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# **InsurTech in insurance: The road ahead for Telematics in India**

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**Abstract**--The Indian insurance sector is characterised by the presence of information asymmetry and moral hazard. Resultantly, the adoption of InsurTech has become a necessity. While telematics, a form of InsurTech, is gaining significant impetus globally, it is still at a nascent stage in India. Against this backdrop, the present study analyses the role of Telematics in reducing information asymmetries in the Indian motor insurance sector, thereby improving the risk assessment process and ensuring that the insurance premium is reflective of the risk taken by the policyholder. The novelty of the study is that it is one of the very few studies that have explored the implementation of Telematics in the Indian context. The study is exploratory and uses a mixed-method approach by analysing the use of telematics in developed countries through document analysis followed by semi-structured interviews with Indian vehicle owners and industry experts. The study highlights that Telematics devices can assist companies in reducing information asymmetries and enable precise ascertainment of insurance premiums based on factors such as driving habits, distance travelled, and driving patterns of the policyholders.

**Keywords**--information asymmetries, InsurTech, Telematics, pay-as-you-drive.

## **Introduction**

Technologies, huge forces at work today, foreshadow a dramatic shift in business models globally. Technological breakthroughs are ubiquitous and fast. They are reshaping societies, economies and behavioural norms worldwide. In order to stay in the game, it is imperative for businesses to modify their models at an exponential pace, else, their survival will be in a jeopardy. Quick adoption of new and diverse technological advancements such as big data analytics, digitalization, and the Internet of Things (IoT) can create a competitive advantage for companies globally (Contantinou & Kallinikos, 2015).

It is well documented that the use of technology makes industries efficient and enables innovation by widening access to new geographical and virtual markets. Financial technology (Fintech) creates business models that are equipped with cutting-edge technology. This helps in revolutionizing the process of creation and delivery of product and service offerings (Delloite, 2018). Fintech has caused ripples across banking institutions, and now, the insurance industry has also started to reinvent itself as a result of the advantages that Fintech offers (PwC, 2016). InsurTech, which is a branch of Fintech as shifted the way traditional insurance products are being sold and delivered to customers. The portmanteau term emerged around 2011-2012 and refers to the use of technological and digital innovations to generate business opportunities and improve quality at various value-added steps in insurance industries (Global Fintech Survey, 2016).

InsurTech is an emerging phenomenon with the capability to help insurance industries reconnect with their customers. Insurance markets are characterized by the presence of information asymmetries, adverse selection and moral hazard. InsurTech has the potential to bridge this information gap, thereby reducing the chances of adverse selection as well as moral hazards. One such way InsurTech solves this problem is with Telematics. The word 'telematics' is composed of two words. 'Tele' comes from telecommunications and 'matics' comes from the word informatics. It involves integrating telecommunications and IT for vehicles. Telematics utilizes information related to the general habits of the policyholders through devices like smartwatches, GPS devices in motor vehicles etc. With the help of the Internet of Things (IoT), data is retrieved by insurance companies, and in this way, issues of moral hazard and information asymmetry are reduced.

As per the Insurance Regulatory and Development Authority of India (IRDAI), vehicle insurance is mandatory for every motor vehicle owner. Yet, millions of vehicle owners do not get their vehicles insured, primarily due to high insurance premiums. Presently in the Indian scenario, the premium on motor insurance in India is calculated based on parameters such as the model of the vehicle, the specific capacity, and the geographical use. Factors such as driving habits and distance travelled are not considered while calculating the premium, thereby deterring safe drivers from buying insurance. The use of telematics by motor insurers can help in better segmentation of customers as per their driving habits so that the premiums reflect the actual risk that they bear. As a result, disciplined drivers need not pay for the errors of other people in their respective age or gender groups. The problem of adverse selection is thereby eliminated since each policyholder has to pay a premium based on his habits.

While the market for insurance telematics is gaining significant impetus across the world, it is still at a nascent stage in India, making it a lucrative option to many insurance players. It was only in 2016 that a company introduced telematics-based insurance in India for market testing. This is a huge window of opportunity which, if seized soon, can lead to an exponential growth of the industry.

