

# **Emerging Trends in Automobile Insurance**

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## Introduction

Automobile insurance is one of the few coverage lines that are compulsory in every country. Gilbert Loomis, a resident of Dayton, Ohio, purchased the first known automobile insurance policy in 1897. He purchased a liability insurance policy from the Travelers Insurance Company to protect himself if his car killed or injured someone or damaged their property.

In 1914, the first manual establishing rates on a nationwide basis in the US was published. Automobile insurers established several criteria for rate setting including geography, automobile class, horsepower of the automobile and the use to which the automobile was meant for. In the 50's and 60's various US states made automobile liability insurance compulsory, as by law for all vehicles on the road. This is now the norm in many countries but interestingly enough a couple of US states still have not made insurance mandatory. The "Age and Use Classification" plan to fix different premium rates for different classes of risks was introduced shortly thereafter. This plan established rate classes for persons above and below age twenty-five with sub-classes based on marital status, automobile use, completion of a driver education course and driving record. Variations of these are followed in many countries. Later gender was introduced as a variable and higher premium rates were enacted for metropolitan areas, in the US. As the largest automobile market in the world, the US lead in auto insurance innovation. As the global auto insurance industry grew it adopted and innovated many of the business practices of US based insurers. By the 70's, innovative products, such as, "no-fault"<sup>1</sup> and personal injury protection were common in many major markets. By the 80's, most major markets started or had established independent regulators. As these regulatory authorities began to network and exchange ideas, a more homogenized industry began to take shape. While in emerging economies regulators were trying to strike a balance between deregulation, the need for controlled growth, and consumer protection, in the developed countries the regulators were giving industry an opportunity to experiment and explore alternative business models. In the midst of this, certain concepts and rules found their ways around the world. The advantages of having common regulatory frameworks generally exceed any individual country's need for sovereignty, especially in a climate of intense globalization. Important global business regulations, such as the International Financial Reporting Standards, have moved forward to further support globalization of business.

Across the world, automobile insurers are now producing increasingly superior products with the help of technological advancements and usage of new risk profiling techniques.

Although globally automobile insurance industry followed the prevailing practices of the North American and European markets, regional practices also developed. Insurers have evolved to increasingly reflect consumer requirements of specific regions and in some countries, of specific sub-regions. Insurers in some countries, such as Austria, France, Germany, South Africa, UK and China are giving weightage in rating to the availability of a garage or enclosed parking at the residence of the insured. In some countries the industry is

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<sup>1</sup> Irrespective of who caused the accident, the insurance company pays for the medical expenses and /or for the loss of wages that the insured suffers on account of a collision under this policy.

considering traffic violation conviction records as a rating factor, whereas in others it is not. Insurers in Canada and Australia consider who would be the additional drivers whereas Czech Republic and Sweden don't.

Similarly, the required limits of liability vary from country to country. In some countries, there is an unlimited liability, while in others there is no such requirement. Therefore different products, meeting varying needs have been introduced. Procedures of handling claims also differ from country to country. Often different types of claim are weighted differently. In many markets product innovation is result of existing popular market experience, where as in a few countries the industry has to innovate to adapt to new legislation. In some markets the sophisticated data capturing capabilities enabled the insurers to adopt more accurate rating mechanisms.

A major part of this innovation has happened in the last decade. Many markets saw rising claims in the 90's and the early part of the new millennium, this led to a correspondent increase in the premiums. Car insurance costs became a political issue in many countries. Due to this the insurance industry came under the pressure to manage claims and reduce premium. Industry sought solutions wherever it could, in technology, in collaboration, in prevention and even in consumer education. Simultaneously, governments implemented legislations which also altered the dynamics of the industry. This paper explores the various practices, and factors, which the industry has adapted to or is currently adopting to mitigate the risks.

## **1. Impacts & Significance of Changing Technologies on Automobile Insurance**

Technological advancement is not only changing the driving experience but also influencing automobile insurance. Equipment like air bags, seat belts, and distance sensors are making the drive safer. Emerging technologies, such as stability control systems and sensing systems that extend beyond the automobile, will continue to help drivers avoid collisions and accidents and thus reduce the chances of life threatening casualties.

Technologies like Global positioning systems (GPS), tracking devices and anti theft devices are being encouraged to reduce theft. In addition, on-vehicle event data recorder (EDR) is an emerging technology with the potential to enhance road safety. This section will address the effects of some of these technologies on automobile insurance.

