not play a role in the assistance, could lead customers and noncustomers alike to rethink any negative opinions about a firm.

2.6.2. Feedback Mechanisms

Insurance is not a product about which consumers might offer spontaneous, unsolicited feedback. Negative feedback is usually offered after a serendipitous claim event or a poor experience with customer service. To collect negative feedback, insurance companies should pro-actively ask customers for feedback after using customer service or after a claim. A more structured method of collecting info about customer experience is through surveys but these tools also have limitations. Customer survey data are prone to bias and omissions. Before cooperating with an insurance company, a surveyed customer may have only interacted with insurance agents, who are mainly incentivized to sign customers up for policies. Thus, survey respondents may have an incomplete experience of evaluating their insurer, which makes it challenging for survey makers to identify the person(s) who are actually at the receiving end at the time of a claim.

However, these biases could be at least somewhat de-biased by looking not only at the reported satisfaction from using the insured company's service and asking how confident the insured customer would be in the insured company at the point of submitting a claim. With regards to online reviews, a common consumer experience is to read reviews after a fact, but reviews can also be made at the point of decision making. Insured customers can also refer their experience at the point of signing up for a policy and thus add an additional dimension. A good way for insurance companies to make sure happy customers spread the word is to provide referral bonuses and incentives. This is currently a common practice among car-sharing companies.

2.6.3. Impact of Digital Platforms

Digital constraints have reduced traditional barriers to entry in the insurance segment, enabling more players to compete in providing products and services. A slew of new entrants into the property and casualty insurance market, which is saturated with long-established players, are leading to greater competition by offering customer interactions at lower costs, improved ease of use, and faster responses by utilizing mobile and online technology. These new digital insurance companies have struck a chord with younger clientele by streamlining the often complicated and intimidating process of buying insurance and processing claims into a few quick and easy digital interactions. They appeal to customers by banishing confusing jargon, avoiding hidden fees, and promising to be with the policyholder every step of the way. These growing, tech-savvy insurance companies rely on digital-native business models that leverage social communities, pay-per-mile usage-based insurance, and microinsurance for small-value personal possessions.

One company, which markets its services to millennials, dispenses with agents by using an online "chatbot" that creates a customer profile and issues a straightforward renters or homeowner's policy in about 10 minutes. Using artificial intelligence, the website gathers up basic info from its thousands of policyholder clients, which might include a photo of a prized piece of artwork attached to the profile. The fee-based business model — with the company as both the insurer and insured — debunks the long-held insurance industry principle that the insurer profits when its clients incur massive losses. Instead, the company offers a steep rebate to policyholders who make few or no claims. Should claims exceed the refund, the charges incurred will continue to cover losses, and the company hopes that its satisfied clientele will be willing to accept lower payouts in lieu of fewer claims, thus allowing the company to pocket the difference.

2.7. Regulatory Framework Governing Auto Insurance

Regulatory supervision of auto insurance is treated in various ways in different jurisdictions. In the United States, more than half of the states have made automobile insurance mandatory for car owners. Almost all of these states control the rates of at least some of the insurers operating in their jurisdictions. Moreover, virtually every state established, at some time in its regulatory history, an underwriting bureau that devised plans and procedures to make automobile insurance available to those who could not obtain it in the voluntary market. The need for these mechanisms arises from the nature of the automobile insurance product, the significant public role of automobile insurance, and the economic effect of having a large number of uninsured motorists.

The federal government in the United States also carries out automobile insurance regulation but its role is very limited. However, almost all unique and specialty coverages, such as products, professional liability, and workers compensation are regulated at the national level. It can also be noted that laws within the European Union establish the outlines of directives that must be incorporated into the national legislation of all member countries. This provides for some overall consistency but within this framework, the way in which the rules are applied and the additional requirements set out varies considerably from country to country.

The best-known regulations governing auto insurance require that the coverage be available for all. These focus on the provisions of the laws establishing the requirement for insurance, the enforcement of that requirement, and the universal provision of coverage. In addition, the amount of minimum coverage required is another regulatory matter, as are the financial strengths of the entities providing these services. Some countries also have rules covering, to a greater or lesser extent, the payment of benefits to insureds that are ultimately uninsured.