Given the dynamic changes that are revolutionizing the insurance sector, unless the insurance companies commit to amalgamate the latest technologies swiftly into their business models, they might be mired with challenges such as stagnation of market revenues and loss of share to startups (Delloite, 2018). In this context, the objective of the paper is to analyse and highlight the role that telematics can play in removing asymmetries that plague the insurance industry, thereby making the industry efficient and increasing the consumer base by providing discounts on premium to consumers. Additionally, the paper aims to develop a conceptual framework, which captures both the way “as” and “how” a driver drives his vehicle, to make the process of calculation of insurance premium precise and accurate. The structure of the paper is specified hereby. In the next section, the literature on the issues of information asymmetries, moral hazards, and adverse selection is reviewed. Section 3 provides details specific to the research methodology followed. Section 4 proceeds with the results emerging from the analysis. Finally, in Section 5, the conclusion and policy implications are discussed.

### **Review of literature**

The challenges of information asymmetry, adverse selection, and moral hazards are always present in insurance contracts. The inherent behaviour of the insured to act with less caution is the problem of moral hazard. This information is unobservable by the insurer which causes information asymmetry. As a result, there are high incidences of claims and exhibits adverse selection by the insurer. There have been numerous studies highlighting these central problems of the insurance industry. Cohen (2005) and Weisburd (2010) have expounded the presence of information asymmetry in the Israeli market through the fact that broader insurance coverage is highly related to an increased incidence of accidents and higher associated losses in the Israeli motor insurance market. Further, Kim et al. (2009) have used 28,689 annual motor insurance contracts of the South Korean insurance market and found strong evidence of information asymmetry in terms of both coverage areas and amounts of insurance contracts. Cohen (2005) have shown the existence of a moral hazard and adverse selection effects in automobile, long-term care, and health insurance markets. Wang et al. (2011) tested the presence of information asymmetry, moral hazard and adverse selection in the Taiwanese cancer insurance market and found that policyholders with “good” risk profiles were not willing to share the risk with those with “bad” risk profiles if the result is uncertain.

Adachi et al. (2011) highlighted that in Thailand, property insurance subscription before the 2011 floods was more within companies based in flood-hit localities compared to other localities, highlighting issues of adverse selection. Spindler et al. (2014) have shown that the degree of asymmetric information is dependent on

the coverage of risks and coverage levels in the German insurance market. Einav et al. (2017) in their paper presented evidence that health insurance raises the extent of health care expenditures. Through various studies reviewed, it is inferred that problems of moral hazard, information asymmetry and adverse selection are prevalent in the insurance industry. This is where telematics can play a constructive role in reducing occurrences of moral hazard and adverse selection.

### **Research Methodology**

This paper follows an exploratory approach and is one of the few studies concerned with building theory and understanding the applications of telematics in India. As telematics is still in the initial phase in the auto insurance segment, the area has not been explored in detail yet. The objectives of the paper are to construct a conceptual framework and discuss the importance, advantages as well as challenges when telematics is used in auto insurance over the traditional way of arriving at premiums charged. For this purpose, this study utilizes a mixed-method approach through document analysis and semi-structured interviews. The analysis is hence based on primary and secondary data.

### **Document Analysis**

The first step in the study was conducting document analysis. This involved a critical analysis of secondary data collected from specific cases and literature/reports about countries where telematics has already been implemented.

### **Semi-structured Interviews**

Semi-structured interviews offer advantages of flexibility to mould the interview questions and probe the interviewee for additional details (Boer et al., 2020). Hence, the second step involved the collection of primary data by employing semi-structured interviews, which were undertaken with 80 owners of motor vehicles. Similar interviews were also taken with 3 senior management officials of a leading insurance services provider in India. The interviews helped in developing a framework for the successful identification and implementation of telematics in the auto insurance segment. The interviews were carried out in two different ways: through telephonic conversations and direct face-to-face interactions with interviewees.

### **Findings**

#### **Document analysis**

Since telematics has not been explored in-depth in India, the document analysis was conducted on cases of other countries. As far as the insurance industry globally is concerned, the use of telematics has penetrated mainly in motor and health insurance segments. For example, the wearable fitness bands or small chips on the body track the physical activity of the individual. Similarly, a device commonly known as a black-box or smart-box installed in a motor vehicle tracks the vehicle, its distance covered, and the driving habits of the driver. As a result,

instead of just using the historic and generalized actuarial data in the case of motor insurance, the insurance premium can be personalized as per the individual's driving habits and/or car usage.