### **1.1 Automobile Features to Reduce Physical Injury**

Cars are generally safer now, over the past 3 decades enhancements such as airbags, energy-absorbing car frames and anti-lock braking systems (ABS), have made passengers safer. In addition various steps have been undertaken to make the automobile less harmful to those it might collide with. Many accidents involve an automobile and a pedestrian, thereby putting the insurers at third party liability risk. By incorporating flexible plastic molded bumpers that can absorb shocks, fatal injuries to pedestrians can also be reduced. Automobiles with safety equipment like seat belts and air bags reduce the impact of accidents for the driver and passengers, thus reducing injury and claims. Lower claims leads to a lower premium for automobiles with such safety equipments.

## 1.2 Incorporating Technologies and Factors to Reduce Fraud and Theft

A new technology has been introduced that involves spraying non-removable microdots, containing a unique identification code, onto auto parts. Automated license plate reading technology has been used at U.S. borders with Canada and Mexico to track stolen automobiles entering and leaving the country. The scanned license plate numbers are automatically checked against a database of stolen automobiles.

Consumers are also taking advantage of new security devices to keep their vehicles safe, such as:

- Theft alarms, which activate a siren or horn, if the automobile is opened without disarming the alarm.
- Sensors, which activate an alarm if the sound of breaking glass is detected.
- Ignition locks and kill switches, which prevent hot-wiring by disabling the ignition circuit and fuel system unless the alarm is properly disarmed.
- Electronic tracking systems, which automatically notify the monitoring center if an automobile equipped with the system is started by any means other than through the use of an approved ignition key. This feature also helps the police to quickly locate the stolen automobiles.
- Steering wheel guards, which completely cover the steering wheel, thus preventing its cutting or removal.

In many countries, insurers provide discounts to policyholders who install such automobile security devices e.g. the three largest New York (USA), auto insurers offer the following discounts<sup>2</sup> on their comprehensive converge.

Insurance Company	Alarm only	Active Disabling Device	Passive Disabling Device	Electronic Tracking Device	Window Glass Etching
Allstate	5%	5%	10%	15%	5%
GEICO	5%	5%	10%	15%	5%
State Farm	5%	5%	10%	15%	5%

## 1.3 Data Base Management Systems

Advanced data management technologies are also being used by auto insurers for assistance in underwriting and actuarial analysis. Databases, when combined with the latest data mining tools, make it easier for insurance companies to assess and manage risk more efficiently. In addition, various data collecting agencies such as Insurance Services Office (ISO) provide historical data and/or third party industry data which insurers can utilize to augment their own databases.

Others such as Skywire Software offer Insight, a data warehousing platform specifically designed for the P&C market. Milliman is currently building a unique auto data warehousing platform which integrates the technical robustness of its well established health data warehousing platform with Milliman's proven analytical expertise in auto insurance. Auto

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<sup>2</sup> Transportation Alternatives, not for profit citizen group ([www.transalt.org](http://www.transalt.org))

data warehousing platforms allow a complete view of the business including executive management, accounting, sales & marketing, claims, actuarial, and underwriting KPIs (key performance indicators). The data marts, reports, tools and functions are all specific to the P&C insurance industry, allowing an accurate analysis of industry-specific indicators.

The automobile insurance companies can use databases with up-to-date information from its car insurance portfolio. This enables them to perform various analyses, such as to check how many of its policyholders have had accidents. Various rating, rules and underwriting application suites, when combined with data mining systems and accurate data bases enable insurers to move away from using risk proxies and towards using actual determinants of risk.

Services such as InsureNet provide immediate access to vehicle insurance details. It can tell you if insurance has lapsed on a vehicle, when it was purchased (to prevent back-dating), the name of the State where the vehicle is registered and the insurer. It links the vehicle identification numbers to policy numbers. This service is available without charge to members of the law enforcement community and at a minor charge to automobile insurer. Its main USP is its ability to assign a "UC", (Unique Code), to each combination of policy and VIN, (Vehicle Identification Number).

Another provider of automobile insurance data is ISO. As a data aggregation agency, ISO sources data from various insurance companies, investigation departments and law enforcement agencies. This data is packaged and provided as a database which can be used for ratemaking, reinsurance pricing, classification analysis, benchmarking, strategic planning, underwriting, and marketing programs. Using the ISO DataCube software insurers can perform analyses of credible experience across many factors and use the results in pricing, marketing, underwriting, and claims practices. Other tools they provide are ClaimSearch, which provides claim records from different insurance companies and Decision Net, which gives reports on an individual's driving history that includes:

- driver's license information
- driving history, including deducted DMV points
- driving restrictions, such as glasses and hearing aids
- special endorsements, including tank and hazardous materials
- state-specific rules, regulations, and requirements

In addition, collision simulation and repair estimation software are also being widely used to assess who was at fault in a collision to estimate liability. The utilization of the various IT based solutions mentioned above are empowering insurers to achieve higher quality in underwriting.

