Chapter VII

SUMMARY AND CONCLUSION
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7.1 Introduction:

Insurance as a financial instrument has been used for a long time. The liberalization of the Indian insurance sector has resulted in a number of insurance companies entering the market. This has led to a plethora of choices both in terms of service providers as well as products to the consumers. With the huge untapped market that still exists, the insurance market in India is expected to increase rapidly.

The potential risks of using an automobile involve damage to one's own and others' vehicles and properties in collision, vandalism, theft and related loss, and injuries to driver, passengers and the third parties. Car owners often purchase appropriate automobile insurance policies to cover such potential risks so as to reduce the personal worry or stress incurred by the consequences of any traffic accident. In compliance with the law, the auto owners in many countries are required to purchase compulsory automobile insurance policies to protect themselves from lawsuits when involving damage and injuries. The insured in essential just expect their insurance to cover what is supposed to do. The information of automobile insurance policy market is asymmetric - the insurers may understand the 'terms and conditions' much better than the insured; but the insured certainly understand the 'real risk of their own driving behaviors' much better than the insurers. By definition, more risk-averse persons demand for more
insurance coverage. Adverse selection is the tendency of persons with higher-than-average chance of loss to seek insurance at standard rates, which, if not controlled by underwriting, would result in higher-than-expected loss levels. The high-risk drivers would choose for auto insurance at lower (standard) rates; a driver with higher loss probability or higher degree of risk aversion would choose for lower deductible.

People are willing to purchase insurance, thereby paying a risk premium, in order to eliminate the possibility of a large loss in the future. Since automobile accident reparation is an important issue from social security perspectives, Government of India have promulgated laws on the 'compulsory' automobile insurance to provide basic compensation to person(s) injured in traffic accidents. In general insurance companies, the divisional as well as regional offices are the basic accounting units and it will be a worthwhile exercise for divisional or regional in-charges to analyze the reserves, compare the same with previous years and draw appropriate inferences and work out their own strategies to achieve corporate goals in their office at micro level. Insurance services represent the logical step of financial integration of the owner, drivers and passengers. Different automobile insurance company offer different insurance policies. Auto insurance company set premium according to the driver's previous performance.

7.2 Summary of Findings:

The Bayesian credibility theory as well as credibility models in automobile insurance are essentially a form of experience-rating (Chapter II). The
Poisson/Gamma model and Normal/Normal model are two popular models for estimating claim frequency and amount of premium earned respectively. In this thesis, two more Bayesian models Poisson/Chi-square and Poisson/Exponential model under different set of assumptions have been proposed. It is found that Poisson/Gamma model and Normal/Normal model are suitable for our secondary datasets of NIACL for number of claims and amount of premium respectively. For the simulated dataset of number of claims, Poisson/Gamma as well as Poisson/Chi-square models are appropriate. Poisson/Exponential model also may describe for monthly or quarterly data where the number of claims gradually decreasing.

In some areas of automobile insurance, there may be considerable delay between the time of a claim inducing event and the determination of the actual amount the company will have to pay in settlement. To get the correct picture of its liabilities, an insurance company should set aside the correctly estimated amount of money to meet the claims arising in the future on the written policies. Considering this point, this thesis deals with the development of loss reserving models and its applications to automobile insurance (Chapter III). This thesis tries to extend DFCL method of Mack (1993) which allows one to evaluate fitness, variability and basic assumptions better. A comparative study in respect of standard error has also been made between DFCL method and proposes methods using secondary data of automobile insurance of the NIACL. All the DFCL(AM), DFCL(QM) and DFCL(GM) techniques produce a very similar estimates but the DFCL(QM) as well as DFCL(GM) methods somewhat better than DFCL(AM) method in terms of
percentage of standard error and percentage deviations of experience from expectations both these data sets.

NCD systems are experience-rating systems which are commonly used in motor insurance. Depending on the rules in the scheme, new policyholders may be required to pay the full premium initially and then will obtain discounts in the future as a result of claim free years. This study finds out the probabilities of claims by different categories of policyholders (motorists) according to their driving experience as well as previous accident records (Chapter IV). Here, a transition probability matrix for different discount levels following the IRDA rules of NCD using Markov chains has been proposed. It is seen that the number of accidents by automobile drivers of the districts of North Tripura, West Tripura and Karimganj have a geometric(0.5) or negative binomial(1, 0.5) distribution. The expected amount of premium has to be paid yearly in the long run for the risk is 13% less amount to be paid yearly. Again, the probability of making an accident by ‘good driver’ (06 to 20 years experienced) and ‘bad driver’ are 0.20 and 0.45 respectively. For a good driver, the average premiums paid in the long term is 70% and for a bad driver it is 85% i.e. they pay 30% and 15% less yearly premiums respectively.