Based on telematics data, risk can be measured more objectively based on factors such as distance covered by the vehicle, driving time of the vehicle (night driving has higher risk than day driving), speed patterns, brake patterns, and frequency of driving. Those who exhibit a lesser degree of risk on these factors can be rewarded with a lower insurance premium for their motor insurance policies. Apart from risk assessment, telematics data can also be used to track stolen vehicles and reduce fraud in claims.

It is clear that telematics data helps in making insurance contracts more customizable and usage/behaviour-based instead of charging the same premium from a homogenous group. When it comes to the implementation of telematics-based insurance plans, there are broadly two types of schemes available. The first scheme is the mileage-based scheme wherein the insurance premium is calculated based on how much the vehicle is driven. The second scheme is the habit-based scheme, wherein the insurance premium is calculated based on how well and safely the vehicle is being driven. The mileage-based scheme is labelled as "pay-as-you-drive" (PAYD) insurance and the habit-based scheme is known as "pay-how-you-drive" (PHYD) insurance. Figure 1 describes the characteristics of Pay-as-you-drive insurance.

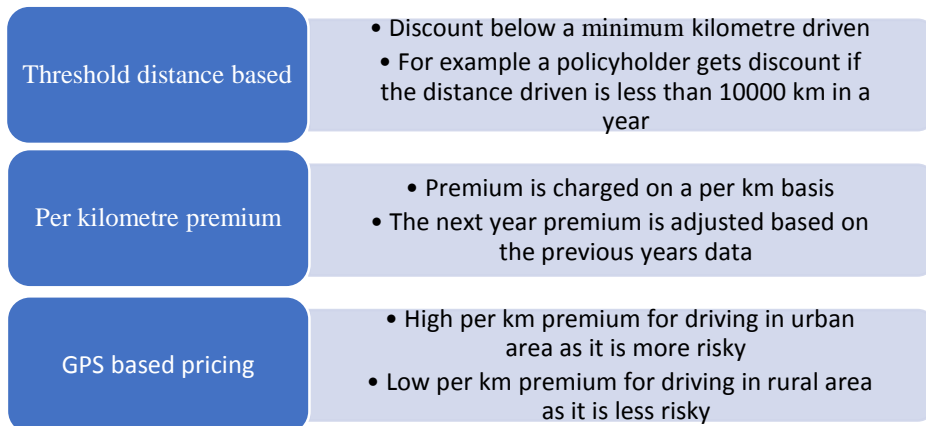


Figure 1. Parameters considered for pay-as-you-drive insurance

In the pay-as-you-drive scheme, premiums are charged on the personal mileage of a vehicle instead of a fixed charge. There is a minimum fixed charge and above that, premiums are charged on a mileage basis. There are three options in the pay-as-you-drive scheme (Tselentis et al., 2016). In the first option, there is a threshold mileage below which the policyholder gets a certain amount of discount in the premium charged. If the limit is exceeded, the policyholder is not entitled to get any discount. In the second option, the premium is charged on a per-unit distance driven by the policyholder over and above a minimum fixed premium value. The last option involves the utilization of the geographical location of the vehicle for the calculation of insurance premium. This option is a more

comprehensive risk assessment, given that the rural and urban road infrastructure conditions have different risk levels associated with them.

In the PHYD scheme, the habits of the driver (how the vehicle is driven) are used to determine the premium charged for the policy. The characteristics captured in this scheme include frequency of driving, acceleration/breaking, timing of driving, and speed of the driver. The PHYD scheme is more complex and more holistic than the PAYD scheme in terms of risk assessment for the policy. In the PHYD scheme, there are different options available for collecting driving habits-based data. The simplest one involves using a smartphone-based application that constantly sends the relevant data to the insurer (Kenter and Stareck, 2014). The other options available for the collection of telematics data include a smart/black box, on-board-diagnostics dongle, and an embedded device in the vehicle. The data collected through these devices are automatically sent to the insurance company for further analysis. Baecke and Bocca (2017), in their study, have empirically analysed the impact of data accumulated by telematics devices on the insurers' risk selection and assessment process. Using logistic regression and other data mining techniques on a set of 6984 telematics users in a European insurance company from 2011-2015, the authors have analysed the impact of using telematics on driving behaviour. Their results show that the usage of telematics significantly enhances the process of customers' risk assessment. Improvement in risk assessment, resultantly, enables these insurance providers to tailor-make their products based on the insured's risk profiles. The study further highlights the advantages of PAYD. For insurance managers who are keen on introducing telematics and insurance services based on usage of the vehicle, PAYD should be the starting point. PAYD variables arrive at a premium calculated on the total distance driven. Therefore, this technique is considered to be the simplest and the most valuable way of tailoring a user's premiums. Lastly, as per the authors, three months of the user's driving-related data is adequate to obtain the risk element and implement telematics-based insurance products and schemes.