#### **1.4 Tracking Technologies**

Many manufacturers are now installing “on-vehicle” event data recorders (EDR). It records automobile movements. In case of an accident, the information prior to the accident can be used to assess whose liability it is to pay for the loss. This technology can also be used for a better assessment of claim costs. Information provided by EDRs includes:

- a. Whether seat belt was in use at the time of accident, by both passengers and driver.
- b. Crash pulse information that defines the severity of the collision in magnitude as well as duration.
- c. Pre-accident information like automobile speed, engine speed, braking status, and distance.
- d. Point and angle of impact to assess who was at fault.

## **2. Laws and Legislations**

The insurance industry is influenced by two types of laws and legislations. It is directly affected by industry regulatory norms and indirectly affected by other laws. This section explores regulatory influences on automobile insurance as well as the effect of common laws. The government impacts the operating environment for an insurer in many ways; we will explore some of the significant methods.

As an initiative to reduce uninsured driving, some states in the USA have introduced No pay, no play laws. These laws prohibit uninsured drivers from suing negligent drivers for non-economic damages, such as compensation for pain and suffering.

### **2.1 Emerging Regulatory Issues for Automobile Insurers**

In mostly all the countries Third Party coverage is made compulsory by law. All the automobiles are required to have Automobile Third Party Liability coverage which covers any injury/damage/loss that the insured automobile might cause to another automobile/property/person.

Some laws restrict an insurer from denying new/renewal coverage and in calculating insurance score<sup>3</sup> on the basis of the factors shown below.

- Age, Religion, Gender, Marital Status, nationality
- Absence of credit history
- Number of credit inquires
- Initial purchase or finance of a automobile or house that adds a new loan to the existing credit history
- Use of a particular type of credit card, debit card, or charge card
- Total available line of credit held.

A recent trend in legislation which is emerging is that of the government passing regulations to widen consumer choice and to give them greater flexibility to move among coverage options. In New Jersey, for example, the regulator has mandated that insurers offer each consumer a minimum of 3 coverage choices or “Insurance scenarios” while buying insurance. Further, they have mandated that a consumer must be told how each choice may affect what they pay and what benefits they would be entitled to in the event of an accident. In addition, the regulator has mandated that a consumer is entitled to a refund, on a pro-rata

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<sup>3</sup> An **insurance score** is a numerical ranking of a potential insured's financial status (usually credit history). Actuaries use these scores to determine risk, and charge premiums based on that risk.

basis, on an old policy if they find a new, cheaper option. According to the National Association of Insurance Commissioners, in nine states regulations require insurers to provide car owners with discounts on the base rates for comprehensive insurance if antitheft devices are installed. In four other states insurers may offer these discounts or are encouraged to offer them. The amount of the discount varies but is typically 15 to 20 percent for passive devices, which are automatically activated when the automobile is locked.

There are regulations which define the limits of coverage, filing system etc. The severity of these regulations varies around the world. Some of these are:

- a) Minimum Coverage for Bodily Injury Liability:** an interval variable of the amount of minimum insurance coverage required by law.
- b) Minimum Coverage for Property Damage Liability:** an interval variable of the amount of minimum insurance coverage required by law.
- c) Pricing Sustainability/Profitability:** an interval measure of aggregate incurred claims as a percentage of aggregate earned premiums within each jurisdiction.
- d) Rate Filing Regulation:** ordinal measure of the type of rate filing regulations employed in the jurisdiction. Rate filing laws are a form of rate regulation or price control utilized by regulators.
- e) Risk Pricing Restrictions:** an interval measure of the number of actuarial risk rating categories prohibited by regulation. Insurers can assign drivers to pricing categories on the basis of the observed risk of automobile accident associated with certain characteristics like age, years of driving experience, gender, geographic location, type of automobile, etc
- f) Solvency Regulation:** an interval variable of the percentage of premiums prescribed by regulation that must be held in the reserve by insurers to guarantee a capital adequacy to pay unexpected insurance claims.

## 2.2 Initiatives to Reduce Automobile Theft

Automobile theft is a widespread phenomenon in industrialized countries. According to Interpol, more than 3 million automobiles are stolen across the world every year. It is estimated that the sale of stolen automobiles generates somewhere in the order of US \$19 billion for those involved in the stolen vehicle trade. Since automobile insurance is one of the largest single classes of property and casualty insurance, the insurance regulators and bureaus are working with car manufacturers and law enforcement agencies to combat auto theft problems. A few of these initiatives are discussed in this section. In addition, various governments are introducing laws, which would make it harder to dispose off the stolen automobiles. With a two-prong approach the objective is not only to identify stolen automobiles but also stolen automobile parts. Such initiatives not only help in recovery but they also act as a deterrent to organized crime since many usual channels for disposing stolen parts are now closed. Initiative such as Automobile Vehicle Theft Law Enforcement Act (US) requires manufacturers to stamp identifying numbers on major car components, making it easier to trace stolen parts.