2.7.1. State Regulations

Auto insurance is highly regulated by the states. Within each state, several regulatory agencies oversee and enforce the insurance laws. In most states, the responsibility for regulation of insurance lies with the Department of Insurance, an independent agency headed by the Commissioner of Insurance. The department is responsible for granting charters to insurance companies to conduct business in that state and for overseeing the financial solvency of these companies. Insurance regulators are responsible for protecting the interests of insurance policyholders. When companies experience financial difficulties or misrepresent the policy terms and conditions, the Department of Insurance has wide-ranging powers to investigate and correct the situation. If depletion of reserve funds threatens to disrupt financial solvency, the regulators can order companies to take steps such as lay off workers, sell off operations, or raise premiums. If even these measures prove insufficient to restore solvency, state insurance regulators can dissolve the company and liquidate its assets.

The financial solvency of an insurance company is crucial to the policyholder. The chances of an auto insurer becoming insolvent are relatively low, approximating 0.5 percent each year. Insurance premiums are the funds that policyholders pay so that the insurance company can operate its business and provide the financial security that policyholders are seeking. These funds are pooled to form reserve funds. When a policyholder has a claim, the insurance company pays for the loss from the reserve fund. Insurance companies earn money by investing premiums received before having to pay claims. Policyholders do expect that the insurance company will be financially healthy enough to pay claims when they are due.

2.7.2. Federal Regulations

Several federal statutes influence the design and servicing of auto insurance. The most significant of these is the 1945 McCarran-Ferguson Act, which gives the states exclusive power to regulate the business of insurance except to the extent that federal law specifically provides customer protection. As a result, the numerous broad federal insurance laws work through the states and rarely mandate coverage required by the federal government. Not covered by state law, nevertheless, are reinsurance and surplus line activities, which are the province of the federal government. Congress established a model for such law in the 1959 Surplus Lines Insurance Regulatory Modernization Act.

The rest of this chapter deals with federal regulations that control specific policy provision requirements, premiums, and claims servicing practices. We begin with laws affecting policyholder protection. These laws are based mostly on the use of power. Federal regulations recognized the fact that insurers selling policies in connection with loan transactions had an economic advantage that insurers selling stand-alone policies did not. As a result, lenders could dictate the specific terms of insurance offered by independent insurers that policyholders could patronize. Federal statutes, sometimes with the support of the IRS, allow lenders to severely restrict the insurance companies and types of policies borrowers may buy.

2.7.3. Consumer Protection Laws

There are several important federal consumer protection laws that impact every state's regulation of the insurance business. These laws require that insurance companies assure the American people that regulations at the state level clarify and safeguard rights of privacy and security regarding consumers' and policies' personal information. The federal laws also provide recourse to policyholders in the event of negligence or malfeasance at the federal level. They are the Fair Credit Reporting Act, the Children's Online Privacy Protection Act, Title V of the Gramm-Leach-Bliley Financial Services Modernization Act, and the Health Insurance Portability and Accountability Act.

The Fair Credit Reporting Act primarily covers credit scoring and consumer credit reports from companies specializing in these aspects of consumer credit. Among its many provisions, the act mandates disclosure of information that is used against a consumer in underwriting decisions and allows consumers to dispute and correct inaccuracies in their credit reports without paying to receive their credit reports in the first place. Consumers have the right to know the name, address, and telephone number of the credit reporting agency that compiled the information used to make the underwriting decision. However, insurance companies are held to lower data usage and accuracy standards than other users of consumer credit information. The Fair Credit Reporting Act requires regulatory studies on the use of credit scoring in the insurance underwriting business but not extensive provisions barring its use.

