國立交通大學

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博士論文

終身吊銷駕駛執照制度之實施成效評估—被吊照人吊照前後開車實證分析

THE EVALUATION OF ADMINISTRATIVE LIFETIME DRIVER LICENSE REVOCATION—AN EMPIRICAL DRIVING INCIDENCE ANALYSIS

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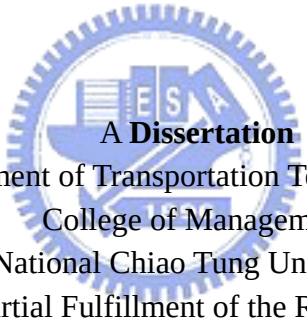

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國立交通大學運輸科技與管理學系博士班

摘要

交通事故之發生固然造成受害者生命、身體及財產上的實害，對於肇事致人死亡或受傷而逃逸，或酒精過量致人死亡或重傷者，在被處以終身吊銷駕駛執照之情況下，其法益的削減包括刑事罰、民事罰以及行政罰（終身吊照)等亦不可謂不重。民國 90 年 10 月大法官會議曾針對肇事逃逸被終身吊銷駕駛執照之案例做出解釋，明確指出本項處分與憲法並無牴觸，惟終身吊照是否影響人民之基本權？或確實使肇事者遠離道路不再開車？則有近一步探究之必要。本研究為探討終身吊照之效果及其對被吊照人之衝擊，針對終身吊照者進行二階段之調查，有效樣本計 768 位，結果顯示其中 23.4% 之受訪者，吊照後與吊照前之開車情況幾乎完全相同，59.8% 之受訪者明顯降低開車頻率，完全不再開車者僅 16.8%。整體而言，被終身吊照者平均降低了 65.7% 之開車里程。就與吊照前幾乎完全相同開車之受訪者而言，其開車之目的主要在於工作、通勤、拜訪親友及接送小孩；就明

顯降低開車頻率之受者而言，其開車主要為了工作及接送小孩。羅吉特迴歸結果顯示，是否遵守終身吊照處罰而不開車之程度，主要與個人屬性（年齡、所得）、處罰情況（入監、吊照長度）以及開車需要(工作、通勤、購物)有關；年長者及低所得者較遵守終身吊照不再開車之規定；被判入監者較多維持與吊照前幾乎完全相同之開車頻率。Generalized Estimating Equations (GEEs) 模式結果亦顯示，個人屬性（年齡、所得、駕照種類）、處罰情況（入監、高額民事賠償)以及開車需要（工作、通勤、休閒旅遊及接送小孩)、開車頻率、吊照、吊照 x 駕照種類，皆明顯影響整體之開車里程。綜合而言，終身吊照確實具有使肇事者遠離道路不再開車之一般效果，但也可能產生不公平的處分結果，使弱勢者更形弱勢。

THE EVALUATION OF ADMINISTRATIVE LIFETIME DRIVER LICENSE REVOCATION—AN EMPIRICAL DRIVING INCIDENCE ANALYSIS

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ABSTRACT

Car accidents bring many damages including death, injury and property loss to the victims. On the other side, in the case of hitting-and-running and causing death/or injury or drunk-driving and causing death/or serious injury, there are many kinds of penalties for offenders including criminal punishment, civil compensation and administrative lifetime driver license revocation (ALLR). In October 2001, the Taiwan constitutional court pointed out that ALLR does not violate the Constitution. Considering driving is a necessity of living, it should be further considered whether ALLR has impacted human basic rights, such as the rights of moving freedom, the right to work and the right of existence, and kicked those illegal drivers out of the road.

This study investigated the effectiveness of ALLR and its impact on offenders, based on a two-stage survey of 768 offenders. It was found that after ALLR had been imposed, 23.4% of these offenders were still driving almost the

same as before, 59.8% drove significantly less frequently, and only 16.8% of the offenders gave up driving completely. Overall, 65.7% of the offenders' annual mileage driven was reduced by ALLR punishment. For those offenders who drove at almost the same driving frequency, working, commuting, visiting relatives/or friends, and driving kids were the main activities compelling them to continue driving. However, for those offenders whose driving was significantly reduced, the necessity of traveling to work and driving kids were their main reasons for continuing to drive.

Results of logistic regression models showed that offenders' compliance with ALLR was significantly correlated with their personal characteristics (age, income), penalty status (incarceration, duration of ALLR), and the need to drive for working, commuting and shopping. Elderly and low-income offenders were more likely to abide by the ALLR restriction. Offenders who had been incarcerated were more likely to drive the same as before ALLR when compared to those offenders who had not been incarcerated. The study results of Generalized Estimating Equations (GEEs) model also showed that personal characteristics (age, income, license category), penalty status (incarceration, high civil compensation), driving needs (work, commuting, traveling and driving kids), indicator of group membership, indicator of post-ALLR, and the interaction of license category together with post-ALLR were all significantly associated with the mileage driven. It was found that ALLR is fairly effective in keeping offenders off the road, but it can reduce their ability to make a living,

resulting in the less fortunate becoming more helpless.

誌　　謝

有人說專注於做研究，是一種快樂！我終於體會了！當初報考交大博士班口試時，有位老師問我為什麼還要讀博士？我回答說：「我的雙胞胎小孩剛要出生，若有幸錄取，我將不會告訴他們，爸爸曾經參加這個考試；若未獲錄取，等他們長大後，我將告訴他們，在他們剛出生時，爸爸曾經參加交大博士班入學未獲錄取，我希望小孩不要注重結果，但要注重過程，不要因為怕失去而放棄參加。」研究期間，雖偶有困頓，但在片片段段的專注過程中，不僅有樂趣，而且收穫豐碩。

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最後謝謝摯愛的父親、母親及慧玟，因為她全心且無私的照顧立行與立揚，以及對我無邊的寬容與支持，我才能克服挫折完成博士學位。

曾建民　謹誌

中華民國 95 年 5 月

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Chapter 1 Introduction

1.1 Research background and motivations

In September 1991, the Taiwan Constitutional Court pointed out:

Road Traffic Safety and Penalty Act 62-2: In the case of crash, the driver who causes death/or injury should take protective or other necessary remedy measurements immediately and report to police. The driver, who violates this Article and runs away, whose driver license will be revoked whole his/her rest of life. For the purpose of promoting road traffic safety, protecting the majority of road users who comply with the law/regulation, and maintaining the social order, this Article does not violate the Constitution.

However, in October 2001, the Taiwan Constitutional Court pointed out again:

Road Traffic Safety and Penalty Act 62-2: In the case of crash, the driver who causes death/injury should take protective or other necessary remedy measurements immediately and report to police. The driver, who violates this Article and runs away, whose driver license will be revoked whole his/her rest of life. For the purpose of increasing traffic safety, protecting the majority of normal road users who comply with the law/or regulation, and maintaining the social order, it does not violate the Constitution. But for those who had committed hit-and-run offence and been revoked driver licenses, in the cases of the drivers having improved their behaviors and having the ability to re-fit the society, the authority has to reconsider whether it is needed to provide a chance for such offenders to rehabilitate their driver licenses.

The original aim of the punishment of administrative lifetime license revocation (ALLR) is to deter serious traffic violations and protect the majority of road users who comply with the traffic law/or regulation by keeping those disqualified drivers off the road. It plays a positive effect no matter in keeping road safety, maintaining society order and protecting the benefits of normal road users.

In fact, it exists a very serious cognitive gap between authorities and the drivers whose

licenses were revoked whole lifetime. From the viewpoint of authorities, they may think that such rigorous penalty can protect the benefits of most normal road users and keep the traffic safely. Thus, the authorities have made more articles in the Road Traffic Safety and Penalty Act to revoke driver license whole lifetime during last thirty years in Taiwan. From the viewpoint of those drivers who were imposed by ALLR, it seems unreasonable to prohibit from driving whole lifetime only owing to one fault or mistake. Furthermore, such offenders have no chance to rehabilitate their driving privilege, no matter how they revise their attitudes and behaviors. Moreover, driving is a necessity of living for most people in a modern society. Many activities including working, traveling, shopping and other daily needs highly rely on vehicles. ALLR may decrease the ability of working, diminish the freedom of moving and reduce the power of surviving. Therefore, ALLR may not only infringe the right of moving freedom which protected by the Constitution of the Republic of China, but also impact the right to work. Moreover, in the case of offenders who are professional drivers, losing driver licenses represent they can't be drivers and have to give up their jobs. Finally, ALLR may impact their normal life and decrease their ability of surviving.

According the Constitution of the Republic of China, Article 10: "The people shall have freedom of residence and of change of residence." Article 15: "The right of existence, the right to work and the right of property shall be guaranteed to the people." Article 23: "All the freedoms and rights enumerated in the preceding Articles shall not be restricted by the law except such as may be necessary to prevent infringement upon the freedoms of other persons, to avert an imminent crisis, to maintain social order or to advance public welfare." Therefore, people have the right to move freely which including the freedom of using different transportation modes (Lee, 2001). Only in the situations of: (1) the necessary to prevent infringement upon the freedoms of other persons; (2) to avert an imminent crisis; (3) to maintain social order; (4) to advance public welfare, shall not be restricted by the law. Wilson,

ex-president of the United States of America, said that: “The innate characteristics of the Constitution is the thought and habit of people. It has to be developed along with the environment of country, the type of society and the living habits of people”. Aristotle, a philosopher of Greece, also stated: “The Constitution is a profile of politics as well as culture of a society.”(Lee, 2001) In other words, the Constitution has to go along with the time forward, reflect the essential of culture and politics, and implement its concrete norms in our real society. Thus, the function of Constitution can be enhanced and glorified, and the society can be progressed soundly. Consequently, the Constitution doesn’t only restrain government from inadequate using political power to infringe the basic right of people but also make a regime become a solid authority to actively protect people’ rights (Shao, 1998).

Many economic and social activities, such as working, commuting, shopping… etc., rely heavily on a means of transportation. Driving a vehicle is thought to be a basic human right for people living in a modern society; indeed, people need to operate a vehicle to fulfill some economic or social requirements. Therefore, the impact of ALLR with no chance of rehabilitation may too much suffering for offenders and unable to be imaged by a normal road user. Thus, such offenders usually want to rehabilitate their driving privileges and seek many ways to recover their driver licenses in different ways. Finally, some drivers who were punished by ALLR had made their suit to the Constitution Court against the Article 62-2 of Road Traffic Safety and Penalty Act: “In a crash, the driver who causes death/or injury should take protective or other necessary remedy measurement immediately and report to police. The driver, who violates this Article and runs away, whose driver license will be revoked whole his/her rest of life.”

Car accidents usually bring many damages including death, injury or property loss to the victims. On the other hand, in the case of hitting-and-running and causing death/injury, or drunk driving and causing death/serious injury, there are many kinds of penalties for the

offenders including criminal penalty, civil compensation and ALLR punishment. All these punishments are immense to offenders. To legislate a law/or regulation, it is important that the sanction must be considered in accordance with the principle of balance and proportion (Lee, 2001; Shie, 1997). Generally, the benefits of offenders that deprived from the sanction must be equivalent to the benefits of the others that protected by such law/or regulation. Moreover, after a period of implement, while it fails to achieve the original purposes which setting in the beginning of legislating the law/or regulation, such sanction has to be abandoned. In the case of ALLR punishment, offenders have no chance of rehabilitation of having their driving privileges reinstated, no matter how much they improve their attitudes and behaviors. The sacrificed benefits, which deprived from offenders, may not equivalent to the benefits, which gained by the others. Therefore, we doubt that the lawmaking of ALLR may not conform to both the principle of balance as well as the principle of proportion.

Some short-term license suspension/revocation (S/R) offenders may be willing to follow a no-driving restriction to avoid being caught by the police during their license suspension period, in order to protect their future driving privileges. On the other hand, a long-term license S/R offender may have little motivation to adhere to such rules, especially when, in the case of ALLR presently in effect in Taiwan, there is no chance for rehabilitation. Furthermore, the punishment for driving a vehicle while under ALLR suspension is the same as driving while under S/R or while disqualified; ALLR offenders therefore have less incentive to stay off the road. Hence, we suspect that the percentage of ALLR offenders who continue to drive is higher than those with short-term license S/R.

Most previous studies have focused on exploring the effectiveness of license S/R as well as the reduced level of driving while under S/R. Very few studies have investigated the impact of S/R on specific offenders. Many economic and social activities, such as working, commuting, shopping… etc., rely heavily on a means of transportation. Driving a vehicle is

thought to be a basic human right for people living in a modern society; indeed, people need a vehicle to fulfill some certain economic and social requirements. Therefore, lifetime revocation of a driver's license, with no chance of rehabilitation, may be regarded as infringing on the offender's human rights of offenders. Moreover, according to present Taiwan traffic regulations, the punishment for driving a vehicle, while under ALLR, is only a fine of 12 000 NTD (New Taiwan Dollars, 34 NTD = 1 USD). Apart from the fine, there is no other punishment. Thus, rich offenders may hardly notice such a penalty, choosing to continue to operate their vehicles; poor offenders, on the other hand, may be forced to abide by the ALLR no-driving restriction, and give up driving. This may result in unequal punishment, where a rigorous penalty such as ALLR, may have a greater impact on the less fortunate members of society by reducing their ability to make a living.

1.2 Research objectives

There are many previous studies exploring the effect of a short-time license S/R in developed countries e.g. the United States of America, Canada, Australia and most of European countries. However, ALLR may not be implemented in these developed countries. Therefore, very few studies have focused on a long-term license S/R. In Taiwan, there is rare literature concerning about license S/R. Although, there are some literatures explored ALLR, however, such studies only come from the researchers belong to the field of the law and focused on whether such regulations violate the Constitution. There is no any study look into the effect of ALLR as well as its impact on offenders.

This dissertation mainly studied the effect of ALLR as well as its impact on offenders. We first focused on the trend on the Constitution and discussed whether such sanction violates the trend. Secondly, we investigated the effectiveness of ALLR and its impact on offenders. Consequently, the main objectives of this dissertation are as followings:

(1) Base on the principles of the Constitution, to explore both the trend of the Constitution

as well as ALLR.

(2) To realize the impact of ALLR policy on the living and the human rights of offenders, including how their basic human rights are disturbed by ALLR, such as the freedom of moving, the ability of working and surviving.

(3) Has the ALLR deprived the right of existence, the right to work, and the freedom of moving?

(4) To explore how the people, whose driving rights have been deprived whole their rest lives, travel to fulfill their needs for economic and social activities. Whether revoking driver license lifetime really keeps the disqualified drivers from the road?

(5) To comprehend that the percentage of ALLR offenders who continue to drive may be higher than those who with short-term license S/R.

(6) To demonstrate that ALLR may result in unequal punishment, where a rigorous penalty such as ALLR, may have greater impact on the less fortunate members of society by reducing their ability to make a living.

(7) To explore the determinant factors that forced offenders to fully comply with the ALLR and totally give up driving, to partially abide by ALLR and reduce driving, or to completely ignore the punishment and drive almost the same as before the ALLR.

(8) To determine the association between the mileage driven, both before and after ALLR, by the offenders and potential explanatory factors.