Currently, in India, IRDAI does not allow for complete telematics-based insurance products. However, in its latest attempt, the authority introduced a draft proposal for introducing telematics in the insurance sector and has asked for suggestions regarding its implementation, pricing, potential opportunities and challenges (IRDAI, 2019). Moving on to the ideas that underline the relevance of using telematics in insurance, Vickrey (1968) was the first one to criticize the fixed premium for insurance and the one-size-fits-all approach. He suggested charging insurance premium based on distance driven instead of a gender or age-based premium only. Further, Iqbal and Lim (2006) highlight the relevance of an Event-data-recorder (EDR) device. This device can collect the data specific to speeding, braking, and sharp-turning which results in increasing the probability of accidents.

There is empirical evidence in favour of telematics-based insurance in countries where it has been implemented. For example, in Spain, the mileage and driving habits significantly impact the risk of accidents and in turn insurance pricing (Ayuso et al., 2016). The usage of telematics has improved insurance pricing, has rewarded safe drivers, and reduced the number of accidents. Similarly, telematics

in the Italian motor insurance segment has resulted in better customer servicing based on objective risk profiling of the user. Further, the telematics-based insurance scheme has been a profitable customer value proposition for the insurance companies as well, as such scheme reduces the companies' claims ratio i.e., claims paid as a percentage of premiums received (Vaia, 2012). The US market has shown several benefits arising from the usage of telematics-based insurance schemes to both insurers and consumers. By using such a scheme, while the insurers can develop accurate risk assessment and pricing practices, the consumers are incentivized with overall reduced premiums in the market (Karapiperis et al., 2015). The literature has also found evidence of a reduction in motor insurance prices in developed countries such as Germany and Switzerland due to the implementation of telematics. A study conducted by Laas (2016) has substantiated the benefits associated with usage-based insurance pricing over the old ones without telematics (Laas, 2016). Based on the document analysis, it can be inferred that telematics has the potential to optimise insurance premiums for users, reduce claims ratio for insurance companies, and change the course of the competitive motor segment of the insurance industry in India.

### **Semi-structured interviews**

The process of Document analysis was followed by a series of focus interviews, conducted in September-November 2021, with industry experts from a leading insurance organization and motor insurance holders aged 25 years-55 years. The interviews revolved around analysing the relevance of telematics, the need for reducing information asymmetry, and the challenges as well as benefits associated with telematics implementation. The interviews typically lasted 45 minutes-60 minutes. The details of the interviewees are presented in Table 1.

Table 1  
Details of industry experts and policyholders interviewed

Details of Industry Experts	
Designation	Department
Vice President	Products
Deputy General Manager	Sales
Team Manager	Actuaries
Details of policyholders	
Age Group	Number of interviewees
18-25	20
25-30	20
30-40	20
40 and above	20
Total	80

The interviews conducted amongst motor vehicle owners from diverse backgrounds have yielded interesting outcomes. Interviews with vehicle owners: The interviews highlight that there exist variations in the driving habits of the vehicle owners interviewed. The interviews indicate the presence of an inverse

correlation between the age of the vehicle owners and instances of reckless driving. While 17 out of 20 (65 percent) drivers aged between 18-30 years admitted to driving recklessly, 13 out of 20 (65 percent) drivers aged between 26-30 years admitted to having driven beyond the speed of 60 km/hr. Further, 10 out of 20 (50 percent) of the drivers aged between 31-40 years had driven after drinking. The number of people above 41 who had admitted to drinking and driving was 5 out of 20 (25 percent). The segmentation of drivers who drink and drive and those who do not drink and drive is presented in Figure 2. The next task was to probe participants about their mobile usage habits. While all the participants had used smartphones on one or more occasions to attend a call, only those in the age group 18-30 showed a tendency to use the device daily for instant messaging, watching videos, and engaging in social media while simultaneously driving.