As of November 2004, 13 states in the USA have enacted Automobile Theft Prevention Authorities (ATPAs). Most of these are funded by a small surcharge on driver's licenses or registration fees, or on automobile insurance policies sold in the state. One of the best examples to support the benefit of collective efforts is the USA state of Michigan which

pioneered the ATPA concept in 1986. Since beginning it has been allocating \$1 from each automobile insurance policy and channeling the funds towards combating auto theft. Michigan's program called Help Eliminate Auto Theft (HEAT), since its inception in 1985 upto 2006, has recovered more than \$43 million in stolen property, awarded \$2.0 million in rewards and helped in arresting nearly 3,000 auto theft criminals.

### **2.3 Initiatives to Modify Driving Behavior**

#### **Enhanced Driving Qualifications:**

Most countries have reviewed and upgraded their tests for issue or renewal of a driving license. For example, the UK introduced a mandatory written test and minimum hours of formal driver training from a recognized agency for the issue or renewal of license. Many countries even advocate recognition for advanced driving skills training for example on highways or motorways. Insurance agencies encourage and offer incentives in terms of reduced premiums or lower deductibles to such advanced drivers.

#### **Ban on Use of Cell Phone While Driving:**

With more than 2 billion cell phones users across the globe, driver's law enforcement agencies and insurers are realizing that cell phone usage while driving is a major cause of accidents. Many governments are initiating legislations to prohibit cell phones usage while driving to reduce accidents.

#### **Driving Under the Influence:**

Most of the countries have legislations to restrain driving while under the influence (DUI) of drugs or alcohol for a long time. A recent trend in this is the enhancement of the penalties for violating this statute. In addition, laws relating to driving while smoking are also being introduced to ensure stringent implementations by local bodies central and federal governments are linking funding for various projects such as highway construction to enforcement of DUI laws. Also, steps such as the standardization across the USA of the permissible drinking age to 21 have also reduced the number of alcohol related accidents.

### **2.4 Initiatives to Modify Passenger's Safety**

For quite some time now many countries have had a primary seat-belt enforcement law, which allows law enforcement officers to fine the occupant for noncompliance with seat-belt laws. Over last few years this enforcement has been extended to mandatory use of rear seat belts. In addition, stringent laws on baby seats and on disallowing children in front seats have had a significant effect on reducing injuries to children in automobile accidents.

In certain markets the government has made it mandatory that all new cars being sold must have air bags and seat belts. In many markets where it is not mandatory, consumer demands have compelled the same. Safety grading of automobiles has enabled consumers to differentiate automobile models based on safety performance.

## **3. Industry's Initiatives & Collaborations to Reduce Theft & Fraud**

IFB, UK stated that fraud claims cost over £1.5 billion a year adding to about 5% of the premiums paid by the honest policyholders. Likewise, in USA the coalition against insurance fraud stated that auto insurance frauds amounted to \$14 billion in false claims in year 2004.

According to the Insurance Information Service, automobile insurance fraud adds about 10 percent to the typical annual automobile insurance premium.

It is evident that fraud and auto theft pose a serious risk to automobile insurance industry. Both insurers and policyholders bear the costs of such activities. Losses caused by these activities affect insurers' profits and potentially their financial soundness. To compensate, insurers raise premiums and this results in higher costs to the policyholders. These activities may also reduce consumers' and market player's confidence.

Various initiatives have been taken by concerned authorities either in the form of laws and regulations. Collaborative alliances between the insurance industry and law enforcement agencies at the central, state and local levels have resulted in successful investigations, arrests and convictions. To facilitate these various associations / bureaus have been formed in most major insurance markets. Some of the associations / bureaus are:

**1. The National Insurance Crime Bureau (NICB) USA:** It combats automobile frauds and thefts by investigating cases referred to it by insurers and through its online databases. The databases allow member insurance companies to search files by driver identification data and also by license plate numbers, VINs, and component automobile parts and type numbers. As of November 2004, 13 states in the US have enacted Automobile Theft Prevention Authorities (ATPAs), mostly funded by a small surcharge on drivers licenses or registration fees, or on automobile insurance policies sold in the state.

**2. Association of British Insurers (ABI) UK:** This body represents the collective interests of the UK's insurance industry. The Association has around 400 companies in membership. Between them, they provide 94% of domestic insurance services sold in the UK. The ABI is funded by the subscriptions of member companies.