1.3 Research approach

This paper collected data either from offenders involved in hitting-and-running offences causing death/or injury, or drunk driving offences causing death/or serious injury, who had been punished by ALLR. To explore the policy of ALLR, we first looked into the principle of the law legislating especially on the viewpoint of the Constitution and probed into whether the rigorous punishment infringe into people's basic rights which including the freedom of

moving, the right to work and the right of existing. For ALLR offenders, the punishments usually accompany criminal penalty, civil compensation and administrative disciplinary action—ALLR. We focused on the relationship between these punishments and constitutional legislating principles, that these punishments may infringe basic human rights that were guaranteed by the Constitution. Even though, these punishments may not an unconstitutional act that according to the Taiwan Constitutional Court's interpretations. However, it may violate the trend of the Constitutional legislation. Therefore, we are not focus on weather the ALLR punishment violates the constitution or not, but on the trend of worldwide constitutional development. Thus, this thesis also makes a description of human's basic rights, which include the meaning of human's basic rights, the types and principles of restriction, the meaning of constitutional interpretation, the principles and trend of constitution. Moreover, we also make a comment on the Road Traffic Safety and Penalty Act Article 62.

Secondly, we investigated ALLR offenders' driving exposure and behaviors after having been imposed by ALLR sanction. A before-and-after comparison of offenders' driving habits, after ALLR had been imposed, was undertaken first, to measure the effectiveness of ALLR. A logistic regression model was then employed to show how driving experiences, under ALLR, were associated with the offenders' characteristics, such as socio-economic factors, penalty status and the needs for transportation. When ALLR punishment is most effective and whether this rigorous punishment has a greater impact on the less fortunate will be discussed. It may be that such rigorous punishment is fairly effective in keeping offenders off the road, but may give rise to other societal problems. Finally, a multivariate regression model, Generalized Estimating Equations (GEEs) (Liang and Zeger, 1986; Hardin and Hilbe, 2003), was used to determine the association between the mileage driven by the offenders and potential explanatory factors. Research Approach was showed as Figure 1.

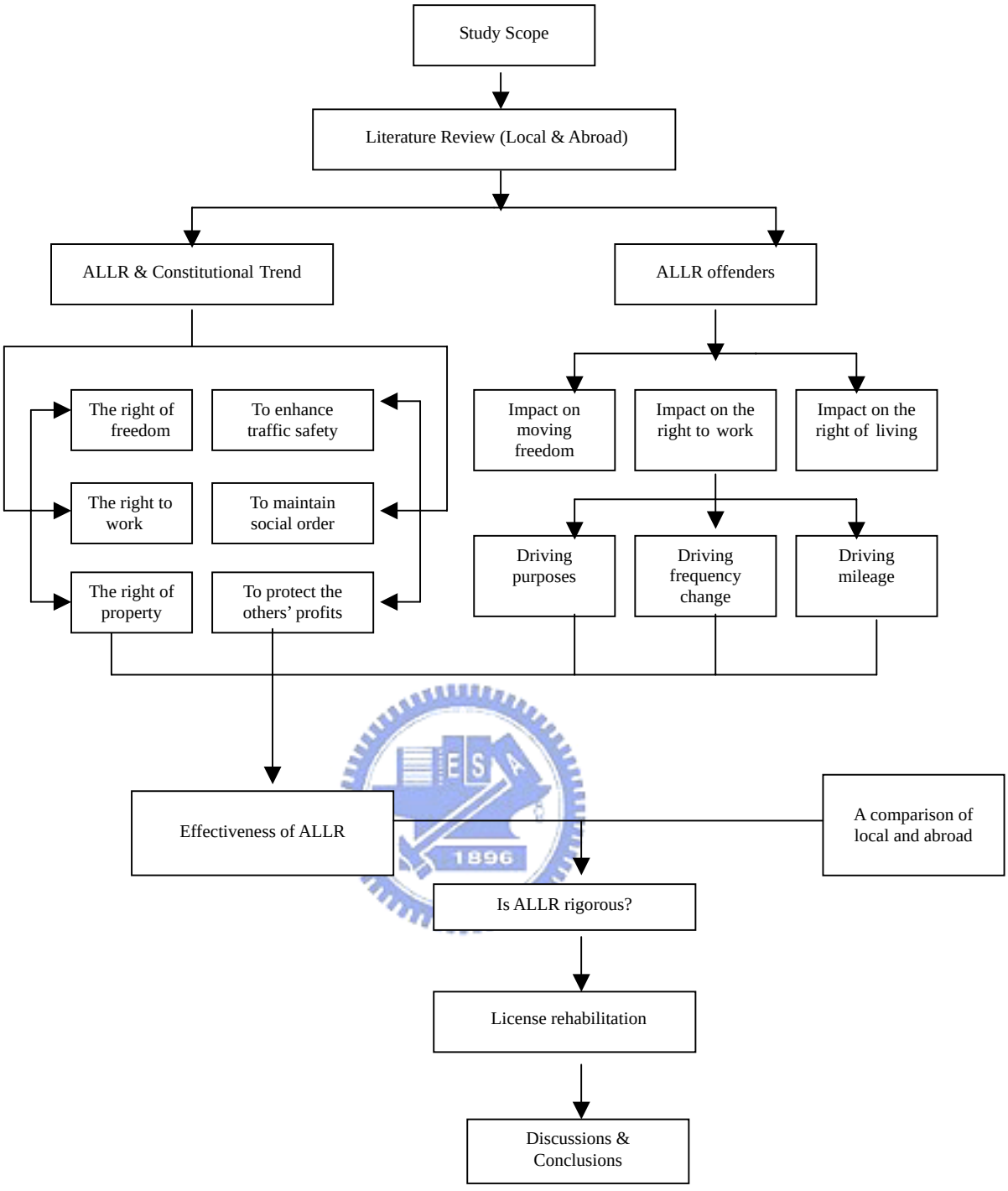

Figure 1: Research approach

As to the measurement of the effectiveness of ALLR, the ideal concept is to compare the "protective benefits" which including keeping road safety, maintaining society order and protecting normal road users' benefits with "sacrificed benefits" which coming from ALLR offenders. However, it is difficult to measure either the effectiveness of keeping road safety,

maintaining society and protecting normal road users' benefits. Moreover, in order to consist with S/R literatures, this study mainly adopted the driving exposure both before and after ALLR to measure its effectiveness. Figure 2 shows ALLR effectiveness system analysis framework.

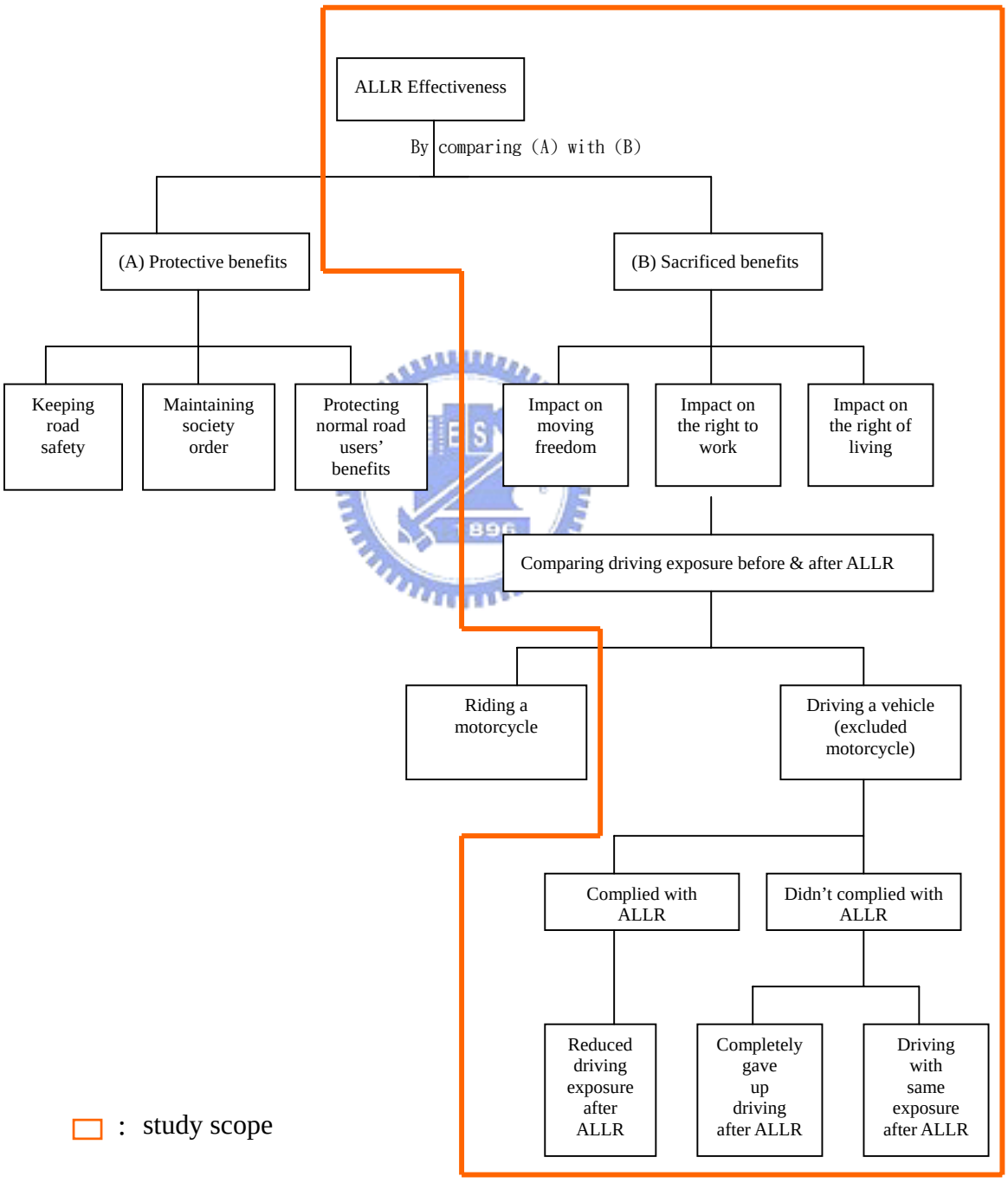

Figure 2: ALLR effectiveness system analysis framework

1.4 Overview of thesis

This thesis is organized as follows. Chapter 2 presents brief literature reviews that include three parts. In the first part, the relationship of ALLR legislation and constitutional principles were expounded. The second part is regarding the effectiveness of license S/R as well as such offenders' driving exposure while under license S/R. In the third part, the methodologies concerning this dissertation include a Logistic Regression Model and Generalized Estimating Equations (GEEs) were reviewed. Chapter 3 introduces the present ALLR policy in Taiwan that includes the background of ALLR development, the current ALLR articles and the current results of implementing. Chapter 4 looks into the trend of constitutional interpretation on ALLR. Chapter 5 addresses the empirical analysis that collects the data of offenders who were punished by ALLR sanction and demonstrates the empirical results includes offenders' basic characteristics, reasons for driving, offenders' driving exposure and behaviors while under ALLR. Chapter 6 and chapter 7 make discussion and conclusions respectively.

Chapter 2 Literature review

2.1 The principles of the Constitution

2.1.1 The meaning of human's basic rights

The human's basic rights are to concrete the concept of freedom and implement it to real society. Carl Schmitt, a constitutional scholar of Germany, has stated "the human's basic rights are the right takes precedence over the existing of country. It is not the rights that authorized by the law, which legislated by the country, but rights that have existed and much be admitted by the country (McCormick, 1996). The types of human's basic rights include the right of freedom and the right of equality in the initial stage. Along with the development of constitution, the more emphasis was on such a life that under culture and dignity. Although there is no exact the words of human's basic right in the Constitution in Taiwan, however, there are many times the Constitutional Court mentioned the concept of human's basic rights while in some cases under constitutional interpretations. ALLR deprives offenders of the privilege of driving a vehicle. In other words, it keeps disqualified road user off the road. Thus, it inevitably impacts the freedom of moving. Meanwhile, in a modern society of capitalism, lose driver license may also impact the ability of working. Furthermore, it may decrease the niche of surviving. In this section, the meaning of the right of freedom, the right to work and the right of existing are discussed.

2.1.1.1 The right of freedom

According the Constitution of the Republic of China, Article 10, the meaning of freedom of residence and change of residence is somewhat the freedom of moving, it is a human's basic right. It represents people can choose their residence freely, and the State cannot infringe it arbitrary. The freedom of residence includes choosing residence freely both in the State and abroad. It cannot be infringed or interfered unlawfully, or dealt with discrimination. Excepting for criminal cases or some special cases according to the law, people moving freely in the

State or changing of residence from the State to abroad that guaranteed by the Constitution all over the world cannot be banned (Lin, 1998).

The freedom of residence and personal freedom are interrelated, with the characteristics of having subjective right. The function of such rights, from a defensive aspect, is to prevent unlawful infringing upon human's basic rights from the State. Either an unlawful limitation on people' freedom comes form the State or an individual person; he/she has the right to claim for the damage. The freedom of moving includes passive freedom of moving and active freedom of moving. The former means that the freedom of moving has to be protected by the State from an unlawful infringement. A person should has the right to resist, passively, the moving which is not an authorization by law as well as on his/her own will. The authorization by law means an authorization must be based on either on the law or the Constitution unequivocally. Therefore, the passive freedom of moving includes no residence shall be invaded except in accordance with the law, no person or his residence shall be searched except in accordance with the law, no residence shall be held in custody except having a legal reason. The latter means that the State shall promote the opportunities to fulfill the person's freedom and rights concretely. In other words, it represents a freedom that people have the right to move anywhere without the State's permission. Generally, it includes the people shall have freedom of residence, setting residence, and freely using any kind of transportation modes (Lee, 2001).

2.1.1.2 The right to work

The 'work' includes two kinds of concept. Subjectively, it represents a person who connects it to his live; objectively, it represents a repeated behavior within a certain period. The materials, which are necessary to maintain a living, only come from either the property or labor. Especially the income from labor is the means of maintaining a living for most persons who have no capital or productive instrument. Hence, by the way of choosing a job freely, to

get a reasonable reward in order to make a living has a great meaning. It forms the type of society and keeps it stable. The theory of constitution in nineteen century is based on two fundamental elements that include the right of freedom and the right of property. Thus, the relation of the State and people was based on the freedom and property. However, the fundamental elements of constitution in the present generation were expanded to three main factors, namely the right of freedom, the right of property and the right to work. All these three basic rights were guaranteed by the Constitution. The right to work, both its theoretical and empirical development, became gradually one of the most important basic rights that guaranteed by the Constitution (Haeberle, 1984).

The right to work and the right of property are the most important factors to support a living. The theory of constitution in present generation, the right to work, therefore, stands at the same important position as the right of freedom and the right of property (Wang, 1992). Besides the right to work is guaranteed to the people that included in Article 15 of the Constitution. The Constitution Section 4, Social Security, is also including the State shall provide suitable opportunities of working for the people who are able to work, improve the livelihood of laborers as well as the capital and labor shall in accordance with the principles of harmony and cooperation.