2.8. Conclusion

The previous sections provided an overview of key topics related to auto insurance, including premiums, coverage, risk management, and claims. However, there is much more to learn about this fascinating industry. The four appendices provide additional information on licensing, state auto insurance plans, coverage forms, and more. The reader is encouraged to consult these appendices to gain a deeper understanding of the history and future of the industry. In summary, the auto insurance industry is a mature industry that has been present for many years, with an outlook that predicts additional challenges mainly based on competition and technology. Additional challenges faced by the auto insurance market are inflation, rising interest, and emerging risks. Although there is doubt about how this will impact the consumer, there is no doubt that any challenge will have to be faced by companies in some way. The auto insurance market will always be there, whether the companies do well or slide. The only uncertainty is to what extent. Therefore, the improvement of the professionals who work in the auto insurance market will not only improve the company they are working for, but also enhance and add value to the auto insurance industry as a whole. Hopefully, this book can be an initial help in this process.

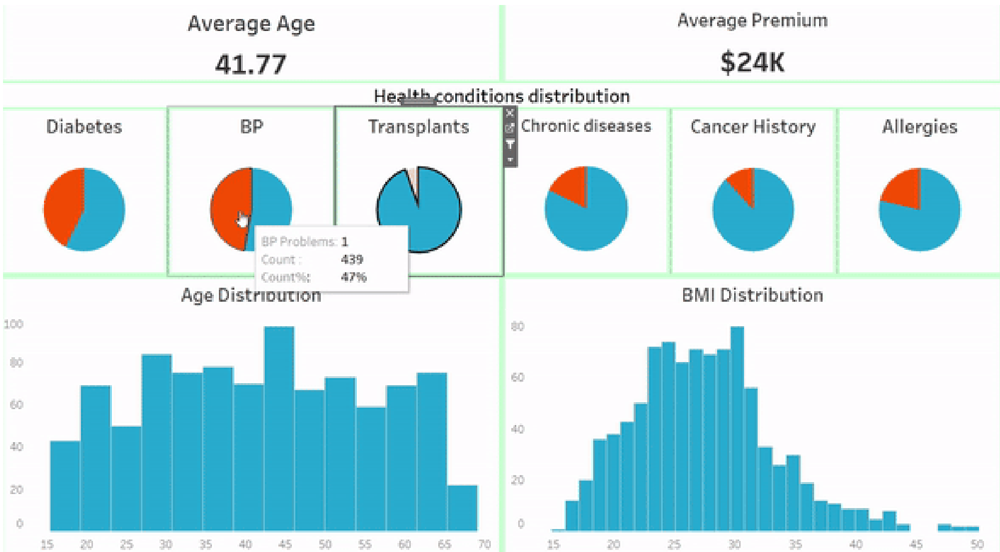

Fig 2 . 3 : Insurance premium prediction

2.8.1. Final Thoughts and Future Trends in Auto Insurance

Over the past couple of years, developments in the world, including challenges, rising inflation rates, supply chain issues, and labor market shortages have had an impact across multiple industries, and auto insurance is no exemption. As consumer needs, expectations, and behaviors have shifted, insurers too have been rethinking their strategies going forward. The opportunities and challenges they face require an ongoing reevaluation of how to make the best use of technology, data, and partnerships to build durable relationships with their customers.

Among the various trends affecting the future of the industry, the most relevant is the drive towards customer centricity. Customers today are looking beyond just simply price or coverage with their carriers; they need and expect more. As such, insurers are increasingly investing in intently marketing their value propositions that highlight the differentiators that matter to customers, including being easy to do business with, offering useful services and tools, being there at a moment of need, and offering trust and peace of mind.

A number of trends have impacted personal auto insurance and the way in which policies and claims are managed. Insurers have introduced telematics, which collect driving data and behavior for at-risk customers, as another tier of personalized pricing and risk assessment; Usage-Based Insurance, which allows insurers to charge low-mileage customers discounted rates; bundled protection offerings; expanding the services ecosystem; Embedded InsurTech products; enhancing risk modeling through technology and data; periodic real-time predictive analytics to inform internal engagement, pricing, underwriting, and claims strategies; predictive analytics within claims; the rise of digital's presence; Bots; digital payment solutions; automated garage and supply chain solutions; and drone property appraisal. For other practices, industry incumbents are developing partnerships with non-insurance peers, deploying data scientists, and even investing in or developing business models on their own in the constantly evolving social climate and economic landscape.

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