**3. Insurance Fraud Bureau (IFB) UK:** Launched in JULY 2006, IFB analyze the details of insurance policies and claims records of all participating insurers to identify suspicious activities. It then leads or co-ordinates an investigation with the effected insurers to expose fraudsters and bring them to justice, recovering fraudulent money paid out and seeking criminal prosecution. The IFB operates the Fraud Cheatline, a toll free and confidential helpline.

**4. Agence pour la Lutte contre la Fraude à l'Assurance (ALFA) France:** ALFA liaison between insurance companies and the government on fraud issues, helps with training for insurance company personnel, and funds academic research to control fraud. Interestingly, ALFA goes a step further than the other national fraud bodies, because it assists its members with investigations. It has a team of investigators, normally experienced ex-police officers, whose salaries are compensated by local insurers and who are regularly called upon by insurers to assist in fraud cases.

**5. Fraud Defense Network (FDN) USA:** The Fraud Defense Network was founded in 1994 at the request of several leading insurers. It is regarded as one of the leading connection points for the anti-fraud community, acting as the information channel for

access to investigative information. The principal roles of the network are to maintain online investigative databases, to provide access to investigative tools and to facilitate information sharing.

Two other bodies which are active in assisting the automobile insurance industry formulate and implement anti-fraud and anti-theft measures are:

**a). National Association of Insurance Commissioners (NAIC) USA:** Established in 1871 in the US, NAIC is a voluntary organization of the chief insurance regulatory officials of the 50 states, the District of Columbia and the five U.S. territories.

**b). International Association of Insurance Supervisors (IAIS):** Established in 1994 and based in Switzerland, IAIS's membership includes insurance regulators and supervisors from over 180 jurisdictions from 120 countries.

Various types of auto insurance frauds has happened, some of the common ones are:

- Clinics billed the insurance companies, falsely claiming that they provided medical services to auto accident victims. But in truth, many "patients" were never actually injured in an auto accident, and whatever "care" the clinics delivered was merely part of a fraud.
- Cloned automobiles are made by the criminals through counterfeit Vehicle Identification Number (VIN). In this criminal makes a counterfeit VIN of legitimate one. The similar vehicle is stolen and the legitimate VIN on the vehicle is replaced with the counterfeit VIN. Bearing a counterfeit, the stolen vehicle is now a "clone" of the legitimate one and can be sold without detection by government agencies.
- Flooded automobiles, which were marked as a total loss and designated for salvage by the insurance companies, are cleaned up, moved and sold in other areas of the country.
- Garage owners are making fraudulent claims for repairs to damaged vehicles.
- Filing of false theft reports to insurance company after vehicles are sold for their parts.
- Passenger or third party claimants filing counterfeit claims to insurance companies for non-existent property damage, personal injuries or damage of car.
- To maximize gain from fraud, some people buy more than one insurance policy.
- Fraudsters deliberate drive in such a manner as to get hit by other motorists in order to bring fraudulent claims.

Following steps have been taken to reduce fraudulent activities in the automobile insurance industry.

- Many countries have enacted laws and statutes that contribute to successful fraud deterrence, and most of them have fraud bureaus dedicated to fighting insurance fraud. All of these require all personnel—claims, underwriting, and sales—to cooperate in the anti-fraud effort.
- Most fraud is committed by a small number of criminals who tend to utilize the same method on different insurers and different financial sectors. Databases of identified fraudsters are continuously being developed and made available to the industry.

- Vehicles which have been marked as “totaled” (a term used for unreparable damage) are listed on the industry / regulators website. This makes it harder for criminals to repair and resell such automobiles or to easily use the identity of such vehicles on other stolen vehicles.
- By analyzing various details once a claim is filed it is possible to identify suspicious claims for a detailed review. The following details might be of help in identifying a false claim:
  - The policy inception date.
  - The total coverage purchased.
  - History of previous claims of all the people involved in an accident.
  - If the vehicle has hit another vehicle or stationary object, then by reviewing pictures of physical damage one can determine if the injuries claimed are consistent with the damages.
  - The claim can be verified with the help of police report made at the time of accident and by matching it with the physical damage.
  - Questioning witnesses, if any, would be helpful in determining appropriateness of claim.

It is important to educate the public so that they can assist in anti theft and anti fraud programs. If they understand that such assistance will lead to lower premiums in coming years and possible rewards immediately, their level of cooperation would be much higher.

It is due to the effect of all such efforts that U.S. driver might pay less for auto insurance in 2007 as opposed to 2006. The average premium expenditure is expected to drop by 0.5 percent<sup>4</sup>, The average annual cost for auto insurance premiums nationwide for 2007 is estimated at \$847 per policy, the first decrease since 1999. This translates into a \$4 per policy savings as compared to the \$851 the typical U.S. driver paid in 2006. The industry analysts believe that fraud-fighting successes have contributed to a decrease in bogus bodily injury and automobile damage claims, which is now showing positive results for the US car drivers and insurance industry as whole.