2.1.1.3 The right of existence

The freedom and equality, on the surface, base on the law, however, it led to an unfree and unequal situation in a real economic society. The society then recognized that it was not enough to guarantee a person' existence and a dignitary living while only has the basic right of freedom. Consequently, the concept of social rights emerged from such circumstance. It is believed that people shall have the rights, which covering the field of economy, society and culture such as working, education, health and social insurance…etc., to attain the aim of owning personal dignity as well as moral integrity. To solve this dilemma which arose from

capitalism, most of western developed countries consequently to adopt an amendatory way that legislating more positive laws to guarantee the right of existence including both in economic and social field. Especially after World War II, the concept of human rights has been paid more attention by most of countries. At the mean time, after facing some serious challenges which come from political and economic situation. The social rights were therefore became an important part of constitution. Finally, the right of existence aroused to be an important issue that protected by the Constitution (Tsai, 1999).

The right of existence, which protected by the Constitution, includes esteem for life and continuity of living. From the view point of the relationship of the people and the State, although the State has the right to request people abiding the law, on the other side, people also have the right to request the State esteem their life and take care of their living. In the Republic of China, the concept of the right of surviving has been included in the Constitution, Article 15. In Japan, the right of surviving was more unequivocal included in the Constitution. Its Article 25 states that: “All the people of the State shall have the right to have a minimum requirement of a living with health and culture. The state should try any possibility to promote social welfare, social insurance and public health (Chuan, 1991).” Meanwhile, the Japan government widely legislating social security laws to fulfill the content of social welfare, to establish a sound social protect and insurance system, such as living protect law, aging welfare law, child subsidies law, citizen annuity law, and citizenry health insurance law…etc. To ensure the protection of the right of surviving not only make all the people have a dignitary, healthy and cultural living on the base of freely existence, but also have a positive meaning for glorifying the justice and harmonizing the whole society.

2.1.2 The restrictive principles and types of basic rights

2.1.2.1 Restrictive principles

According to a law or authoritative regulation to restrict people’s basic rights cannot be

arbitrary. The State cannot use an illegal means to deter people's illegal behavior. It was the basic requirement of rationality of a State in the modern constitutionalism. The state to legislate a law to restrict people basic rights must be in accordance with three principles of constitution, that show as followings (Lee, 2001；Shia, 1997):

(1) The principle of law reservation

According to the Constitution, Article 23, to restrict people's basic right shall be in accordance with the law. Besides, the authority also can make an authoritative regulation to restrict people's basic rights, however, such regulation must under the explicit authorization of the law. Moreover, to make such regulation shall not be violated the principle of re-authorized prohibition. In other words, such regulation should not be beyond the range of authorization of the law.

(2) The principle of equality

To restrict people's freedom or rights by a law shall be in accordance with the principle of equality, which means that the same things should have the same treatments and the different things should have the different treatments, and cannot arbitrarily use different treatments.

(3) The principle of proportion

To judge weather a restriction on people's basic rights violates of the Constitution should consider the necessity of the aim of such restriction, the rationality of restriction content and the characteristics of restriction activities? Accordingly, it must be reviewed individually by the principles of proportion and equality. The principle of proportion, believed by most of constitutional scholar that in the Article 23 of the Constitution of the R.O.C., usually includes three sub-principles that discussed as followings:

(a) The principle of appropriateness

The principle of appropriateness, also known as the principle of corresponding with the aim, means that legislating a law to impose restriction on people's basic right should fit in with the aim. Generally, if the legislation of a law is not covered in the Article 23 of the Constitution, it represents such legislation is not correspond to such principle. This principle can also conduct 'the principle of arbitrarily-prohibition' and 'the principle of inappropriateness-prohibition'. The means or measures that the State adopt to restrict people's rights shall be appropriate and helpful to achieve the aim. From the viewpoint of human dignity and human freedom, an inappropriate restriction on people's moving freedom is the same as punishment.

(b) The principle of necessity

The principle of necessity, also called 'the principle of minimum harm', means that a necessary action, which in all possible ways to achieve the aim, can make a least harm. In other words, it is a choice within the means under the same aim. Therefore, to restrict or intervene a basic right, even though such restriction or intervention is in accordance with the principle of appropriateness, followings are also needed to inspect. a) How many means can achieve the aim? b) What are the restrictions that produced by these different means? c) To choose a means which holds the minimum harm.

(c) The special principle of proportion

The special principle of proportion, also called 'the principle of ratio'. It means that even a measure to restrict basic rights is in accordance with the principle of appropriateness as well as the principle of necessity and being a minimum hurt, still can't over the special principle of proportion. Except the aim shall be appropriate, the measure also has to be considered whether it is appropriate or whether the measure of restriction goes beyond the proportion. The State exerts its authority cannot use a measure which unbalanced with the outcome. A measure that the State enforce shall be

necessary for its aim, however, such measure cannot bring overload to the people. In other words, the measure and the outcome should be equivalent. The profit, come from the effectiveness of the goal, should be equivalent to the lost-profit, deprived from the people. While the measure didn't reach the original aim but brought an over-burden to the people, either the aim must be modified or abandoned.

2.1.2.2 The types of restriction

In Taiwan, there are four types of direct restriction which can be adopted to limit people's basic rights which showed as followings (Lee 2001):

(1) To be a means of punishment

To punish an offender by means of incarceration or restriction on their freedom i.e. to limit a criminal offender's residence (Criminal Litigation, 116,120), to restrict the right of changing residence for an offender who is free form probation, to restrict the right on moving abroad for an obligor who didn't pay his/her taxes over a certain amount (Taxes Levy Act, 24-3), to commit a hit-and-run offence causing death/injury will be punished an incarceration of 6 months to 5 years etc.

(2) To ensure authority of the State can be realized

According the Epidemic Prevention and Control Act, the authority has the right to limit people to get in and out the fashion area, while an epidemic disease is widespread. A person, who is in a restrain period, can't depart from his/her restrain area unless having permission (Ensure Safety Act, 74-2-5). Whether to leave or enter a country must have a passport and visa, unless having a permission of foreign ministry, the authority can't issue a passport for a country having no relationship with the Republic of China (Passport Act, Article 14).

(3) To advance public welfare

The management of high bearing capacity on freeway is on the aim of promoting its traffic smooth, however, it inevitably restrict people's moving freedom.

(4) To maintain social order

In order to maintain social order, it is necessary to restrict people to use transportation models such as abiding with traffic light, driving on the right side, restraining a motorcycle from using freeway, speeding prohibition.

2.1.3 The limitation of basic rights for ALLR offenders

Punishment according to the law may include criminal sanction, civil levy sanction and administrative sanction. Each sanction has its own theory of law and limitation. Legislators adopting one or two or more than two sanctions to deter a behavior that violates the law usually have their specific consideration (Lee, 2001). However, before adopting any kind of sanction should consider the people of the State how to inform their positive or negative action (Whang, 2001). In the case of hitting-and-running and being punishment by ALLR, sanctions include criminal, civil levy and administrative punishment. In which, the level of civil levy sanction depends on the negative legal profit come from victim including life, body and property damage that decided by the court. The criminal and administrative sanctions inevitably lead to a various restriction on the basic rights including moving freedom, the right to work and the right of existing.

2.1.3.1 The restriction on moving freedom

(1) Criminal penalty

Table 1 shows the different criminal penalties may be produced for a hit-and-run offence including the penalty of desertion, an attempted crime, hitting-and-running, innocent homicide, innocent hurt etc (Tseng & Hwang, 2000). Consequent term of imprisonment, various according to the law, substantially limit the freedom for offenders.

Table 1: The possible criminal penalties for hitting-and-running offence

Crime	Criminal Act, Article	Contents
Desertion	294-1	He/she, who has the obligation to rear or protect a person according to the law or contract but violates such obligation, can be punished

		imprisonment from 6 months to 5 years.
Attempted homicide	271-2	He/she, who commits a homicide, can be sentenced to death, life imprisonment, or over ten years imprisonment. Attempted homicide should be punished.
Hit-and-run	185-4	He/she who operates a motor vehicle causing death or injury and run can be punished imprisonment from 6 months to 5 years.
Innocent homicide	276	He/she who commits an innocent homicide can be punished imprisonment under two years or custody or under 2000 NTD fine.
Innocent hurt	284	He/she commits an innocent hurt can be punished imprisoned under 6 months, or custody, or 500 NTD fine; in the case of causing serious injury can be punished imprisonment under one year, or custody, or 500 NTD fine.

(2) Administrative punishment

The Constitution Court against the Article 62-2 of Road Traffic Safety and Penalty Act: "In the case of crash, the driver who causes death/or injury should take protective or other necessary remedy measurement immediately and report to police. The driver, who violates this Article and runs away, whose driver license will be revoked whole his/her rest of life."

In September 1991, the Taiwan Constitutional Court pointed out:

Road Traffic Safety and Penalty Act 62-2: In the case of crash, the driver who causes death/or injury should take protective or other necessary remedy measurements immediately and report to police. The driver, who violates this Article and runs away, whose driver license will be revoked whole his/her rest of life. For the purpose of increasing traffic safety, protecting the majority of road users who comply with the laws/or regulations, and maintaining the social order, this Article does not violate the Constitution.

However, in October 2001, the Taiwan Constitutional Court pointed out again:

Road Traffic Safety and Penalty Act 62-2: In the case of crash, the driver who causes death/or injury should take protective or other necessary remedy measurements immediately and report to police. The driver, who violates this Article and runs away, whose driver license will be revoked whole his/or her rest of life. For the purpose of increasing traffic safety, protecting the majority of road users who comply with the laws/or regulations, and maintaining the

social order, it does not violate the Constitution. But for those who had committed hit-and-run offence and been revoked driver licenses, in the cases of the drivers having improved their behaviors and having the ability to re-fit the society, the authority has to reconsider whether it is needed to provide a chance for those drivers to rehabilitate their driver licenses.

Road Traffic Safety and Penalty Act 62-2: “In the case of crash, the driver who causes death/or injury should take protective or other necessary remedy measurements immediately and report to police. A driver who violates this Article can be punished by suspending his/her driver’s license from 3 months to 6 months. In the case of running, his/her driver’s license can be revoked.” Article 67: “The driver, who punished by the Article 62, cannot reinstate his/her driver’s license.” Article 68: “The driver who violates the Road Traffic Safety and Penalty Act or the Road Safety regulation and be punished by driver license S/R, all the privilege of operating motor vehicles, such as cars, trucks, motorcycles…etc. will be revoked at the same time.” Hence, such administrative sanction makes offenders loss their driving privilege during their rest of life including all the transportation modes e.g. cars and motorcycles. Inevitably, it seriously impacts the offenders’ moving freedom. Moreover, according to the present driver license design system, ALLR offenders have no chance to reinstate their driving privilege no matter they can demonstrate their ability and willingness to follow the regulations of the road and society.

2.1.3.2 The restriction on the right to work

To revoke a person’s driver license lifetime represents he/she can’t operate a motor vehicle for his/her rest of life. In the modern society, losing driving capacity may decrease the ability of working. Especially in a capitalistic society, it may represent serious impact one’s ability of working. Owing to the moving freedom and ability decreased, in the case of working heavily rely on vehicle, the ability of competition may decrease largely and further impact their work. The most serious situation is that professional drivers have to give up their

jobs and change their work. In the capital side of the capitalistic society, the ALLR impact on entrepreneurs may much less of that on labors, for the reason that they usually hired drivers. In the real situation, ALLR impacts on who were heavily rely on vehicle to earn a living or professional drivers most seriously.

2.1.3.3 The restriction on the right of existence

The right to work and the right of property are two bases of the right of existence. The impact of ALLR on the right of existence is similar to on the right to work, its impact on labor group is much more than on enterpriser group. The reason is that usually the ability of a labor using property to earn profit is much less than that of an enterpriser. Labors usually use their manpower to earn a living. Similarly, in the case of using transportation vehicles to make a living e.g. the ALLR offenders who applied for constitutional interpretation were small truck drivers who used their truck to make a living. Therefore, ALLR may represent a serious impact on the right or existence.

2.1.4 The constitution interpretations No. 284 and 531

The Constitutional Court in Taiwan to interpret the Constitution can be in many ways such as to judge whether constitution fits in with the aim, to distribute the power of the State, to confirm the Constitution and to implement the Constitution. Hence, the outcome of the constitutional interpretation cannot be simply determined whether it corresponds to or violates the Constitution. It also cannot to check only on the interpretation or the document of explanation, but on all the points of view (Hwang, 2000). The interpretation of the Constitutional Court usually cannot derive an objective and firmly believed result, but a trend or tendency. For the basic rights and legal profits that protected by the Constitution, the Constitution Court except to judge whether it corresponds to the Constitution, the more important thing is to interpret the relevant rights, the essence and content of legal profits. Meanwhile, according to the relations among the basic rights to set up principles and system,

to harmonize and balance personal rights and group rights, to protect human rights, and glorify a constitutional government.

Although both the interpretations of the opinion of the Road Traffic Safety Act 62 are on the aim of enhancing the road safety, protecting the others profit and maintaining the society order. And it doesn't violate the Constitution. However, the interpretation on may, 2001 mentioned that: "in the cases of the drivers having improved their behaviors and having the ability to re-fit the society, the authority has to study whether it is needed to provide a chance for those drivers to rehabilitate their driver licenses."

To compare the two interpretations, the latter obviously more conform to the spirit of protecting human's right than the former. From the second paragraph of the latter interpretation, it seems that to revoke a person's driver license forever and without rehabilitation during the rest of life is unreasonable.

2.2 Literature of license suspension/revocation

Many drivers, given a sentence of license S/R continue to drive, but at reduced levels (Hagen et al., 1980; Ross and Gonzales, 1988; Smith and Maisey, 1990). Ingraham and Waller (1971) found at least 30% of drivers given license S/R for drunk driving continued to operate a vehicle despite the licensing action. Williams et al. (1984) indicated that 65% of drivers confessed to operating a vehicle while under license S/R. Ross and Gonzales (1988) reported that 66% of suspended drivers were still driving on the road. DeYoung (1999) estimated that three-quarters of S/R drivers continued to drive, but they apparently drove less, and with more care. Malenfant et al. (2002) showed 57% of motorists were still driving while their licenses were suspended.

Although many S/R drivers continue to drive, many studies have explored the effectiveness of administrative license revocation (ALR) and support the view that it is a positive step in reducing subsequent alcohol-involved driving by offenders (Zador et al., 1989;

Henderson and Kedjidjian, 1992; Lund, 1993; Sweedler and Stewart, 1993; NHTSA, 1993*).* Most of these studies have demonstrated that this sanction is effective over a short term (Homel, 1981; McKnight and Voas, 1991; Mann et al., 1991; Peck, 1991; Siskind, 1996). However, ALR is usually no longer than a few years, and prior research has commonly focused on a relatively short-term license S/R. Very few studies have explored the effectiveness of ALR over the long term.

In addition, driving while under S/R is difficult to enforce. It can only be detected when the driver of a vehicle has been stopped by the police for committing another traffic offence (Voas and Deyoung, 2002); thus, offenders are likely to be encouraged by the belief that there is little danger of being caught (Knoebel and Ross, 1997).

2.3 Literature of methodology

2.3.1 Logistic regression model

Regression methods have become an integral component of any data analysis concerned with the relationship between an outcome variable and one or more explanatory variables. The most common regression method is conventional regression analysis, either linear or nonlinear, when the outcome variable is continuous (iid). However, when the outcome variable is discrete, conventional regression analysis is not appropriate. Moreover, there are primary assumptions are not satisfied when the outcome variable is categorical. One is the outcome variable in conventional regression analysis must be continuous, another is the outcome variable can take nonnegative values (Al-Ghamdi, 2002).