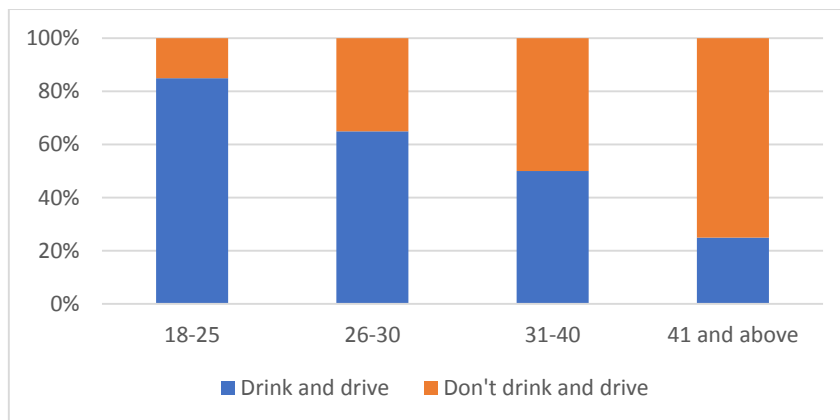


Figure 2. People who drink and drive vs. people who do not

Further, when enquired about the factors considered while deciding to invest in an automobile insurance scheme, the participants mentioned the trade-off between coverage provided and the cost incurred as a primary deciding factor. Another key highlight that emerged from the interviews was that the frequency of claiming insurance from the insurance providers had a varied range, from one in a year to at least three times in a year. This variation, again, underlined the difference in riskiness in driving habits amongst the participants. The responses also revealed that delays caused in the claim settlement process and high premiums charged were the most common issues faced by the participants.

On discussing the concept of telematics and its advantages, the drivers seemed interested in adopting the technology for ascertaining insurance premiums. There was an agreement on the necessity of a diversified set of characteristics to ascertain the premiums of insurance policies. The participants, in general, agreed that receiving higher discounts on insurance premium based on their driving habits would motivate them to ensure a higher degree of safety while driving. The interviews also revealed that the cost of the telematics device and the privacy of data would affect their decision to invest in telematics-based insurance. Interviews with industry experts: The interviews with industry experts yielded many perspicacious responses. The interviews revealed the presence of an increased likelihood of adverse selection while offering insurance to a new

customer. This is particularly because companies do not have access to complete information pertaining to the customer's driving skills and habits.

Additionally, in general insurance, about 50% of policyholders are profitable, 15-20% of customers are highly loss-making. Notably, only 30% of customers are rightly priced. Information asymmetry, therefore, leads to one set of customers subsidizing another set of customers. Hence, companies increasingly feel the necessity of refined data to calculate risk accurately and gain insights into the driver's behaviour. This would in turn minimize the possibility of mistakes that occur due to grouping drivers into basic homogenous classes. Related to the differences in customer behaviour, some interesting findings unfolded. In general, people tend to drive carelessly after getting their vehicles insured, as there is no monetary incentive attached to driving cautiously unless premiums are reflective of such behaviour. Accurate information would assist in calculating premiums that are commensurate with the risks involved. Further, an industry expert revealed that telematics in insurance can result in up to 40 percent reduction in premium rates for policyholders resulting primarily from information symmetry and transparency.

During the interviews, the experts also highlighted the possible challenges that may arise while implementing telematics in insurance. First, the cost of telematics devices can potentially be the biggest challenge in the implementation of telematics in insurance. A typical telematics device retails between Rs. 1500 and Rs. 2500. Any party that bears the cost will have effective savings only after a period of time and not immediately. Second, the privacy issue is another potential challenge that needs to be addressed. Hence, such issues need to be sorted out beforehand, given that all the user-specific information will be in the hands of the insurance provider. Last, data collected from one device might not be accepted by the other service provider when the policyholder decides to shift, thereby making it difficult to switch between service providers. Based on the discussions held and insights gained from the interviews, a conceptual model was developed for arriving at insurance premiums.