The IFB in UK analyzes data from various industry databases to manage fraud. The databases it utilizes are: the Claims and Underwriting Exchange, the Motor Insurance Anti – Fraud and Theft Register (MIAFTR) and the Motor Insurance Database (details of all motor policies). In year 2005, with the help of MIAFTR insurers have stopped payment for amount £ 400 million of fraudulent claims.

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<sup>4</sup> Reported by Insurance Information Institute, USA

## **4. Product Innovations**

Although various product innovations are regularly taking place, two product variations, which are in limited pilot mode currently are highlighted in this section. These product innovations demonstrate the willingness of the industry to explore newer models. Recently Volkswagen introduced a no - charge insurance policy to customers who purchase or lease selected models during a three-month test in Illinois and Wisconsin. All buyers during the pilot period get free insurance underwritten by Nationwide Mutual Fire Insurance Company (Illinois) and Nationwide Property Casualty Insurance Company (Wisconsin). The innovation in this is that Volkswagen will pay the premiums based on the car model rather than a driver's profile. Regardless of who buys the car the premium remain constant for a given model.

The second innovation which we will discuss is an alternative to the traditional fixed cost insurance premium model. Currently the customer pays a fixed premium according to the make and age of the automobile, driver profile, geographical location etc. Not much weightage is given to the distance the automobile travels. The alternative model is known as Pay-As-You-Drive (PAYD). Under the Pay-as-you-drive model the automobiles travel distant as additional criteria, along with those mentioned above, while determining the premium. Pay-as-you-drive (PAYD) pricing converts fixed cost automobile insurance to a variable cost automobile insurance depending on vehicle mileage. However, there is not much information to support the actuarial adequacy of either of the two models discussed above. In addition many experts believe that the annual mileage only has minor predictive value in explaining prospective auto losses. Many other factors are more important in the rating structure, they argue.

### **4.1 Motive behind PAYD Model**

The benefits of PAYD insurance extend beyond the financial effects. Some of the potential benefits are:

- Consumers will save more by reducing their driving.
- PAYD pricing reduces the need to subsidize the insurance cost of high-risk, unlimited mileage insurance coverage by overcharging low-risk low mileage policy holder.
- A significant proportion of automobiles remain uninsured because of high premium costs. PAYD makes insurance more affordable for those who drive less.

### **4.2 Product Pricing**

Premiums can be calculated and collected either on the basis of the expected mileage or by billing at the end of a specific period for the miles driven in that period.

- Pre-paid products: Here drivers will have to prepay on the basis of the miles they expect to drive during the term of coverage. This payment can be either one time or in installments. At the end of the term the automobile owners will be credited for unused kilometers or pay any outstanding balance.
- Post-paid products: In this service motorists will be billed on the basis of their monthly automobile mileage.

Both of these services require verified mileage data. The simplest approach is to have brokers or automobile owners report odometer readings, with random verification spot checks. A more sophisticated method will be the use of GPS transponders to record mileage. Another approach is to require odometer audits.

Typically an odometer audit requires following steps:

1. Check speedometer and instrument cluster for indications of tampering.
2. Record tire size and check if it is within the specified range.
3. Attach a small seal to the ends of cables to indicate if it has been tampered.
4. Record odometer reading and forward results to the automobile-licensing agency.

### **4.3 Product Implementation**

Individual insurance companies are implementing PAYD pricing in some regions on a pilot basis. Regulatory changes may be required to remove some of the existing barriers while implementing PAYD products. According to many industry experts the complexity of this model might lead to a higher administrative cost and hence higher premiums.

## **5. Impact of Natural Hazards**

Natural hazard such as flood, hail or flooding are responsible for the maximum variation in the automobile own damage claims burden. The number of automobile losses due to natural disasters has nearly doubled in the year's 2001- 2005. In the USA, the number of reported claims for automobile loss from natural disasters recorded by ISO's Property Claim Services (PCS) increased steadily, from 485,150 claims in 2001 to 982,350 claims in 2005. A total of 3.3 million claims over the past five years. The insurance companies in Louisiana and Mississippi have settled claims worth of \$2 billion this year for 305,000 damaged automobiles due to the hurricane Katrina in the year 2005.

Natural hazards broadly affecting the insurance industry in two ways:

1. They impact the overall economic performance of the nation. Thus affecting the performance of insurer's investments.
2. Direct impact through the claims made with regard to severe weather conditions.