This study isolates the factors influencing professional automobile drivers’ demand for life insurance using logistic regression analysis (Chapter V). The results of this analysis show that if the driver use his own car, the chance of taking a life insurance policy is greater than those of other. The senior drivers and married drivers have more tendencies to do the life insurance policies. The higher income
level of the family increases the possibility of taking a life insurance policy. This study also indicates that type of family is another important factor. Nuclear family, comparatively have a higher possibility of taking the life insurance policy than that of joint family. Furthermore, a driver who faces one or more accidents has more tendency of taking a life insurance policy than who does not. Similar results have been observed for health condition of driver. It is evident from the studies that purchasing a life insurance policy differ in various districts. Drivers belong to Hindu religion have more tendency of taking life insurance policy. This study also reveals that nature of use (passenger carrying or good carrying) of vehicle, education level in the family and drinking behavior have no significance effect on taking the life insurance policies.

This study also measures the levels of knowledge about drugs of professional automobile drivers who are likely to be familiar with addictive drugs such as heroine, cocaine, aphim and others with the help of correspondence analysis (Chapter VI). Knowledge of drugs and its ill effects on human health are important for both sound health as well as safe driving. This study shows that the drivers belong to Karimganj district have superior knowledge about drugs than the other two districts, which may be due to less restricted and freely moveable plain land international boarder. Younger and older aged driver have much knowledge about drugs which may be the effect of society as well as chronological access of drugs. Among the different social groups, ST drivers are much familiar with drugs which may due to social boundlessness. The knowledge about drugs positively
associated with education levels of the drivers. Health status of the driver is another important factor on knowledge about drugs. This study also shows a positive association between health status and knowledge about drugs. It is very common and known to all, that why goods carrying drivers are much familiar with drugs. The number of friends decreases with the increment of knowledge about drugs which may be due to the fact that drivers having much knowledge about drugs are much addicted by drugs. Finally less experienced or younger portion of driver, most of them belong to modern era have better knowledge about drugs which may be due to the changing situation of the society.

7.3 Conclusion:

From the overall study, it has been found that new models (proposed throughout the thesis) as well developments may be more consistent and sensitive over conventional ones for appropriate dataset. The finding of the present work will be useful for better understanding of the claiming process. Poisson/Chi-square model as well as Poisson/Exponential model may be very useful when appropriate data will be at hand. The DFCL(QM) and DFCL(GM) can be an effective method of estimating the reserves in the incremental run-off triangle. The number of accidents by professional automobile drivers of the study area follows geometric or negative binomial distribution. The bad drivers are almost twice as likely to claim as good drivers but the premium is only, on average marginally higher. Therefore, one could adjust discounts levels of NCD slab of IRDA so that bad drivers pay a premium doubled than that of good drivers. Alternatively, introduction of different
types of discount system like expanding the number of categories of discount levels will be helpful to encourage the good drivers. A longer and more gradual scale might differentiate between the different risk groups more efficiently. After the analysis logistic regression for life insurance demand of professional drivers, it is found that demand of life insurance varies significantly with the religion, health, family income and type of family, number of accident, geographical area driving, marital status, self car driving and age of license obtained. The findings of the thesis demonstrate the utility of correspondence analysis in analyzing data presented in a large contingency table.