Statistical analyses are often based on general linear models that were developed to handle continuous independent data. A common example of the general linear model is ANOVA. The generalized linear model is an extension of the general linear model to handle both discrete and continuous data (McCullagh and Nelder, 1989). One of the most common types of the generalized linear model is logistic regression. The generalized linear model

transforms the data via a link function. In logistic regression the link function is the logit link function. An iterative process is used to solve for the parameter estimates. The coefficients represent the log-odds of an outcome being present when all other variables are held constant.

The logistic regression model is widely used analytical tool in traffic safety research. From a methodological viewpoint, a wide variety of approaches have been employed to study fatality risk. For example, Kim et al. (1995) use data on accidents in Hawaii to illustrate the use of a categorical log linear model to examine personal and behavioral predictors of crash and injury severity, while Shankar et al. (1996) describe the development of a nested procedure for the analysis of accident severity on rural freeways. In the UK, Jones and Bentham (1995) calculated Odds ratios to determine probabilities of fatality amongst traffic accident causalities according to a complex matrix of explanatory variables. However, despite this apparent diversity of methodologies, common to most investigations is the requirement for a statistical model, which will predict fatality risk for an individual based upon a range of explanatory variables. In line with this, the most frequently used technique is the generalized linear modeling (GLM) methodology of logistic regression (Menard, 1995).

The logistic regression model applies maximum likelihood estimation after transforming the categorical dependent variable into a logit variable. A logit is the log of the odds ratio. It does not assume equal distribution of the dependent variable for each level of the independent variable, nor necessarily a linear relationship between the independent and dependent variables. Moreover, the logistic regression model does not assume a normal distribution of the variables. As such, it is a particularly robust model for various traffic safety analyses (Kima, 2003). It is one form of statistical model called ‘generalized linear model’ with a logit (also called ‘log odds’, i.e. ln p/(1-p)) link function. This model has many advantages over ordinary least square regression models where the dependent variable is not continuous or normal in its distribution, and has constant variances. Logistic regression allows one to

predict a binary outcome from a set of explanatory variables that may be continuous, categorical, or a mixture of the two. The basic model form and statistical test method for logistic regression is introduced as followed.

The dependent variable in logistic regression is dichotomous; that is, it is assumed to follow a Bernoulli distribution. Therefore, it takes the value 1 with a probability p of an event occurred, and the value 0 with probability 1-p of an event not occurred.

The form of the logistic regression equation is:

$$\ln\left[\frac{p(x)}{1-p(x)}\right] = \alpha + \beta_i x_i$$

where p (x) is the probability of an event occurred, which is a function of a set of factor vectors, x; α is the constant of the equation, and β_i is the coefficient of the i^{th} factor.

The coefficients of the logistic model can be obtained by using the maximum likelihood estimation (MLE) method. To test the statistical significance in the model of each coefficient, β_i, a Wald test is usually used. The Wald test calculates a squared Z statistic, yielding a Wald statistic of asymptotic chi-square distribution with one degree of freedom, which is:

$$Wald = \left(\frac{\hat{\beta}_i}{SE(\hat{\beta}_i)}\right)^2 \sim \chi_1^2$$

where $\hat{\beta}_i$ is the i^{th} estimated coefficient and $SE(\hat{\beta}_i)$ is the standard error of the i^{th} estimated coefficient.

As for the overall test of the model, the likelihood-ratio test is widely used. This test employs the ratio of the maximized value of the likelihood function for the model with constant term only ($L(c)$) over the model, with a constant and estimated coefficient ($L(\hat{\beta})$). Using negative two times of log transformation of the likelihood-ratio yields an asymptotic p degree of freedom of the chi-squared statistic. The likelihood-ratio test statistic equals:

$$-2\log\left(\frac{L(c)}{L(\hat{\beta})}\right) = -2\left[\log(L(c)) - \log(L(\hat{\beta}))\right] \sim \chi_p^2$$

where $\log(L(c))$ and $\log(L(\hat{\beta}))$ are respectively the values of the log likelihood function at its maximum, and p is the number of estimated coefficients.

The goodness-of-fit measure, ρ^2, was defined as followed:

$$\rho^2 = 1 - \frac{\log(L(\hat{\beta})}{\log(L(c))}$$

To interpret the model conveniently, logit (i.e. ln p/(1-p)) can be converted easily into a statement about odds ratio (O.R.) of the dependent variable simply by using the exponential function. For example, if the x_i variable increases one unit while holding the remainder variables constant, the O.R. of these two levels for x_i will be exp ($\hat{\beta}_i$) and the 95% confidence interval (C.I.) for O.R. will be exp ($\hat{\beta}_i \pm Z_{0.95}$*SE ($\hat{\beta}_i$)).

Logistic regression is often used for analyzing motor vehicle crash data. In predicting accident frequency, Milton and Mannering (1997) state: “The use of linear regression models is inappropriate for making probabilistic statements about the occurrences of vehicle accidents on the road.” They showed that the negative binomial regression is a powerful predictive tool and one that should be increasingly applied in future accident frequency studies. Kim et al. (1996) developed a logistic model and used it to explain the likelihood of motorists being at fault in collisions with cyclists. Covariates that increase the likelihood of motorist fault include motorist age, cyclist age, cyclist alcohol use, cyclists making turning actions, and rural locations. Kim et al. (1994) attempted to explain the relationship between types of crashes and injuries sustained in motor vehicle accidents. By using techniques of categorical data analysis and comprehensive data on crashes in Hawaii during 1990, a model was built to relate the type of crash (e.g. rollover, head-on, sideswipe, rear-end, etc.). They also developed an “odds multiplier” that enabled comparison according to crash type of the odds of particular

levels of injury relative to non-injury. The effects of seatbelt use on injury level were also examined, and interactions among belt use, crash type, and injury level were considered. They discussed how log linear analysis, logit modeling, and estimation of 'odds multipliers' might contribute to traffic safety research.

Kim et al. (1995) built a structural model relating driver characteristics and behavior to type of crash and injury severity. They explained that the structural model helps to clarify the role of driver characteristics and behavior in the causal sequence leading to more severe injuries. They estimated the effects of various factors in terms of odds ultipliers, which is how much does each factor increase or decrease the odds of more severe crash types and injuries. Nassar et al. (1997) developed an integrated accident risk model (ARM) for policy decisions using risk factors affecting both accident occurrences on road sections and severity of injury to occupants involved in the accidents. Using negative binomial regression and a sequential binary logit formulation, they developed models that are practical and easy to use. Mercier et al. (1997) used logistic regression to determine whether either age or gender (or both) was a factor influencing severity of injuries suffered in head-on automobile collisions on rural highways. Hilakivi et al. (1989) also used logistic regression in predicting automobile accidents of young drivers. They examined the predictive values of the Cattel 16-factor personality test on the occurrence of automobile accidents among conscripts during 11-month military service in a transportation section of the Finnish Defense Forces. James and Kim (1996) developed a logistic regression model to describe the use of child safety seats for children involved in crashes in Hawaii from 1986 through 1991. The model reveals that children riding in automobiles are less likely to be restrained, drivers who use seat belts are far more likely to restrain their children, and 1- and 2-year-olds are less likely to be restrained.

2.3.2 Generalized estimating equations (GEEs)

2.3.2.1 The form of GEEs

McCullagh and Nelder (1989) introduced the Generalized Linear Model (GLM) for exponential family data with the form

$$fy\,(y, \theta, \phi) = \exp\ \{ f(y\theta - b(\theta))/a(\phi) + c(y, \phi) \}\ ,$$

where $a(\ )$, $b(\ )$, and $c(\ )$ are given, θ is the canonical parameter, and ϕ is the dispersion parameter. The GLM is then given by

$$g(\mu_i) = g(E[Y_i]) = x_i'\beta\ ,$$

where x_i is a p x 1 vector of covariates for the i^{th} subject, and β is a p x 1 vector of regression parameters. One of the attractive properties of the GLM is that it allows for linear as well as non-linear models under a single framework. It is possible to fit models where the underlying data are normal, inverse Gaussian, gamma, Poisson, binomial, geometric, and negative binomial by suitable choice of the link function $g(\ )$ (Hilbe, 1994).

Liang and Zeger (1986) and Zeger and Liang (1986) introduced generalized estimating equations (GEEs) to account for the correlation between observations in generalized linear regression models. One aspect of the approach builds upon previous methods of variance estimation developed to protect against inappropriate assumptions about the variance (Huber 1967; White 1980, 1982). The GEEs method is an extension of the generalized linear model, and is applicable in the analysis of correlated discrete outcome data (Liang and Zeger, 1986). The appeal of GEEs is the interpretation of the data is the same as when a model that assumes independence is used, yet it is a valid method for correlated data (Zeger and Liang, 1992). GEEs are often used when analyzing longitudinal or nested data. Several previous studies have examined the use of GEEs in the analysis of longitudinal injury-related and illness-related data. For example, Williamson et al. (1996) found when modeling longitudinal injury data under certain circumstances the use of GEEs resulted in different conclusions compared to logistic regression. While Williamson's study addressed correlation of observations taken over time, motor vehicle crash data consist of correlated data at one point

in time. Diggle, Liang, and Zeger (1994) provided a detailed review of marginal models as well as other approaches, which including random effects models and transition models.

Let Y_{ij}, $i = 1,\ldots..,\ n;\ j = 1,\ldots\ldots,\ t$ be the jth outcome for the ith subject, where we assume that observations on different subjects are independent, though we allow for association between outcomes observed on the same subject. In the GEEs setting, we are not assuming that Y_{ij} is a member of the exponential family, but we are assuming that the mean and variance are characterized as in the GLM. We assume the marginal regression model

$$g(E[Y_{ij}]) = x_i^{'}\beta,$$

where x_{ij} is a p x 1 vector of study variables (covariates) for the i^{th} subject at the j^{th} outcome, β consists of the p regression parameters of interest and $g(\ )$ is the link function. Common choices for the link function might be $g(a) = a$ for measured data (the identity link) $g(a) = \log(a)$ for count data (log link), or $g(a) = \log(a/(1-a))$ for binary data (logit link). GEEs have been a popular approach to regression model fitting for this type of data. In the case of a binary data with the logit link, it will be that

$$\log(E[Y_{ij}]/(1 - E[Y_{ij}])) = x_i^{'}\beta,$$

which implies that

$$E[Y_{ij}] = \mu_{ij} = \exp(x_{ij}^{'}\beta)/(1 + \exp(x_{ij}^{'}\beta),$$

and if the outcomes are binary, it will be that

$$\mathrm{var}(Y_{ij}) = V_{ij} = \exp(x_{ij}^{'})/(1 + \exp(x_{ij}^{'}))^{2},$$

In addition to this marginal mean model, it is needed to model the covariance structure of the correlated observations on a given subject. Assuming no missing data, the t x t covariance matrix of Y_i is modeled as

$$V_i = \phi A_i^{1/2} \mathrm{R}(\alpha) A_i^{1/2},$$

where A_i is a diagonal matrix of variance functions $v(\mu_{ij})$, and $\mathbf{R}(\alpha)$ is the working correlation matrix of Y_i indexed by a vector of parameters α.

2.3.2.2 Specification of working correlation matrix

There are a variety of common structures that may be appropriate to use to model the working correlation matrix. In general if the number of observations per cluster is small in a balanced and complete design, then an unstructured matrix is recommended. For datasets with mistimed measurements, it may be reasonable to consider a model where the correlation is a function of the time between observations. For datasets with clustered observations, there may be no logical ordering for observations within a cluster and an exchangeable structure may be most appropriate. Comparisons of estimates and standard errors from several different correlation structures may indicate sensitivity to misspecification of the variance structure. For both the independence working structure and the fixed working structure, no estimation of α is performed. It is noted that use of the exchangeable working correlation matrix with measured data and identity link function is equivalent to a random effects model with a random intercept per cluster.

2.3.2.3 Empirical and model based variance estimators

Zeger and Liang (1986) referred to $\mathbf{V}i$ as a working matrix because it is not required to be correctly specified for the parameter estimates and the estimated variance of the parameter estimates to be consistent (as long as the mean model itself is correct and there is no missing data). However, Liang and Zeger (1986) showed that there could be important gains in efficiency realized by correctly specifying the working correlation matrix. Sets of estimating equations are solved, through an iterative process, to find the value of the estimator β. An empirical variance estimator can be used to estimate var(β). This variance estimator is also referred to as a robust estimator. Another variance estimate available from GEE models is the model-based estimate, which is consistent when both the mean model and the covariance

model are correctly specified. Since in general the analyst will not know the correct covariance structure, the empirical variance estimate will be preferred when the number of clusters is large. When the number of clusters is small, say < 20, the model based variance estimator may have better properties (Prentice 1988) even if the working variance is wrong. This is because the robust variance estimator is asymptotically unbiased, but could be highly biased when the number of clusters is small.

2.3.2.4 Missing data issues

Longitudinal or clustered studies often have missing data, either by design or happenstance. If a litter in a teratology study is the level of clustering, litter size may vary between litters. If the missingness can be thought of as being missing completely at random in the sense of Little and Rubin (1987), then the consistency results established by Liang and Zeger (1986) hold. However, the notation and calculations for arbitrary missing data patterns are more complicated than in the balanced and complete case. Robins, Rotnitzky, and Zhao (1995) proposed methods to allow for data that is missing at random. Their inverse probability censoring weight approach requires that the missingness law be modeled, and that weights corresponding to the inverse probability of missingness be included in the GEEs. This will yield consistent parameter estimates, but the variance will tend to be incorrect. Unfortunately, the method of Robins et al. (1995) only works well when there is dropout. That is, once a subject misses a time, that subject is not seen again. Often subjects miss a single observation, and then are seen at the next time. In summary, when fitting GEEs, the analyst must consider not only the model for the mean, but also the model for the variance and the underlying missingness process.

Chapter 3 The ALLR policy

A driver who holding a driver's license in Taiwan is required to obey the Regulation of Road Safety as well as the Regulation of Freeway Traffic Management while driving his/her vehicle on the road. Once the driver breaks these regulations, the driver and/or his vehicle will be punished according to the Road Traffic Safety and Penalty Act. There are two kinds of sanctions. One is vehicle-based, and the other is driver-based. In the vehicle-based sanctions, penalty varies depending on the level of traffic violation; it may include detaining the license plate of vehicle for some periods, suspending vehicle license plate for some periods and revoking vehicle license plate forever.

In the driver-based sanctions, the penalties include fining, cumulating traffic violation scores, prohibiting driving at the scene, suspending the driver license for a period, and suspending the driver license forever. Among these penalties, ALLR is the most serious one and makes the drivers have no chance to get their licenses back no matter how they revise their attitudes and correct their behaviors. In other words, the present driver license suspension policy in Taiwan has no rehabilitative design for those people who were punished by ALLR.

3.1 The development of the law

During last thirty years, the democratization of Taiwan was not mature enough and the social system was significantly influenced by the martial law. The car was not popular and the car ownership was quite low at that time. The most popular transportation tools were bicycles, motorcycles and buses. The evaluation of social function was emphasized on the order of society, the safety of traffic, and the security of nation. Under such kind of circumstance, the law of driver license suspension was expanding both in lifetime and a certain period. The longest period suspension is ALLR.

