Moral Hazard in Japanese Auto Liability Insurance

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Summary

In the case of car-to-car accidents, the current judicial precedents tend to find negligence on both parties. And as a result of auto liability insurance premium settings, especially the "down 3 grades" ("D3G") applied to both parties, drivers whose driving utility is low may have an incentive to drive less and become paper drivers, while drivers who enjoy high driving utility may have an enhanced incentive to drive, although this insurance settings lessen the burden of insurance premiums on drivers with high driving utility and avoid adverse selection.

Keywords: traffic accident, mutual negligence, auto liability insurance, insurance premium, D3G, moral hazard, adverse selection

1. Handling of Traffic Accidents by Auto Insurers

Drivers purchase auto liability insurance (often called "voluntary insurance" as non bodily injury insurance is not mandatory) from insurance providers to cover their liability for property damages caused by traffic accidents. Under the insurance policy, insurance payments for traffic accidents are made in accordance with the terms and conditions stipulated in a settlement[1] between the parties, or a court judgment.

Court case precedents involving traffic accidents provide guidance for settlement in the process. Notably, except in limited extreme cases such as accidents caused from ignoring a traffic light, or clashing a parked car, both parties tend to be held liable, and the ratio of liability (share) is determined by the relative fault of the parties. When an insurance company negotiates a settlement on behalf of the insured, there is an incentive to agree on some intermediate point at an early stage, considering the insured party's desire for early settlement and the dispute resolution costs. A simple payoff matrix is shown below.

Table 1: Payoffs under Precedents

	(i) Insurance carrier of party Y: ***Proposal/ Counterproposal***	(i) Insurance carrier of party Y: ***Litigation***
(2) Insurance carrier of party X: ***Accept***	**-50** **-50**	
Refuse	**-100** **-0**	**-90** **-70**

Suppose that the insurer of party Y makes an initial 50:50 settlement offer. X's insurer, in choosing between acceptance and rejection (a 0:100 counterproposal), will calculate whether the offender's insurer will accept the counterproposal or whether it will result in litigation. If the court is likely to approve a 40:60 sharing of damages, and if each party

[1] In negotiating settlements, each party's insurance carrier often represents the parties.

will incur 30 litigation costs, Y will be more likely to sue than to accept the counterproposal. Anticipating this, X (or its insurer) will accept the 50:50 proposal by Y.

In the following section, we will review how the current dispute practice of attributing liability to both parties and settling cases in half-way impacts drivers through incentives created by insurance policies and premiums. Notably, there is a variety of prior work about the moral hazard of the insurance mechanism. This paper considers what kind of incentives drivers would face from the setting of premiums for the auto liability insurance.

2. Setting of Auto Insurance Premiums and Economic Impact

Auto liability insurance premiums are calculated based on, roughly speaking, four factors; (1) the insurer's basic premium rate for each type of car, (2) the mileage, (3) the driver's driving history, and (4) a rating system in which the discount rate increases with each year. Of these factors, the vehicle type in (1) corresponds to the amount of possible loss in the event of an accident. For other three factors, we will consider how they affect the drivers' incentives to avoid auto accidents, through their roles in premium rate setting, and for this purpose, an NTT Data Mathematical Systems' data analysis (see the figure below) is very informative,

Figure 1: Analysis of NTT Data Mathematical Systems

2.1 Mileage

Distance travelled can be presumed to correlate with the risk of accidents. However, as shown in the figure above, adding mileage as an explanatory variable only results in the increase of 0.08 of the posterior accident probability. Overemphasizing this factor in insurance premium design is questionable.

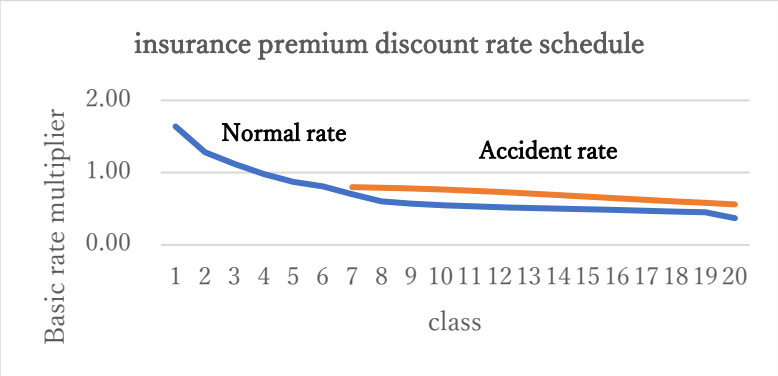
2.2 Driving History (Gold License Discount)

According to the figure above, the increase in the posterior probability is 0.27 for drivers with a prior history of traffic violations, and the premium discount (the so called "Gold License Discount") for drivers with no history of traffic violation seems reasonable. However, being a "driver with good driving record" also increases the posterior probability by 0.10. This may be due to the fact that paper drivers are included in this group of drivers, which means that this group includes various subgroups with ea different risk profile. In any case, the rationale for the Gold License Discount is not as simple as it may seem.