### **Conceptual model**

Figure 3 shows the conceptual model that can be used to arrive at discounts or surcharge in premiums for policyholders. When a person signs up for a telematics-based car insurance policy, the insurance company installs a telematics device (blackbox/whitebox). The device comprises a GPS device (to send real-time location of the car and information related to weather); a motion sensor (to capture the information related to sudden brakes and acceleration); and, a sim card (to transmit data to the satellite). Along with it, the policyholder downloads a mobile application that captures additional information related to the use of a mobile phone while driving the car. Data captured in the devices is transmitted to the satellite, which in turn, shares the information with the insurance company.

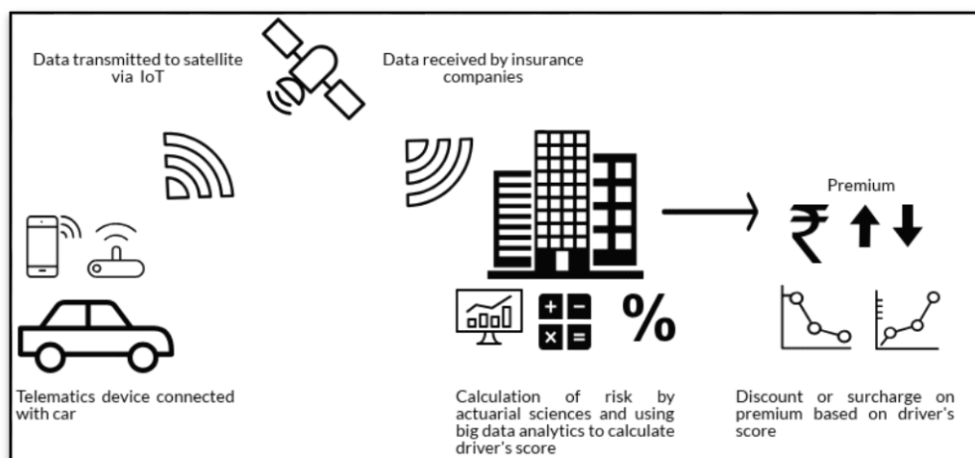


Figure 3. Conceptual Framework for Pay-as-how-you-drive insurance

The details of data transmitted are listed in Table 2.

Table 2  
Data captured by telematics devices

S. No	Data captured
1	Time of the day when the car is driven
2	Speed of driving
3	Frequency of sudden brakes and accelerations
4	Number of kilometres driven
5	Mobile usage while driving
6	Weather condition while driving

Based on “as” and “how” the policyholder drives, the risk is calculated by actuary experts using their accepted formula. Further, using big data analytics, each driver is given a score between 0-100. In order to maintain transparency in the process, the policyholder can also view the data captured by the devices as well as his score real-time on his mobile phone application. The higher the score, the safer is the driving, and the higher is the discount on the premium. The process of arriving at the score is based on the usage of the car, as well as how the policyholder drives, making it “Pay-as-how-you-drive” insurance.” The model derived is an amalgamation of usage and behaviour-based insurance. This can capture risk more precisely and accurately, thereby leading to an ideal amount of discount or premium to be paid by the policyholder.

### Discussion and Conclusion

This study has made an attempt to explore the solutions to the central problems of moral hazard, information asymmetry and adverse selection using telematics. In this context, the study focuses on the motor insurance segment of the Indian insurance industry. The study has utilized a mix of document analysis and

focused interview method to assess the opportunities and potential challenges of telematics in India. From a managerial perspective, the following implications emerge. First, there is an increasing need felt amongst vehicle owners for differential pricing of premiums in automobile insurance. The use of telematics can cater to the needs of such vehicle owners by providing them information on how risky their driving habits are. Second, data captured through telematics can assist companies in developing dynamic risk profiles and in deciding whether or not they should provide insurance to high-risk drivers. The data will also facilitate better segmentation of customers and help in the formulation of relevant marketing campaigns based on the target age-groups of drivers. The possible challenge that needs to be tackled by companies is deciding who would bear the cost of the telematics device.

From a policy perspective, the results reveal that there is a great potential of telematics in making the insurance market more efficient. Dynamic premiums pricing can provide an incentive for drivers to drive safely, as then, they would be rewarded with a low insurance premium. The regulator should frame policies that clearly define privacy agreements in order to safeguard and maintain user interest. The ball is in IRDAI's court now to allow for full-fledged usage-based programs and assess its success.

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