Taiwan has grown rapidly over the last thirty years, with increasing numbers of motor

vehicles resulting in a higher frequency and severity of traffic safety problems. In most countries there are two ways of revoking a driver's license: one is ALR and the other is judicial license revocation; only the former is imposed in Taiwan. Because of the lingering influence of the martial law, abolished in 1987, and the rigorous need to limit traffic accidents, the authorities in Taiwan have continued to believe that rigorous punishment can reduce traffic violations. Thus, sanctions have been adopted for offenders who commit hit-and-run offences, causing death/or injury or drunk driving causing death/or serious injury, which include criminal penalties, civil compensation and ALLR.

The ALLR policy in Taiwan was started in 1968. The Article 55 of the Road Traffic Safety and Penalty Act: The man, who used a vehicle to commit a crime and was sentenced to a certain criminal penalty, whose driver license will be revoked whole his/her lifetime. The articles of such penalty have been broadly increased during the past thirty years from only one article in 1968 to nine articles in 2001. These nine Articles are: (1) did not make the payment at a toll station and caused the clerk death/or injury; (2) overloading vehicle length/or width/or height caused death/or serious injury; (3) drove vehicle with breathing alcohol concentration exceeding 0.25 mg/dl, or taking drug and caused death/or serious injury; (4) crashed and caused death/or serious injury and rejected to do the alcohol test; (5) professional driver committed a crime during his operation time and was sentenced to guilty; (6) violated the regulation of railway level crossing and crashed; (7) drove a car to commit a crime and was sentenced to guilty; (8) resisted the checking of traffic police and caused death/or injury; (9) committed a hit-and-run offence and caused death/or injury.

The number of ALLR Article was only one in 1968 and increased to nine in 2001. However, the authority revised the law and increased the articles in the past was only based on the belief that the more chaos the traffic condition is, the more rigorous law should be applied. The possible impacts on the human rights of people punished by ALLR were not

carefully considered in each law revision. Present nine Articles for ALLR can be classified into eight items that showed in Figure 3 and summarized in Table 2.

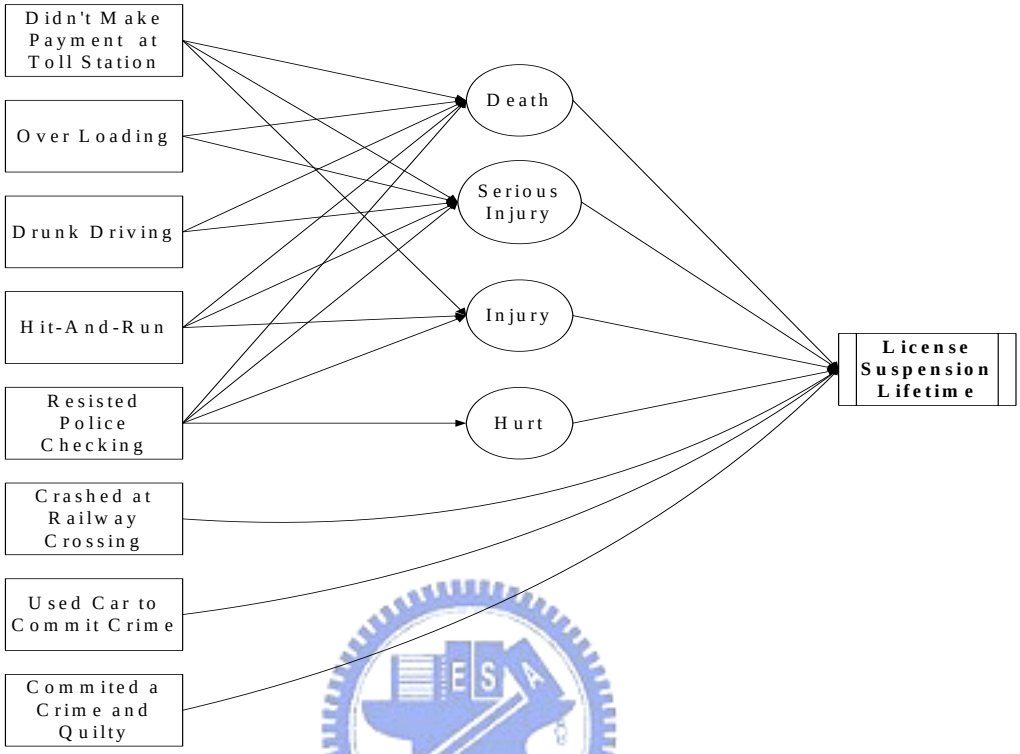

Figure 3: Traffic violations resulting ALLR

Table 2: Present Articles for ALLR (January, 2001)

Articles	Contents	Time of Revision
27-2	Did not make the payment at a toll station, bridge, tunnel, or ferry, and caused clerk death/or injury, suspending the driver license whole lifetime.	January 1997
29-4	The car was overloading vehicle length/or width/or height, and caused death/or serious injury.	January 2001
35-1	Drove vehicle with breathing alcohol concentration exceeding 0.25 mg/dl, or using drug and caused death/or serious injury.	January 1997
35-3	Crashed and caused death/or serious injury and rejected to do the alcohol test.	January 1997
37-2	Professional car driver committed a crime during his operation time and was sentenced to guilty.	July 1981
54	Violated the traffic regulation of railway level crossing and crashed.	July 1975
61-1-1	Drove a car to commit a crime and was sentenced to guilty.	February 1968
61-1-2	Resisted the checking of traffic police and caused death/or injury.	July 1975
62-1	Hit-and-run and caused death/or injury.	July 1975

3.2 Current results of ALLR implementing

According to official statistics, there were around 3000 drivers whose driver licenses

were suspended in Taiwan during the period from 1993 to 2002. It implies that about three hundred drivers were deprived their rights to drive lifetime each year during the past ten years. However, this amount is getting higher in recent three years and about 800 cases per year. Within them, there are two major groups. One is hit-and-run and results death/or injury, and another is drunk driving and causes death/or serious injury.

In Taiwan, a driver who commits a hit-and-run offence causing death or injury or a drunk driving offence causing death or serious injury, will be prosecuted by a public prosecutor and awarded a criminal penalty of up to 5 years in jail. However, a hit-and-run offence not causing serious injury may not always be determined as criminal, it depends on whether or not the victim seeks court action. Similar to a criminal penalty, civil compensation varies with the consequences of the accident. The primary aim of ALLR, a driver-based sanction, is to revoke driving privileges and keep offenders off the road forever. In the present licensing system design they have no opportunity for rehabilitation. In other words, offenders have no chance of being rehabilitated or of having their driving privileges reinstated, regardless of how much they have corrected their behaviors or have the desire to abide by the laws of the road and society. Moreover, according to the present ALLR regulations, all privileges of operating motor vehicles, including cars, buses, trucks, motorcycles etc. are revoked at the same time.

Chapter 4 The trend of constitutional interpretation on ALLR

The principle of proportion, to be a measurement of examining whether a sanction violates the Constitution or not, can be divided into three sub-principles including: (1) the principle of appropriateness; (2) the principle of necessity; (3) the principle of proportion in a narrow sense. In a criminal legislation, the principle of appropriateness represents the meaning of ‘arbitrarily punishment prohibition’, the principle of necessity represents the meaning of ‘a humble punishment’, and the principle of proportion highlights a spirit that a punishment may correspond the principle of appropriateness but still needs to view whether the punishment is too sever. It is so-called ‘a severe punishment prohibition’.

According to the Constitutional Interpretation No. 531, the Article 62 of the Road Safety Act is on the aim of protecting traffic safety as well as road users’ life, personal safety and property. Schünemann, a criminal jurisprudence scholar, expressed that the crime of hitting-and-running in Taiwan Criminal Act is similar to Article 142 of the Germany Criminal Act. It may not violate the Constitution, however, it may be near to violate the Constitution. Suie (2000) expressed that it has violated the Constitution. Followings are on the view of committing a hit-and-run offence and being punished by ALLR, to explore the relationship of ALLR and the Constitution.

4.1 The relationship of ALLR and the privilege against self-incrimination

The Road Safety Act Article 62 requires the accident driver must report to the police, it is so-called ‘the obligation of introduce’ or ‘the obligation of report’. The driver can’t leave the scene; in the case of leaving the scene, he/she must return to the scene, it is so-called ‘the obligation of return’. All these obligations are not corresponding to the principle or trend of the Constitution. This principle in American is so-called the Privilege Against Self-incrimination, or “no person shall be compelled in any criminal case to be a witness against himself”. According to the Constitution of Germany, this principle is included in

human dignity and to ruled by the law (Schünemann, 2000). Hiding and escaping after committing a crime is a legal behavior, which permitted by the Criminal Act in most of countries (Suie, 2000). Most of jurisdiction systems in the world are similar that guilty or no guilty is triggered by the procuratorial organ to investigate and sentence by the court or jury. A suspect to seek a non-guilty sentence for his/her commitment is extremely normal and legal. Thus, the concept that the State cannot compel a suspect to proof himself and be guilty is largely implemented in most of developed countries. For example, the Constitution of America Article 5 states: “No person shall be compelled in any criminal case to be a witness against himself. Except for a suspect is willing to make a statement, the State can not compel a suspect to make a statement; while the State compels a suspect to make a statement, the suspect has the right to reject”. It is so-called ‘the right to silence’ (Wang, 1999). It is a concrete manifestation of ‘the privilege against self-incrimination’. Moreover, in the modern countries such as the United Kingdom, America, Japan, Germany and Singapore…etc., before the State or authority declaring the suspect has the right of silence, the suspect’s statement has no the power of evidence. In other words, in the case that the State or authority doesn’t inform the suspect has the right of silence; the State or authority cannot use such evidence to against the suspect (Ju, 1994).

Using ‘the obligation of introduce’ or ‘the obligation of return’ to compel a crash driver provides the information which may cause a burden on such driver. If such information is only used to issue a fine in a traffic violation, it may not against ‘the principle of the privilege against self-incrimination’. However such information may be used in a criminal case e.g. desertion, attempted homicide, hit-and-run, innocent homicide and innocent hurt…etc. And it may lead to a situation that the State triggers a suit procedure to prosecute for crash driver's criminal liability (Schünemann, 2000). It may violate ‘the principle of the privilege against self-incrimination’.

4.2 The relationship of ALLR and the principle of equality

To request a hit-and-run offender stay at the scene and report to the police may violate 'the principle of the privilege against self-incrimination', such offender may not be treated equitably while comparing with other serious crimes. In other words, such offender may be discriminated (Hsu, 2000). In a crime of homicide, hurt, arson…etc., the victims usually need to be rescued from an emergent situation. However, the Criminal Act never requests such offender stay at the scene, report police, and rescue the victims. Moreover, there is no other punishment while offender violates such obligations. The Road Traffic safety and Penalty Act Article 62 compels the driver who involves a crash shall stay at the scene ant report to the police. Comparing these serious offences, a crash is a minor offence and usually owing to neglect but not a deliberate intention. Thus, to request a minor wrongful offender more and a serious illegal offender less may violate the principle of equality.

4.3 ALLR and the principle of propriety

Directly to restrict people's basic rights such as the right of freedom, the right to work and the right of property shall explore whether these restrictions consist with the content of the Constitution, Article 23. Although the Constitutional interpretation No. 531 is of the opinion that the Article 62 of the Road Traffic Safety and Penalty Act is on the aim of enhancing traffic safety, protecting normal users' profit and maintaining social order and doesn't violate the Constitution Article 23. However, whether such sanction has effects on enhancing traffic safety is still unclear, opinions vary by different jurists. He who holds a negative opinion usually thinks there is no relationship between stay at the scene and traffic safety promotion. While a driver be noticed that he/she will be punished for involving a crash and running. It may make them stay at the scene and report to the police, however, it seems have no relationship with operating vehicle carefully. An arbitrary punishment usually come from the concept of a rigorous penalty is effective in troubled times. In realty, the level of

punishment usually has no relationship with the incidence of crimes. Therefore, the concept of using a criminal punishment to pre-deter an illegal behavior may lack of conviction. In other words, to increase the criminal punishments is useless for decreasing a crime incidence (Lin, 1995). Except this, from the number of ALLR cases in resent years, it also didn't show that such punishments have positive relation with the principle of corresponding with the aim.

4.4 ALLR and the principle of necessity

To restrict people's basic rights directly except needing to accord the Constitution Article 23, another important requirement is to fit the principle of necessity. If a behavior certainly will endanger the social order seriously, it is needed to consider adopting administrative sanction first, before using criminal penalty (Lee, 2000). To adopt criminal penalty untimely usually may violate the principle of differentiation between the jurisdiction and administration (Lee, 2001). Adopting a criminal penalty by a serious incarceration only exists in German, Taiwan and few other countries. If the Criminal Act Article 185-4 is on the aim of protecting public profits and avoiding public danger, therefore, any crash offence no matter the victims dead/injury or not, the driver can't leave the scene. In other words, the essence of causing death or injury in the Road Traffic Safety and Penalty Act Article 62 is a wrong arrangement (Lin, 2000). If the sanction is on the aim of protecting the life or body of the victim, there is no necessity of rescuing in a fatal crash case. Moreover, to protect the profit of life of body, there have crime penalties of desertion, attempted homicide, innocent homicide and innocent hurt. It seems no need to legislate a crime penalty of hitting-and-running. In the item of causing injury, it is hard to discriminate whether the injury is manifest or not. For example, is a scrape or bruise an injury? There are various injuries may happen in a traffic crash, however, it lacks a clear definition of injury. Thus, revoking a driver's license depend on 'injury' may violate the principle of necessity.

4.5 ALLR and the principle of proportion

To condemn a hit-and-run offence is for the reason that the offender violates the obligation of rescuing or breaks a traffic ethics. Nevertheless, to condemn a desertion in a fatal crash is meaningless; even in an injury crash, the victims usually have abilities to seek help and may not have the problem of desertion. Therefore, the crime of desertion actually only exists in the situation of serious injury. However, to revoke a driver license regardless these different reasons seems violate the principle of proportion. Except this, in the case of no fatality or injury crash, the driver can avoid the sanction of hitting-and-running also seems violate such principle (Lin, 1999). In General, on the viewing point of condemning a crash driver stay at the scene but fail to control the scene and avoid possible consequent crash shall be treated equitably. Most of accidents are owing to neglect but not intention. A driver who causes somebody hurt and leaves the scene owing to careless is not rare. Even the driver who knows the accident occurred but leave the scene for the reasons of scaring or panic are also commonly happened. To revoke such drivers' license a certain period may be proper and effective. However, to revoke such drivers' license whole lifetime may violate the proportion principle of constitution.

Chapter 5 Empirical study

5.1 Materials and methods

5.1.1 Data source

The area of Taiwan is 36 000 square kilometers. In 2004, the population was approximately 22.7 million, with a population density of 620 inhabitants per square kilometer. The number of motor vehicles was 6.0 million (excluding motorcycles) with one car for every 3.8 persons. The number of drivers' licenses issued was approximately 10 million (excluding motorcycles), with 6% being professional licenses. We collected data from offenders involved in both hit-and-run offences causing death/or injury, and drunk driving offences causing death/or serious injury, who had been punished by ALLR. From 1993 to 2002, 2554 drivers were punished by ALLR. Among these offenders, around 70% were hit-and-run cases and 30% were drunk-driving cases; 21% were drivers who held professional licenses.