2.3 Grading Mechanism

The figure below shows a graphic summary of the premium “grading” mechanism (discount/penalty rate relative to the basic rate), based on Sony Insurance's insurance policy.

Figure 2: Sony Insurance's Grading Mechanism



As is well known, the discount rate of insurance premium decreases by one grade (up) with each renewal of the policy term. This can be explained as reflection of a decrease in the posterior accident probability as seen by the insurance carriers.

The problem lies in the increase in insurance premiums when the policy is used to pay for accident damages. If a party is found liable for the accident and the damages are paid for from the insurance policy, a penalty of "three grades down" (the “TGD”) is imposed, and if both parties are liable, they both receive the penalty. The insurance premium thereafter will become higher than it would be if the policy were not used for as long as the driver maintains the policy. In addition, for a certain period of time after the accident, the higher "accident premium rate” will apply (red line in Figure 2).

3.3 Mechanism and Rationale for TGD

3.1 Mechanism

Using the Sony Insurance’s premium schedule, we estimate the impact of the TGD. If a policyholder's insurance premium is 100,000 yen per year at grade 10 at the time of the accident, and the TGD applies because the driver uses the policy, the total premium penalty will be equal to 99,000 yen over the next 10 years. Notably, this penalty is irrespective of the degree of liability for the accident. Even if the liability ratio is 10:90 (the other party’s liability is far higher), both the driver and the other party are subject to the same penalty.

3.2 Rationale

This TGD system seems to be justified as reflecting an increase in the posterior probability of accidents, and Figure 1 shows that the "quality of driving" parameter (which includes past accident cases) has the largest difference between the prior and posterior probabilities (0.39) compared to other variables such as "driving history" or "age”.

However, according to a survey by the Japan Center for Automotive Safety and Driving, the share of drivers who have been accident-free for the past five years is 95

percent of all drivers, whereas 90 percent of accidents (including those involving bodily damages) are first-time accidents caused by the drivers who have been accident-free for the past five years. There is no reason to assume that this share is lower in property damage accidents. This suggests that, at least for first-time accidents, a considerable degree of randomness cannot be ruled out in their causes.

Furthermore, this study notes the existence of a group of drivers who repeatedly cause accidents and get ticketed for traffic violations (the "High Frequency Drivers"). This suggests that, although most drivers avoid accidents after they experience the first accident, the High Frequency Drivers do not. Therefore, their share among the entire drivers of the same incident history increases, and as a result, the overall probability of accidents after the second accident seems to increase as well. In fact, this interpretation is consistent with the results of the NTT Data Mathematical Systems analysis.

4. Practical Significance and Impact of the TGD

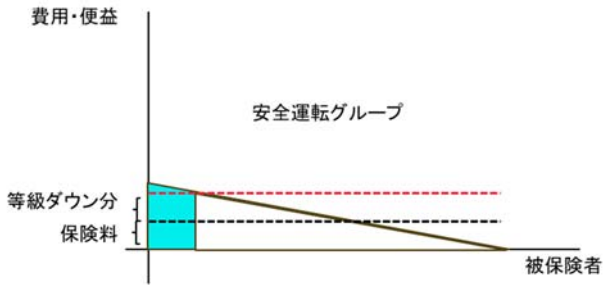
4.1 Practical Significance

As discussed above, the TGD which applies to to all responsible drivers does not necessarily reflect an increase in the posterior accident probability of a particular driver. Moreover, it is difficult to rationalize why the same penalty is imposed regardless of the degree of one's responsibility. In the current court and off court practice where both parties tend to be found to be liable for the accident, The TGD functions more as a finance system in which the insurance company pays for a portion of the accident costs and collects it from the insured through increments of premiums.

4.2 Impact on Driving Behavior

Drivers would like to avoid the additional payment from the TGD. However, since the sharing of liability for accidents is widely accepted by courts and by insurance companies, they will be better off not driving entirely, in order to avoid the TGD penalty. This incentive is likely to be more significant for drivers for whom driving is not essential part of their life. The phenomenon of “paper drivers” may be a product of this incentive. Additionally, as no insurance payments are likely paid out for the non driving group, there appears to be income transfer to insurance carriers (see figure below).

Figure 3: Cost-benefit curve for the safe driving group

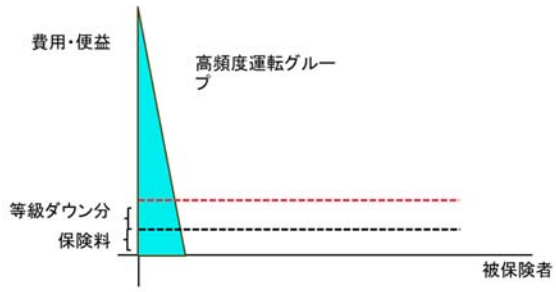


On the other hand, to avoid driving entirely is not a realistic option for drivers who enjoy relatively greater benefits from driving, or those who need to drive frequently.