Finally, in automobile insurance industry, introducing and developing new credibility theory and Bayesian theory play a role in integrating sample and collateral information. Simulation methods are crucial to understanding the many models considered for anything. Run-off triangle is essential tool in finding amount of reserve keep aside for smooth running business. Markov chains are important in predicting the success of rating methods, including NCD systems. To obtain a better understanding of affecting factors in a comparison manner, a logistic regression analysis is essential. Correspondence analysis is a way of describing data by visualization in case of two-way or multi-way cross-tabulation. Is it no wonder that the automobile insurance mathematics and industry must depend on statistics and statistician respectively!
7.4 Limitations:

In order to draw valid conclusions, some limitations of this study may be recognized. Throughout the thesis findings are emphasizing solely valid in a North-East Indian context or some districts of it. Not having collected data from any other part of India, this study can not claim that conclusions are indeed valid for other parts of India but also have no reason to assume the opposite. Collections of secondary data are at first based on information found in the yearbooks. The collections of required secondary data are very difficult because the recognized firms are not willing to provide yearbooks or data. The websites data of the farms are not modified. Consequently, the analyses of this thesis are limited to NIACL data. Similarly, the collections of primary data limited to only three districts of North-East India. This is due to cost, time and labour point of view. It is difficult to get answer form the professional automobile drivers when asked about their income status, accident record and knowledge about drugs during primary survey. Finally the sample size comes with its own limitations. Some analytical limitations are mentioned below.

Firstly, the selections of prior in Bayesian credibility models always kept in doubtfulness. The Bayesian credibility models can’t be used for forecasting long period of time like logistic model of classical statistics. Secondly, in the development of loss reserving models based on run-off triangle, analyses depend only on first two moments and it very difficult to estimate the higher order moments. Conclusions depend on standard errors; no other statistical devices or
standard testing methods are applied. Thirdly, the numbers of accidents or the claim frequencies are considered in the analysis of no claim discount systems of IRDA irrespective of the amount of claims. The decision of whether to claim or not in a particular policy year may depend on the amount also. Finally, correspondence mapping is not possible for two by two cross table. Consequently, some important boolean cases intentionally not included in the analysis.

7.5 Possible Future Works:

Research on automobile insurance has multiple dimensions. It is almost impossible to touch the entire automobile insurance process in a single work. The experience gained under the present study can be used for large-scale research in the field of automobile insurance in the region. The present thesis only focuses on studying and developing Bayesian credibility models, extension of DFCL methods of Mack (1993), NCD system of IRDA, life insurance demands of professional drivers and assessing the knowledge of drugs among professional drivers. It can obviously make the task of forthcoming studies in the mentioned topic easier in the region.

In chapter II, this study proposes only few Bayesian credibility models, but there may be more such models, which can be study in future. In case of amount of claim, one can study about normal distribution with unknown variance. Further, it is suggested that empirical Bayesian credibility method can also be tried for predicting future number of claims and aggregate amount of claims for comparisons. Third chapter touches slightly on the loss reserving of Mack (1993).
The estimates of the development factors in the chain ladder technique can be reformulated by substituting arithmetic mean by quadratic mean as well as geometric mean. In this case, more research or experiments are needed for sound decision to select the appropriate development factors under different datasets. Chapter IV considers only number of accidents or number of claims ignoring the amount of claims to study the NCD system of IRDA which can be studied in future. This study isolates the influencing factor of life insurance demand of professional drivers of three districts only which can be extended to entire North Eastern India to get better idea or isolation. Similar extension can be made in case of knowledge about drugs considering more numbers of drugs.

7.6 Message to the Policy Makers:

Present work may be helpful for academicians, policyholders and planners to deal with automobile insurance problems. Professional automobile drivers are important segment of the population who are likely to be familiar with addictive drugs. Knowledge about drugs and its ill effects on human health are important for both sound health as well as safe driving. The findings of this study may be helpful to make a policy to control the abuse of addictive drugs among the professional automobile drivers. Socio-demographic factors that explaining the knowledge about the addictive drugs of the automobile drivers mention in this study which may helpful directly or indirectly in rate fixing. This study may be helpful in insurance sector also in making experience rating and setting of different policies of premiums under different categories of policyholders.
Poisson/Chi-square and Poisson/Exponential models are two new important models of loss reserving. The estimates of the development factors in the chain ladder technique can be reformulated by substituting arithmetic mean by quadratic mean as well as geometric mean. The bad drivers are almost twice as likely to claim as good drivers but the premium is only, on average marginally higher. Therefore, one could adjust discounts levels of NCD slab of IRDA so that bad drivers pay a premium doubled than that of good drivers. Alternatively, introduction of different types of discount system like expanding the number of categories of discount levels will be helpful to encourage the good drivers. A longer and more gradual scale might differentiate between the different risk groups more efficiently.