5.1.2 Data collection

In order to keep in touch with all ALLR offenders, a two-stage survey was conducted, with the assistance of all 7 Departments of Motor Vehicles (DMV) in Taiwan. In the first stage, two waves of questionnaire surveys were conducted. In the first wave, questionnaires were mailed directly to the 2554 ALLR offenders in September 2003. In the second wave, the same questionnaire was mailed to offenders who had not responded to the first wave. In order to increase the response rate we conducted a telephone follow-up, if the offender's phone number was in the DMV database. Offenders were asked to return their questionnaires and leave their current telephone numbers, if they were willing to be interviewed by a follow-up telephone contact. Specifically, the comprehensive questionnaire included questions such as: (1) Basic personal characteristics at the time of survey: gender, age, marital status, income, education, license category before revocation, having dependents to take care of or not etc.; (2) Penalty status: criminal penalty, civil compensation and duration of ALLR; (3) Relative

driving frequency under ALLR, classified into five groups, namely, same frequency, slightly less frequency, fairly less frequency, much less frequency and completely giving up driving; (4) The reasons for driving under ALLR, including because of job activities (e.g. working and commuting) as well as family activities (e.g. shopping, traveling for touring/or leisure, visiting relatives/or friends and driving kids) and driving alterations under ALLR (reduced driving frequency, dodged police road checks, changed driving routes, shifted in driving time, avoided daytime driving and others). For more detail of the offenders' basic personal characteristics, the offenders' age was a continuous variable; incomes were classified into 8 groups including under 10 thousands NTD, 10 to 20 thousands NTD, 20 to 30 thousands NTD, 30 to 50 thousands NTD, 50 to 80 thousands NTD and more than 80 thousands NTD; educations were including elementary school, junior high school, high school, college and graduate school; license category before revocation included ordinary license and professional license; having dependents to take care of or not included the number of dependents that offenders had to take care. As to penalty status, the collecting information of criminal penalty included weather offenders had been incarcerated or probated; the levels of civil compensation were divided by three groups, based on the accident cases were injury, serious injury or fatal crash, namely under 30 NTD, 30 to 150 NTD and more than 150 NTD. Furthermore, in order to obtain an accurate estimation of the mileage driven by ALLR offenders, both before and after revocation, a telephone interview was conducted by trained personnel in the second stage of the survey. This interview was mainly used to measure the annual mileage driven by the offenders, both before and after ALLR. We compared the driving frequency given by the offenders in the first stage of the questionnaire survey with the driving mileage obtained in the second (telephone) stage of the survey. Only consistent samples were included in the final analysis. The data collection procedure was showed as Figure 4.

The percentage of questionnaires returned unclaimed by the postal service due to invalid addresses was 32%; in all 895 questionnaires were collected. When the questionnaire return rate was corrected for those returned unclaimed, the actual return rate was 52%; 768 offenders completed the two-stage survey effectively, and these documents were used in the final analysis.

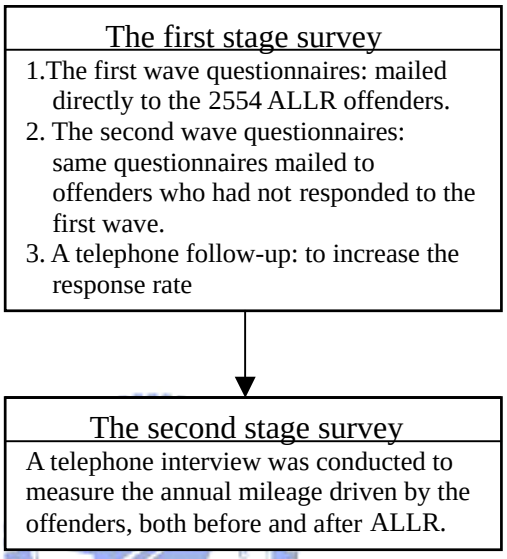

Figure 4: Data collection procedure

Simple cross tabulations were adopted to categorize the collected and no-response offenders by jurisdiction, hit-and-run/drunk driving offences and professional/ordinary licenses. The results showed no significant difference between collected and no-response offenders by the 7 jurisdictions, as well as hit-and-run or drunk driving participants. Although the proportion (23.7%) of respondents who had held professional licenses was slightly higher than for the population as a whole (21%), the difference was not significant. We believe therefore that no significant bias existed in either the survey areas or the participant groups.

5.1.3 Measures and variables

5.1.3.1 The measurement of the compliance of ALLR as a whole

In general, by comparing the driving frequency and mileage driven before and after ALLR for all offenders, the compliance of offenders who had received ALLR could be

reasonably measured. Thus, two kinds of information, related to offenders' driving exposure in response to ALLR, were collected and applied to measure the effectiveness of ALLR in this study. One was the relative driving frequency after ALLR compared to the situation before ALLR. The other was mileage driven, before and after ALLR, respectively. Since relative driving frequency after ALLR was collected in five groups, it is easy way to compare these five groups and show five different compliances with the restriction of ALLR. However, our emphasis is not on the differences between these five driving groups, instead, we focus on exploring who had complied with the ALLR penalty and who had not. Therefore, we defined offenders who significantly reduced their driving exposure after ALLR were represented as having complied with the penalty. And offenders who had no reduction, or had only minimally reduced their driving exposure, were defined as not having complied with the penalty. Based on such definition, we therefore combined the same driving frequency and the slightly less frequency groups into the almost same driving group, which represented those who had not been influenced by the ALLR penalty. On the other side, we combined the less frequency and much less frequency groups into the reduced driving group, together with those who had completely given up driving, to represent those who had been significantly influenced by the ALLR penalty. The average annual kilometers driven, both before and after the imposition of ALLR, were provided by the interviewed offenders. By comparing the driving frequency and mileage driven before and after ALLR, the compliance of offenders who had received ALLR could be reasonably measured.

5.1.3.2 The measurement of the compliance of ALLR for different driving groups

To gain further insight into the relationship between compliance with ALLR for different driving groups, a logistic regression model was called for. Since we were not emphasizing on the differences between five different driving groups, but focused on exploring who had complied with the ALLR penalty and who had not. Therefore, we didn't adopt the multiple

logistic models to explore the differences between different five driving groups. Instead, we conducted two logistic regression models separately to look insight into offenders who had significantly complied with the ALLR penalty and who had not, in three different driving groups hierarchically. Figure 5 shows the procedure of measuring offenders' compliance with ALLR.

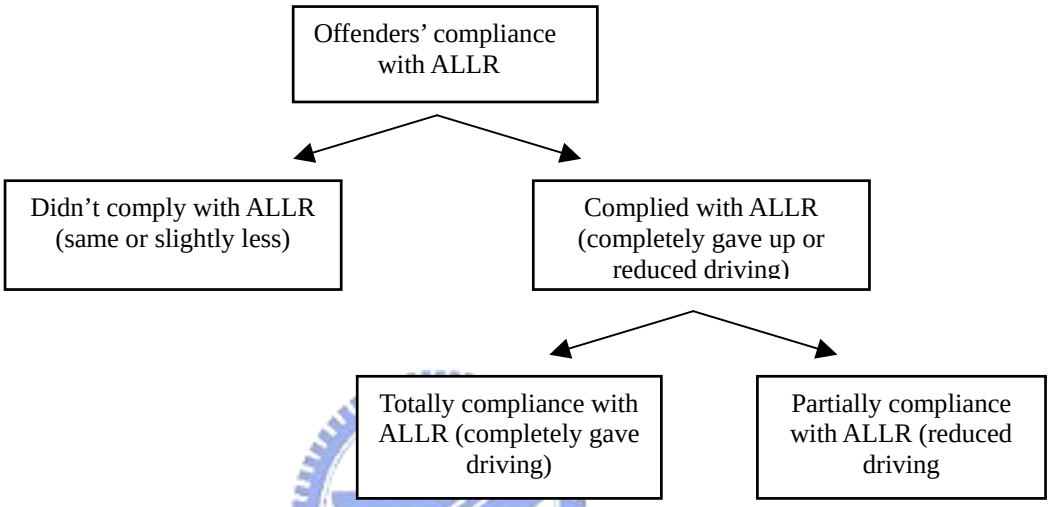

Figure 5: The procedure of measuring offenders' compliance with ALLR

(1) Two logistic regression models

In the first logistic regression model, the outcome variable was set to one while offenders belonged to "the same or slightly less frequency group, and the outcome variable was set to zero while offenders belonged to "the others". In the second logistic regression model, the outcome variable was set to one while offenders belonged to "completely gave up driving group", and the outcome variable was set to zero while offenders belonged to "reduced driving group".

Most people need to travel to fulfill certain economic and social activities; however, dependence on a vehicle can vary from one person to another. Based on this fact, offenders might be expected to drive very little, while under ALLR suspension, fulfilling only the least possible driving requirements. Therefore, we explored the driving activities that seemed to be

the most necessary to offenders, among job-related activities (e.g. working, commuting) and family-related activities (e.g. shopping, visiting relatives/friends, leisure travel and driving kids etc.).

Besides the driving activities which offenders need to fulfill their economic and social necessities. Some other characteristics of offenders may also affect offenders' compliance with ALLR. Therefore, both the explanatory variables for two logistic regression models were comprehensive designed that including: (1) ALLR offenders' personal characteristics such as gender, marital status, average monthly income, education, license category and having dependents to take care of; (2) Penalty status such as criminal penalty, civil compensation and duration of ALLR; (3) Reasons for driving such as working, commuting, shopping, leisure travel, visiting relatives or friends and driving kids.

All these specific characteristics were expected to be different between the three driving groups that demonstrated quite different responses to the ALLR sentence. By the way of developing two separate logistic regression models: the first compared the "almost the same frequency" group to all the other offenders, while the second compared those who had completely given up driving to the "reduced driving" group. In this way we could differentiate between groups, while using an odds ratio concept to determine those factors affecting the behavior of offenders, in response to ALLR. We expected these two logistic regression models to support our hypothesis, that these factors would influence offenders' compliance with ALLR and affect the behavior of offenders in response to ALLR. All the offenders' personal characteristics, (gender, age, marital status, income, education, license category, having dependents to take care of), penalty status (incarceration, civil compensation, duration of ALLR) and reasons for driving under ALLR (working, commuting, shopping, traveling for leisure, visiting relatives/or friends, driving kids, etc.) are shown in Table 3. However, the reasons for the driving explanatory variables were not applied to the differentiating model,

which compared the offender group that had completely given up driving after ALLR, to the reduced driving group.

Table 3: Description of explanatory variables for two logistic regression models

Variable type	Variable title	Variable description	
		Model 1 Same or slightly less frequency group vs. the others	Model 2 Completely gave up driving group vs. reduced driving group
ALLR offenders' personal characteristics	Gender	Gender (male=1)	Gender (male=1)
	Age	Age ≤ 40 (yes=1)	Age ≤ 40 (yes=1)
	Marital status	Married (yes=1)	Married (yes=1)
	Average monthly income	≤ 30 000 NTD (yes=1)	≤ 30 000 NTD (yes=1)
	Education	Collage and up (yes=1)	Collage and up (yes=1)
	License category	Professional (yes=1)	Professional (yes=1)
	Having dependents to take care of	Having dependents to take care of (yes=1)	Having dependents to take care of (yes=1)
Penalty status	Criminal penalty	Incarcerated (yes=1)	Incarcerated (yes=1)
	Civil compensation (1 000 NTD)		
	Civil compensation (1)	<300 (yes=1)	<300 (yes=1)
	Civil compensation (2)	300 ~ 1 500 (yes=1)	300 ~ 1 500 (yes=1)
	Duration of ALLR	≤ 3 years (yes=1)	≤ 3 years (yes=1)
Reasons for Driving	Working	Working (yes=1)	--
	Commuting	Commuting (yes=1)	--
	Shopping	Shopping (yes=1)	--
	Leisure travel	Traveling/touring (yes=1)	--
	Visiting relatives/friends	Visiting relatives/fri. (yes=1)	--
	Driving kids	Driving kids (yes=1)	--

5.1.3.3 The measurement of the driving mileage for ALLR for offenders both before and after ALLR

Exploring the determinant factors that forced offenders to fully comply with the ALLR and totally give up driving, to partially abide by ALLR and reduce driving, or to completely ignore the punishment and drive almost the same as before the ALLR, is not sufficient to get a whole picture of the effectiveness of ALLR. This is because all the findings are based on the phase of post-ALLR. Moreover, the groupings of driving frequencies were made according to the subjective beliefs of the offenders. For traffic authorities, it is valuable to comprehend the driving exposure as well as the driving pattern of those offenders who didn't comply with the ALLR, both before and after ALLR. After the mileages driven both before and after ALLR were investigated, a multivariate regression model, Generalized Estimating Equations (GEEs)

(Liang and Zeger, 1986; Hardin and Hilbe, 2003), was used to determine the association between the mileage driven by the offenders and potential explanatory factors.

The outcome variables of the GEE model included the mileage driven per year by the offenders both before and after ALLR. The candidate factors thought to influence the mileage driven by the offenders were the same as those in the logistic regression models. By using this multivariate regression procedure in which the mileages driven, both before and after ALLR, of each respondent (cluster) are grouped together as a multivariate outcome, a variety of correlation patterns to account for the correlations between observations within a cluster (respondent). Moreover, an indicator variable representing the group membership (i.e. the almost same driving offenders or the reduced driving offenders) can be used in the model. Its main effect and interaction effects with other variables will indicate the difference in the driving patterns between the two groups. Finally, an indicator variable of post-ALLR in this model will reflect the mileage change after the ALLR, which can be used to measure the impact of ALLR punishment.

The formula of the Generalized Estimating Equations in this study is showed as followings:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + ... + \beta_j X_j$$

$i = 1$, Y represents the driving kilometers which offenders conducted before ALLR

$i = 2$, Y represents the driving kilometers which offenders conducted after ALLR

$j : 1 \sim j$

$X_1 = gender$

$X_2 = age$

$X_3 = marital\ status$

$X_4 = income$

X_5 = *education*

X_6 = *license category*

X_7 = *having dependents to take care of*

X_8 = *incarceration*

X_9 = *civil compensation*

X_{10} = *duration of ALLR*

X_{11} = *working*

X_{12} = *commuting*

X_{13} = *shopping*

X_{14} = *traveling for leisure*

X_{15} = *visiting relatives/or friends*

X_{16} = *driving kids*

5.2 Study results

5.2.1 Basic results

Table 4 shows the basic characteristics of the study respondents at the time of the survey. These characteristics were further classified into three categories for discussion purposes, which are offenders' personal characteristics; penalty status; and reasons for driving under ALLR.