The insurance industries across the world, especially in USA, UK and Canada, have set up task forces to examine and analyze the effects of climate change and natural hazards. The tasks forces are considering actions required to enable regulators and insurers to mitigate and otherwise respond to these problems. They are using risk models to guide the industry in taking strategic decisions about what to insure and at which cost. These risk models have unintended benefits, insurers are utilizing the output while deciding where to establish their offices.

One of the major advancements in this field is catastrophe modeling (also known as CAT modeling). CAT modeling analyzes risks with the help of actuarial, engineering, meteorological, and seismological techniques. In CAT modeling computer-assisted scientific models are being used to estimate the losses that could be sustained by a portfolio of

properties due to a catastrophic event such as a hurricane or earthquake. This might be helpful in achieving a sustainable underwriting model or help the insurer decide how much reinsurance to purchase. It could also be used in their rate filings to help determine how much premium their policyholders should be charged in catastrophe prone areas.

## **6. Rating Variables**

The major determinants of the cost of an automobile insurance policy are the rating variables employed in the rate calculation. Each company adopts its own rating system, although there are well defined guidelines with regard to the regulatory conditions for each country. Although countries differ with regard to the cover available and the types of vehicle sold, they often use the same variables in constructing their rating schemes. The methods tend to vary from the very simple to multi tier rating structures.

The differences from simple to multi tier rating structure reflect the length of time the market has been deregulated. Hence, the UK (deregulated in the 60s) has one of the most sophisticated rating structures, while those more recently deregulated (e.g. China) still have relatively simple structures.

Commonly used rating variables, involve information about:

- Driver Age: Statistics show that drivers under age 25 are involved in more accidents than adults between age 25 and 60.
- Gender: Statistical evidence confirms that males below age 25 are at higher risk.
- Marital Status: Statistically, a married person's risk aversion rate is higher than that of a single person.
- Automobile Type: This variable includes many sub-variables. Sports cars and SUV's are generally driven more aggressively than sedans, thus a higher premium for them. Some cars are stolen more often, effecting their premium and the more expensive the automobile, higher the premium.
- Location: Regions can be differentiated on urban, rural, higher or lower crime rates, accident rates etc.

Rising claim costs, due to which premium rates have increased, have spurred the demand for improved rating models. This has been facilitated by the availability of new technologies to obtain information about the applicant's risk characteristics for use in rating.

Given that automobile insurance in India is going to be de- tariffed soon, it is essential to know and understand these new variables better. This may help the industry develop new refined products and calculate appropriately priced premium rates for diverse types of consumers. Some of the emerging rating variables which most of the developed market are using to rate the automobile policies are described below

### **6.1 Driving Records (Claim History)**

Applicant's previous claim history and traffic violation records are used as one of the rating variables. The insurance companies charge the applicants more if they have been involved in

accidents or have been convicted of one or more traffic violations. Also more the number of claims filed by a policyholder, the more likelihood of increase in the premium rates. Introduction of traffic violation records requires collaboration between the traffic police department and the insurers to build a data depository of all those people fined or convicted for violating traffic laws. Apart from UK no other country in Europe uses these rating variables. However in the USA, Canada and Australia, it is considered a market norm.

## **6.2 Credit History**

Insurance companies in the USA and Europe are using credit information to determine the level of risk before selling or renewing the automobile policies. They use credit history, along with other factors to develop an insurance score. The insurance score may impact the premium or allow a company not to offer the coverage. An insurance score is based in whole or part on credit information. It may include:

- Bill paying history, including details of late payments.
- Number, type and duration of the bank accounts which the applicant has.
- Medical Bills
- Outstanding debt

Each company rates these factors differently. Thus the insurance score varies from company to company. Through these variables, insurance companies get to know how regularly the policyholders pay. Insurers use credit information to try to identify consumers, who are consistent and reliable. This information is being used by the insurer to refine their risk classifications, consumer valuations, improving price and underwriting models.

The automobile insurance industry asserts that an individual's insurance score, if combined with other related variables (such as age, experience, automobile type, marital status, occupation etc.), strongly correlates with the likelihood of filing future insurance claims. However the relationship of insurance scores to loss frequency or severity, potential overlap of insurance scores with other rating factors, and the relative importance of all risk factors requires the application of multivariate analysis<sup>5</sup> techniques whereby all risk factors are analyzed simultaneously.

Further more, studies have also proved that credit score has a strong correlation with claim frequency than severity. That is, as the credit scores improve, the frequency decreases, i.e. people have fewer accidents or claims. Severity may decrease as well, but not at the same rate as the frequency. A study by ECONorthwest commissioned by Oregonians (USA) Against Insurance Rate Increases shows that in Oregon, 58 percent of auto policyholders paid lower premiums due to the use of credit information by their insurer. Auto insurance policyholders with a favorable insurance score paid as much as 48 percent less than they would have paid without the insurer's use of credit information, with an average saving of \$115.