The elasticity of the cost curve drawn for this group with respect to insurance premium rates must be low, so there is a question of whether the current insurance rates, including the TGD are sufficient as an incentive to prevent accidents for this group (moral hazard).

As mentioned above, the mileage is used as one of the factors setting insurance premium rates, and insurance carriers to take a step to reflect the risk associated with the high frequency drivers, which should dampen moral hazard in this group. Moreover, as the insurance companies are subsidized by the non driving group with the premiums (transfers) they pay, and in effect are reducing the burden on the high-frequency drivers. In this sense, the TGD is indirectly working to lessen adverse selection. (Figure 4)

Figure 4 Cost-benefit curve for the high-frequency drivers



However, insofar as it has the effect of placing the burden of insurance premiums more broadly on non drivers and reducing the burden on the high-frequency drivers, the TGD mechanism raises the issue of fairness of distribution. The auto liability insurance differs in this respect from insurance for random contingencies (e.g., medical insurance), for which everyone is at risk.

5. Evolution of insurance Design and Case Law

Although it is difficult to examine the extent to which moral hazard actually occurs, anecdotal evidence of "aggressive driving" suggests that moral hazard is causing certain driving behavior. To address this, an improvement in the current insurance design and practice is desirable. One approach would be to better identify high frequency drivers and set appropriate premium rates. In addition, the practical application of the TGD in all cases should be reviewed to better ensure fairness.

Even under the current TGD mechanism, it would be possible to improve the practice by changing the precedents to better address moral hazard and fairness. As discussed above, insurance companies are likely to pursue the "50:50" solution as long as the judicial precedent of holding both parties partially liable. This precedents should be improved by investigating further if the driver in question demonstrated accident prone behavior in the past. Its previous accident history should be weighed appropriately to reach a conclusion, and the courts should not avoid “0:100” results. Under the improved criteria, the payoff matrix will change as shown in in Table 2.

Table 2: Payoffs under the Improved Criteria

	(i) Insurance carrier of party Y (high frequency driver)	
	Proposal/Counterproposal	***suing***
(2) Insurance carrier of Party X: ***Acceptance***	**-50** **-50**	
refusal	**-100** **-0**	**-130** **-30**

With this payoff, Y's insurer is more likely to accept the "0:100" counterproposal, since attempting to resolve the dispute through litigation will only result in additional dispute resolution costs. If such a practice becomes common, the moral hazard of the high frequency drivers will be better prevented because transfers from the non driving group will be reduced, although adverse selection may occur.

Summary

In this paper, we show that there are two groups of drivers, the safe or non driving group and the high-frequency drivers, and that the court precedents tend to find both groups responsible for accidents, suggesting that the TGD mechanism may be transferring income from the safe or non driving group to the high-frequency drivers. Although adverse selection may be avoided by the mechanism, it causes a fairness problem for the safe or non driving group, and a more appropriate rate-setting mechanism is desirable. In addition, the moral hazard problem could be avoided by improving the current rule under the case law, and holding the high-frequency drivers responsible appropriately.

References

Tokyo District Court Civil Traffic Litigation Study Group (ed.), "Bessatsu Hanrei Times 38: Civil Traffic Litigation ni okeru negligence setoff rate no kakutei kyoka no kanri [Standards for the Recognition of Negligence Setoff Ratio in Civil Traffic Litigation]" (5th ed., fully revised) (2014).

Japan Society of Actuaries (2023), Non-Life Insurance, Chapter 3, "Calculation of Premiums," 47-53.

Sony Insurance "Basics of the Grading System," available at: https://www.sonysonpo.co.jp/auto/guide/agde021.html

NTT Data Mathematical Systems, "Technical Sample Project: Analysis of Accident Factors Using Auto Insurance Data," (web document) available at: https://www.msi.co.jp/support/msip/samples/download/BLS/BayoLinkS_%E8%87%AA%E5%8B%95%E8%BB%8A%E4%BF%9D%E9%99%BA%E5%88%86%E6%9E%90_%E8%A7%A3%E8%AA%AC.pdf

Center for Automotive Safety and Driving (2012), "Research Study on the Relationship between Traffic Accident and Violation Characteristics and Subsequent Accident Rates and its Utilization Measures (II)," Survey Research News No. 26.

Ibid (1982), "Report on the Actual Conditions of Driving by Driver Group," available at: https://www.jsdc.or.jp/Portals/0/pdf/library/research/s56_1.pdf

Posner, R. A. (2011) *Economic Analysis of Law*, 8th ed., New York, Aspen Publishers.