Table 4: Basic results of the sampled ALLR offenders (N = 768)

	n	%		n	%
Offenders' personal characteristics			*Penalty status*		
Gender			Incarcerated		
Male	755	98.3	Yes	71	9.3
Female	13	1.7	No	697	90.7
Age			Civil compensation (Thousand NTD)		
≤ 40	538	70.1	<300	380	49.5
>40	230	29.9	300~1 500	200	26.0

Married			>1 500	188	24.5
Yes	498	64.8	Duration of ALLR		
No	270	35.2	≤ 3 years	283	36.8
Income (NTD/month) [a]			> 3years	485	63.2
≤ 30 000	537	69.9	*Reasons for driving under ALLR* [b]		
> 30 000	231	30.1	Working	390	61.1
Education			Commuting	184	28.8
No college	631	82.2	Shopping	123	19.3
College and up	137	17.8	Leisure travel	138	21.6
License category			Visiting relatives/friends	142	22.3
Professional	128	23.7	Driving kids	188	29.4
Ordinary	640	76.3			
Having dependents to take care of					
Yes	628	81.8			
No	140	18.2			

[a] : 34 NTD = 1USD

[b]: Sample size n=639, excluding offenders who had completely given up driving offenders 16.8%, n=129

5.2.1.1 Offenders' characteristics

Among the interviewed offenders, 98.3% were male, over 70% were under 40 years of age, and 64.8% were married. Apparently, most of these ALLR offenders were among the most productive members of their families. The results also showed that approximately 70% of the respondents had an average monthly income equal to or less than 30 000 NTD, over 80% were not college educated, and over 80% had dependents to take care of; 23.7% held professional driver's licenses and 76.3% held ordinary driver's licenses, before ALLR.

5.2.1.2. Penalty status

Among the respondents, 57.9% had been found guilty; 84.0% of those found guilty had been given probation, while 16.0% had been incarcerated from 2 months to 88 months, for an average of 14.9 months. The main reasons so few criminal penalties were handed out may have been: (1) The crash had been the result of negligence, and was not intended, resulting in a limited criminal sentence; (2) The fact that most injury cases do not go through the criminal process, especially when negotiation for civil compensation has taken place; or (3) For cases entering the criminal process, the courts will often not impose a jail sentence, in order to encourage a guilty plea.

Civil compensation may be negotiated between the offender and the victim, or may be judged by the courts. The survey results indicated that 93.3% of the interviewed offenders were responsible for civil compensation, of which 81.4% were settled through negotiation between victims and offenders and 18.6% were determined by the judgment of the court. Among the levied civil compensations cases, 36.3% had caused death and the amount levied averaged 1.5 million NTD (about 44 000 USD) which is around 3 years' average income in Taiwan; 63.7% had caused injury and the amount levied averaged 300 000 NTD (about 8 900 USD).

The period of time, since their licenses had been revoked, varied from 6 months to 120 months, with an average of 53.8 months. Among the interviewed offenders, 63.2% had been deprived of the privilege to drive for more than three years.

5.2.1.3. Reasons for driving under ALLR

The reasons for driving under ALLR were classified into two categories. The first category related to job activities, including working and commuting, while the second related to family activities, such as shopping, traveling for leisure, visiting relatives or friends, and driving kids. It was found that only 16.8% of the interviewed offenders had completely given up driving, after the imposition of ALLR. For those who still drove after ALLR (83.2%, n = 639), 61.1% felt it was necessary for working, 28.8% for their daily commuting, 19.3% for shopping, 21.6% for leisure travel, 22.3% to visit relatives/or friends and 29.4% to drive their kids. A significant proportion of the interviewees drove their vehicles for more than one reason.

5.2.2 Driving incidence under ALLR

5.2.2.1 Driving exposure under ALLR

After being sentenced to ALLR, 12.6% of the interviewed offenders confessed that they drove with the same frequency as before, 10.8% drove slightly less frequently, 24.5% drove

fairly less frequently, 35.3% drove much less frequently, while only 16.8% had given up driving completely. According to the previous classifications we combined these 5 different driving groups into 3 groups; the proportions are shown in Table 5. It can be seen that ALLR only removed 16.8% of the offenders from the driving population, while the other 83.2% continued to operate vehicles.

Table 5: Percentage of the three different driving exposure groups after ALLR

Driving exposure group after ALLR	Almost same driving frequency group	Reduced driving frequency group	Completely gave up driving group
Percentage (%)	23.4	59.8	16.8

For offenders who did not stay off the roads, the average driving mileage distribution before and after ALLR can be seen in Figure 6. The diagonal line is the indifference boundary,

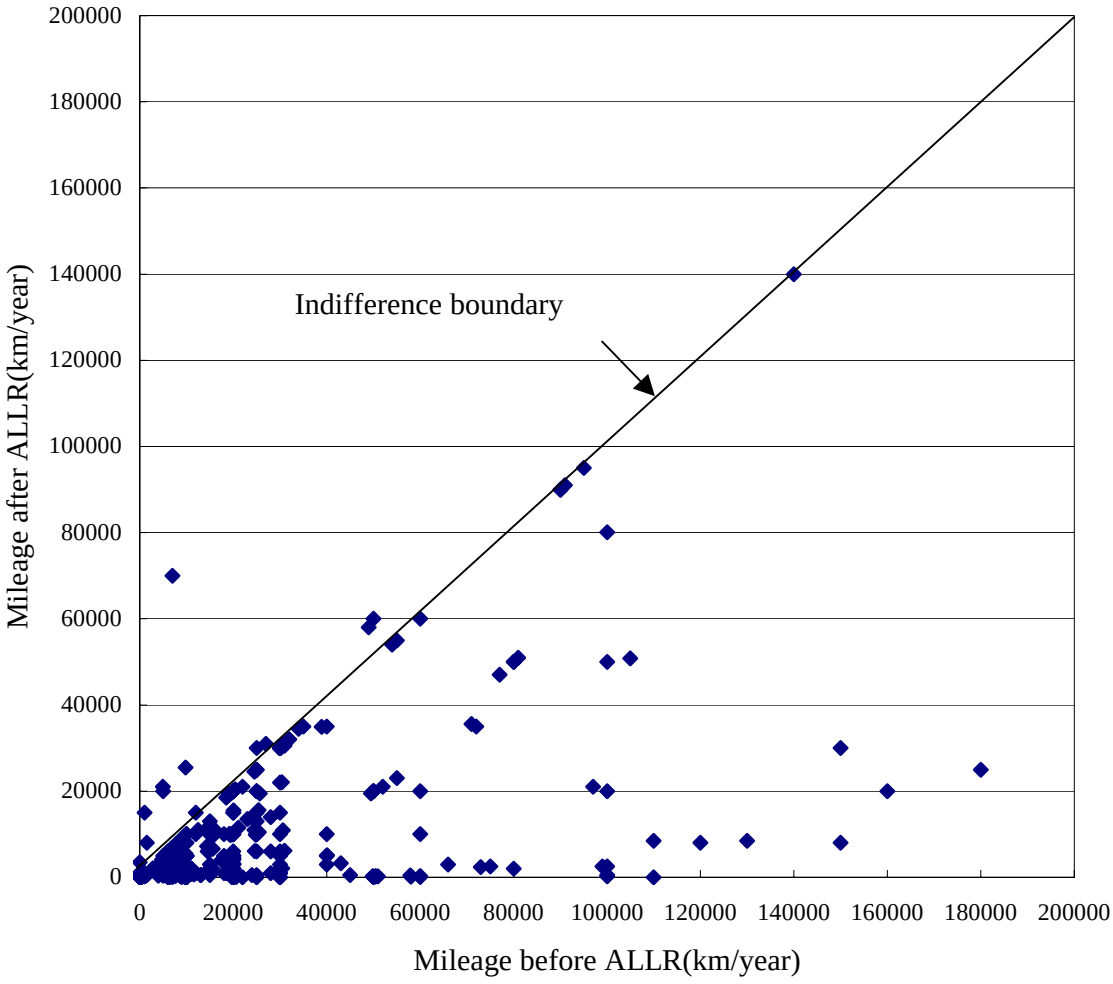

Figure 6: The mileage distribution before and after ALLR

representing the fact that their driving mileage after ALLR was the same as before ALLR. Points under the indifference boundary line represent reduced mileage after ALLR. The results show the majority being under the indifference boundary, indicating that most offenders' driving mileage after ALLR was less than before ALLR. Only a few of the offenders had a higher mileage after ALLR; these few, however, had a lower driving mileage before ALLR when compared to other offenders. Figure 7 shows a comparison of the cumulative probability of driving mileage before and after ALLR.

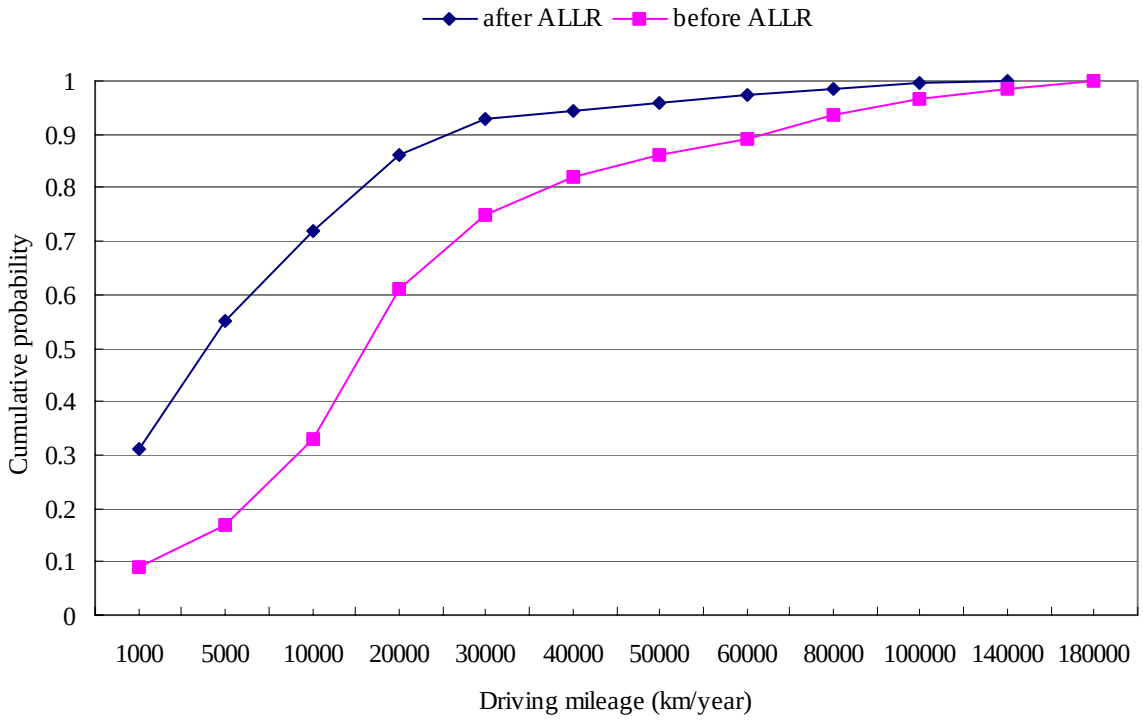

Figure 7: A comparison of the cumulative probability of mileage before and after ALLR

In order to have a clear picture of the driving exposure of ALLR offenders, before and after sentencing, the study participants were asked to give their mileage driven before and after ALLR, during the second stage of the survey. Figure 8 summarizes the average annual mileage driven, before and after ALLR, for the three categories of offenders, classified by their driving frequency after ALLR. For those offenders who said they drove with almost the same frequency after ALLR, average annual kilometers driven was 29 684 km before ALLR

and 22 147 km after ALLR, for a reduction factor of 75%. Offenders belonging to this group seemed to have high dependence on automobiles before ALLR, and continued to operate a vehicle to carry out most of their daily activities, even after ALLR. The ALLR penalty, as well as the penalty for driving while under ALLR, seemed to cause them little concern.

For the group who drove with reduced frequency after ALLR, their average annual kilometers driven were sharply reduced to 3 419 km after ALLR from 24 581 km before ALLR, for a reduction factor of 13.9%. The ALLR penalty apparently caused this category of offenders much concern, forcing them to significantly reduce their mileage. For these reduced driving offenders, they tended to drive as little as possible, only driving when there were no other appropriate or convenient transportation alternatives available.

For the 16.8% of interviewees who said they had completely given up driving after ALLR, their average annual kilometers driven had been 16 854 km, before ALLR. We found that this group of offenders had the lowest average annual mileage, before ALLR, of all driving exposure groups; this category of offenders may have been less dependent on automobiles or could have been served by other transportation alternatives.

As a whole, the average annual mileage driven before ALLR was 25 495 km, which was significantly reduced to an average of 8 750 km after ALLR. This showed that the average annual mileage driven after ALLR was significantly reduced to 34.3% of the average annual mileage driven before ALLR. Thus, ALLR did indeed have a significant impact on offenders. While most of the ALLR offenders were still driving, their driving was significantly reduced after being sentenced to ALLR.

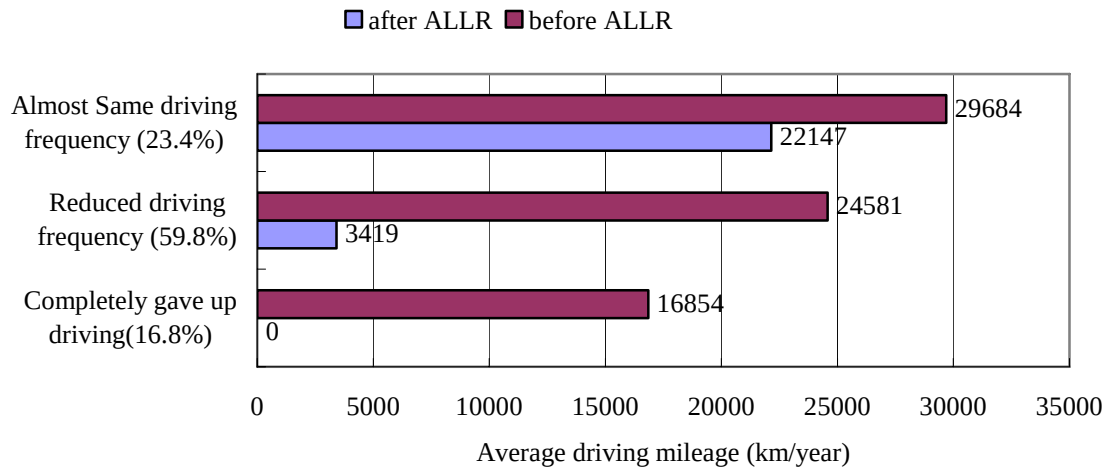

Figure 8: A comparison of mileage before and after ALLR by three different driving exposure groups

5.2.2.2 Changes in driving behavior

After ALLR, those offenders who continued to drive altered their driving behavior (Figure 9). 74.8% indicated a reduction in their driving frequency; 37.0% said that they dodged police road checks; 22.2% said they had changed their travel routes; 13.4% said they had changed their driving time; 3.0% said that they avoided daytime driving; and 8.3% adopted other modifications.