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<sup>5</sup> It comprises a set of techniques dedicated to the analysis of data sets with more than one variable

However, using credit history is often perceived to be in conflict, particularly if the individual's score is affected by catastrophic events such as divorce, medical problems or loss of a job. In addition, the regulators and consumer groups have expressed growing concern that use of insurance scores might have its own limitations.

### **6.3 Territorial Rating**

The territorial rating is also being used as one of the rating variables, as in the same region both highly urban areas with congested traffic and rural areas with very little traffic can be observed. The differences in the premium across the territories are based on sound actuarial principles, supported with statistical data. In the USA, there used to be three states that had some type of restriction on territorial rating (MA, MI and CA). Now there are only two because the Michigan legislature has decided that it was not really a good idea for rural drivers to subsidize for urban drivers and repeal the law.

### **6.4 Number of Kilometers Driven**

It has been statistically proved that there is a strong correlation between number of kilometers driven and claim records. People who clock fewer kilometers on their dashboard are less exposed to risk than higher mileage drivers. Insurance companies either offer them discount or lower their premium because they are on the road less than other people means that they represent a lower risk. Driving pools are also becoming popular. In the USA it is a market norm. Even UK, Canada, France, Japan and China are using it as one of the rating variables.

### **6.5 Automobile Security**

Automobile safety features are often one of the mandatory data values used for rating purposes. Security of the automobile is used as a rating variable regularly in the USA, UK, Australia and Canada. According to the studies, automobile safety norms and equipment can not only reduce the accidents and thefts but also reduce the severity of mishaps. The policy holder's are being asked about the following details:

- Location of automobile parking during overnight (Garage or on road)
- Whether anti theft devices are installed
- Steering wheel locks
- Wheel locks
- Window etching
- Air Bags

In most of the cases reduction in the policy premium is passed on to the consumers in the form of discounts.

Not only from the consumer point of view, but also from the company's perspective, pricing equity and accurate cost projection are crucial to stay in the competitive environment. The study and implementation of above stated risk factors used for rating purposes could be helpful in updating and automating a company's underwriting systems. Especially, the use of multi-variate analysis (General Linear models) to analyze data and to capture the interactions between the rating variables. These techniques are being used to modify rating factors as well as come up with very complicated Tier rating plans (combining many factors into a Tier

rating variable through complicated Tier determination rules), which further minimizes subjective judgment by relying on more objective, rigorous, data-driven decision processes.

## 7. Summation

Various technological advancements along with new regulations and risk assessment models have contributed significantly to mitigating the risks involved in the automobile insurance industry. In most markets change has been driven by consumer demands and legislative requirements. In others, the industry foresaw the future and prepared itself. Whereas in India utilization of technology and innovation in rating is still in early stages, the industry can learn much by closely observing trends, norms, and patterns in other countries.

In the last 4-5 years, since the private players got active, the auto insurance market has witnessed significant changes. Initiatives taken so far have proved to be a boon for the auto insurance segment of the industry, which constitutes 40% of the total general insurance market. With the advent of de-tariffing, more advancement is expected to happen. The industry will need to focus on:

- Risk and fraud management strategies
- Product innovations to meet consumers demand
- Accurate pricing of products,
- Mitigating Cross subsidization in consumer segments and
- Adaptation of new technologies

There are many directions which the insurance companies can explore. These include enhancing data collection, developing a greater understanding of vehicle technology, understanding new rating variables and promoting driver safety education. In addition, industry needs to engage more proactively with consumers to understand their needs. Besides actuaries, other industry professionals need to obtain a greater understanding of the role of data and the mechanisms of data analysis. Industry in various countries has moved to advanced data analytical methods, such as multi-variant analysis. The Indian industry must take the preliminary steps of standardizing the collection of data; this lays the foundation for advanced analytics.

The technological advances and open regulatory systems in various markets have led to the development of effective risk management tools. These tools strengthen various processes including claims handling, product innovation and pricing.

Evidence from other markets proves that collaborative efforts, intelligence sharing and industry wide knowledge development initiatives deliver results. In addition collaborative models reduce costs for all the participants. Sustainable mechanisms of funding and supporting such initiatives are required. Support may be required from the government and the regulator. The segments which the industry collaborations cannot fulfill are usually met by entrepreneurs. This is demonstrated by various data aggregation services by profit oriented enterprises. Proactive steps by industry, government and the regulator will enhance innovation, support competition and benefit the consumers through lower rates. Lower premiums and stricter enforcement will also reduce the number of uninsured vehicles. The

Indian auto insurance segment is at a critical stage and poised for significant growth, the time is ripe to plan for its future.

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