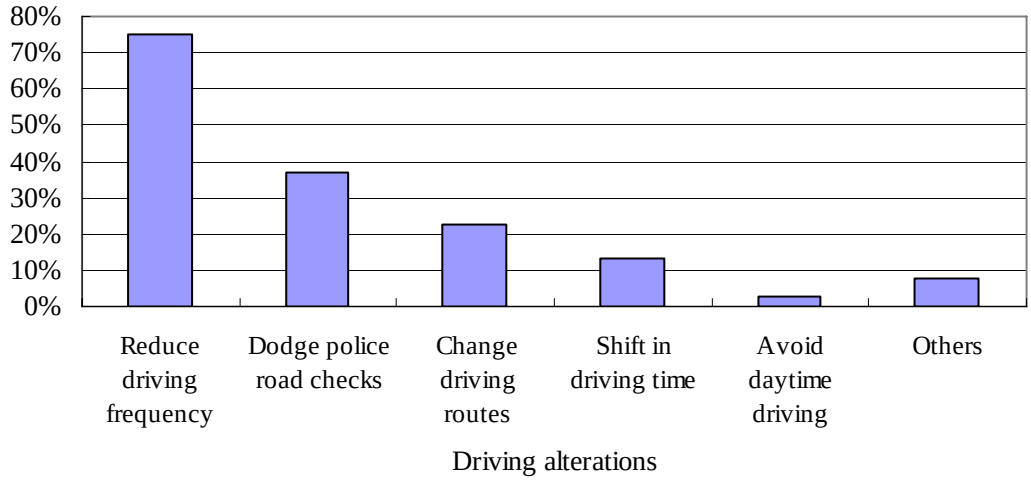

Figure 9: Driving alterations under ALLR

5.2.3 Logistic regression analysis for different driving frequency groups

In the previous section we found that the need to drive, and to fulfill some activities played an important role in determining the compliance of ALLR offenders. However, even with the same needs, offenders with different characteristics or attitudes may still comply differently with ALLR. For example, an aggressive offender may have a lower level of compliance with ALLR than someone who is conservative. In practice, knowing which influential factors may significantly affect offenders' compliance with this rigorous punishment can have value. The two logistic regression models were therefore hierarchically designed, to identify these influential factors. In Model 1, the almost same driving offenders were compared with all other offenders (i.e. the reduced driving offenders and the no-more-driving offenders) in terms of their characteristics. The almost same driving offenders were the group that practically ignored the ALLR punishment, while the reduced driving offenders and no-more-driving offenders represented the groups that complied with the punishment. The characteristics of the no-more-driving offenders were also compared to the reduced driving offenders in Model 2, in order to explore which offenders had absolutely complied with ALLR.

5.2.3.1. The findings from Model 1 – those who ignored ALLR punishment

For the purpose of formulating the binary problem, to distinguish who would continue to drive almost the same as before ALLR, the indicator variable of Model 1 was set to one if the offender was driving almost the same as before ALLR, and to zero for the other. Among the candidate variables the results showed that only the factors of age, income, penalty of incarceration, driving for work, driving for commuting and driving for shopping were significant in Model 1 (See Table 6). Offenders over 40 years of age were 82% less likely (odds ratio = 0.183) to drive with almost the same frequency, when compared to offenders under 40. Furthermore, offenders with a monthly income of over 30 000 NTD were

approximately three times more likely (odds ratio = 2.959) to drive with almost the same frequency, when compared to the offenders with a monthly income under 30 000 NTD.

The study results also showed that offenders who had been incarcerated were more than 15 times as likely (odds ratio = 15.567) to drive with almost the same frequency when compared to offenders who had never been incarcerated. This indicates that incarceration seemed to make offenders more likely to drive with almost the same frequency as before ALLR. This may be the case for the following reasons. First, offenders who had been incarcerated may be more aggressive than their counterparts; thus, incarceration had no effect on their driving habits. Second, about sixty percent of offenders were found guilty, but only twenty percent of those guilty offenders were incarcerated; the other guilty offenders had confessed their guilt and sough probation. The offenders who had been incarcerated may not have felt regret, making it unlikely they would change their driving habits, and so drove the same as usual. Third, a hit-and-run offence could be the result of aggressive speeding or because of fear of the consequence. Such offenders may have felt they had paid for their crimes by being incarcerated; therefore they would refuse to abide by the no-driving restriction under ALLR.

For the reasons for driving explanatory variables, the offenders who drove for working, commuting and shopping had an odds ratio of 7.855, 3.272 and 3.011, respectively, for driving almost the same, when compared to offenders who had none of these respective driving reasons. It was apparent that those ALLR offenders, who chose to continue operating a vehicle, did so mainly to carry out their working and commuting activities, as well as family shopping.

5.2.3.2 The findings from Model 2 – those who absolutely complied with ALLR

In Model 2, the indicator variable was set to one for the offender having given up driving after ALLR, and zero for the offender who was still driving but with significantly reduced

exposure, after ALLR. The study results showed that the age of the offender, whether the offender had been incarcerated or not, and the duration of ALLR were the three significant factors at $\alpha = 0.05$ to distinguish the no-more-driving offenders from the reduced driving offenders (See Table 6). The offenders aged over 40 were 1.88 times more likely (odds ratio = 1.879) to completely give up driving, when compared to offenders under the age of 40. The results also indicated that offenders who had been incarcerated were 3.5 times more likely (odds ratio = 3.571) to completely give up driving, when compared to offenders who had not been incarcerated.

Table 6: Estimated results for the two logistic regression models

Explanatory variables	Model 1 Almost same driving group vs. the others			Model 2 Completely gave up driving group vs. reduced driving group		
	β	*p*-value	O.R. (95%C.I.)	β	*p*-value	O.R. (95%C.I.)
Offenders' personal characteristics						
Age						
≤ 40			Reference			Reference
>40	-1.698	.000**	.183 (.073-.457)	.632	.032*	1.879 (1.056-3.356)
Income						
≤ 30000 NTD			Reference			
> 30000 NTD	1.085	.001**	2.959 (1.528-5.729)			
Penalty status						
Incarcerated						
Yes	2.745	.001**	15.567 (3.877-62.508)	1.271	.023*	3.571 (1.192-10.638)
No			Reference			Reference
Duration of ALLR						
≤ 3 years						Reference
>3 years				-1.161	.000**	.313 (.182-.539)
Reasons for Driving						
Working	2.061	.000**	7.855 (3.650-16.908)			Not applicable
Commuting	1.185	.001**	3.272 (1.650 -6.488)			Not applicable
Shopping	1.102	.009**	3.011 (1.314-6.900)			Not applicable
Constant	-3.211		.040	-.727		.483

* Significant at α=0.05; ** Significant at α=0.01

Finally, offenders whose licenses had been revoked for more than 3 years had 69% less likelihood (odds ratio = 0.313) of completely giving up driving than offenders whose licenses had been revoked for less than 3 years. Because driving while S/R can only be detected when the police stop the driver of a vehicle for committing another traffic offence (Voas and Deyoung, 2002), it is likely to make the offenders to believe that there is little danger of being

caught (Knoebel and Ross, 1997). The longer the ALLR offenders had been without their drivers' licenses, the less anxious they became and the lower their perceived risk of being stopped by the police. In addition, complying with a short revocation of their driver license may be relatively easy for most people, while a very long suspension of their driving privileges may be too much for them to endure. Both of the above reasons explain why the longer a license has been revoked, the less the ALLR offenders will refrain from driving.

5.2.4 GEE model analysis for mileage driven for still driving offenders

In this section, discovering the determinant factors affecting offenders' driving mileage both before and after ALLR, and estimating the mileage reduction as a result of the ALLR for offenders who were still driving were explored. All of the individual candidate variables, and the possible interactions between variables (e.g. the indicator variable of the group it belongs to, together with working, commuting…etc., or an indicator variable of the post-ALLR together with working, commuting…etc.) were included in the GEE model. After several trials, the result, as shown in Table 7, was considered to be the best model in terms of explanatory ability. The study results showed that personal characteristics (age, income, license category), penalty status (incarceration, high civil compensation), driving needs (work, commuting, traveling and driving kids), indicator of group membership, indicator of post-ALLR, and the interaction of license category together with post-ALLR were all significantly associated with the mileage driven.

Offenders under 40 years of age drove approximately 1 873 km a year more compared to offenders over 40 years of age. Offenders with a monthly income over 30 000 NTD drove 2 115 km/year more when compared to offenders with a monthly income under 30 000 NTD. Offenders who held professional licenses before the ALLR drove 20 400 km a year more compared to offenders who held ordinary licenses before the ALLR.

As to penalty status, incarceration and high civil compensation were significantly

associated with the mileage driven by the offenders. Offenders who had been incarcerated drove approximately 14 609 km a year more compared to offenders who had not been incarcerated. Offenders whose civil compensation was greater than 1 500 000 NTD drove approximately 5 182 km a year more compared to offenders whose civil compensation amounted to less than 300 000 NTD.

Table 7: Study results of the GEE parameters and standard error estimates

Parameter	Estimate	Standard Error	95% Confidence		Z	Pr > |Z|
			Lower	Upper		
Intercept	3596.8	1238	1167	60262	2.02	0.04*
Offenders' personal characteristics						
Male	1719	4159	-6403	9845	0.42	0.68
Age (≤ 40)	1873	758	329.6	3304	2.45	0.01*
Married	2528	2359	-2095	7153	1.07	0.28
Average monthly income (> 30000 NTD)	2115	1597	-75	4305	1.97	0.05*
Education (Collage and up)	2828	2490	-2053	7709	1.14	0.25
License category (Professional) [a]	20400	6001	8637	32164	3.40	0.0007**
Having dependents to take care of	790	834	-845	2428	0.95	0.34
Penalty status						
Incarcerated	14609	6042	2764	26453	2.42	0.02*
Civil compensation (a) [b]	5182	2112	1037	9323	2.45	0.01*
Civil compensation (b) [c]	1650	2344	-2944	6248	0.70	0.48
Duration of ALLR >3 years	1654	1905	-2079	5389	0.87	0.38
Reasons for Driving						
Working	2915	1905	-788	6681	2.38	0.02*
Commuting	1137	5630	33	2241	2.02	0.04*
Shopping	1572	2153	-2646	5794	0.73	0.46
Leisure travel	2360	1106	186	4529	2.13	0.03*
Visiting relatives/friends	1901	2139	-2272	6118	0.90	0.36
Driving kids	2304	1013	343	4315	2.30	0.02*
Group (almost same driving Group) [d]	9446	2491	4561	14331	3.79	0.0002**
Post-ALLR [e]	-11052	1706	-14698	-7867	-6.47	0.0001**
License (Professional) * Post-ALLR [f]	-20902	6647	-34148	-8089	-3.18	0.0015**

*Significant at $\alpha = 0.05$; ** Significant at $\alpha = 0.01$;

[a]: Professional license = 1, ordinary license = 0;

[b]: Civil compensation > 1500 000 NTD = 1, Civil compensation < 300 000 NTD = 0;

[c]: Civil compensation: 300 000 ~ 1 500 000 NTD = 1, Civil compensation < 300 000 NTD = 0;

[d]: Almost same driving Group = 1, reduced driving group = 0;

[e]: Post-ALLR = 1, Pre-ALLR = 0;

[f]: Professional license and Post-ALLR = 1, others = 0

Regarding driving needs: working, commuting, leisure travel and driving kids were found to be significantly associated with the mileage driven. These driving-activities contributed 2 915, 1 137, 2 360 and 2 304 km per year respectively to mileage driven by offenders. Moreover, the results showed that offenders who belong to the 'almost the same'

driving group drove 9 446 km/year more than offenders who belong to the ‘reduced’ driving group.

In general, while controlling all the other explanatory factors, offenders drove 11 052 km/year less after ALLR compared to before the ALLR. The offenders with professional licenses before the ALLR were found to significantly reduce their driving mileage by 20 902 km per year after the ALLR.

Chapter 6 Discussions

6.1 Discussion 1 -- A discussion of concept

We believe that the original purpose of ALLR is to deter the violation of aggressive hitting-and-running but not leaving the scene. Moreover, to condemn an aggressive running should by means of a judiciary process. Currently, the ALLR punishment is issued from the police. It not only exists a risk of fairness problem but also imposes an overload on police.

This study showed that current ALLR punishment, offenders have no chance to rehabilitate their driving privileges, had serious impact on offenders' basic rights including moving freedom, the right to work and the right of existence. The 'protective benefit' may not balance with the 'sacrificed benefit'. It may violate the proportion principle of constitution.

Many offenders have expressed that the ALLR punishment brought more impact than that of criminal penalty and civil compensation. It seems to violate the principle of law design. Furthermore, it may not accordance to the principle of necessity.

Request a hit-and-run offender stay at the scene and report to the police except may violate 'the principle of the privilege against self-incrimination', such offender may not be treated equitably while comparing with other serious crimes. In other words, such offenders may be discriminated. It may violate the principle of equality.

To impose a rigorous punishment on serious traffic violators was originated from the concept of retribution that commonly adopted by the police country such as the Germany. However, in most of western countries, while more emphases are on the human rights, authorities may provide more chance to rehabilitate these rights. Very few countries have imposed a very long-term license revocation. Moreover, a rigorous punishment usually accompanies a rehabilitative design. In Canada, an indefinite license suspension has imposes on serious traffic violators. However, by the concept of "three strikes and you're out", such rigorous punishment only imposes on offenders who violate serious traffic offence three times.

Moreover, a rehabilitative design was adopted. As to the ALLR in Taiwan, it seems too emphasis traffic safety to respect human rights.

6.2 Discussion 2 -- A discussion of empirical driving incidence

This study has shown that ALLR may be completely effective for only 16.8% of offenders, by compelling them to completely refrain from driving. The results also indicated that ALLR was ineffective for 23.4% of offenders, whose driving habits remained almost the same as before ALLR, and fairly effective for 59.8% of offenders who drove with a significantly reduced frequency. Overall, the 83.2% of ALLR offenders who continued to drive was higher than in previous findings, which were based on relatively short-term license S/R. There may be many reasons for this. First, offenders punished by the relatively short-term S/R may be willing to obey the licensing action and refrain from driving during their S/R period, in order to protect their future driving privileges; ALLR offenders do not have the same motivation. Second, ALLR offenders are in the worst situation possible, as they have no chance of rehabilitation of having their driving privileges reinstated, no matter how much they improve their attitudes and behaviors. Therefore, most ALLR offenders feel desperate and have little to lose by disregarding their sentence. The results of prior studies, in which participants usually under-represented their own incidences of driving, while under license S/R (e.g. Malenfant et al., 2002), may share few similarities with ALLR cases. Third, ALLR offenders were aware of the low risk of apprehension for unlicensed driving, especially after a lengthy period of revocation.

The average annual mileage driven after ALLR decreased significantly to 34.3% of the average mileage driven before ALLR. The results of linear regression showed that, for the almost same driving offenders, annual driving mileage was mainly associated with driving for working and commuting activities, as well as visiting relatives/friends and driving kids. However, for the reduced driving offenders, their annual driving mileage was only related to

trips of relatively short distances for working and driving kids. In general, ALLR seemed not to significantly persuade the almost same driving offenders group to give up driving for daily activities except for slightly less frequent shopping and leisure travel. However, it did make the reduced driving offenders cut back on their driving, not only for most activity categories, but also in the frequency and/or travel distance for those activities they felt were absolutely necessary.

The age of the offender was found to be a significant factor affecting compliance with ALLR in both Models 1 and 2. Young offenders were more likely to ignore the penalty, and to drive more frequently than older offenders after ALLR. This implies that ALLR was less effective in young offenders. This may be because young offenders are usually more aggressive, as well as needing more flexibility and mobility for driving to work, than older offenders. Furthermore, a higher percentage of offenders over 40 years of age tended to completely give up driving after the imposition of ALLR, when compared to younger offenders.

Offenders' incomes had significance in Model 1 but not in Model 2. This implies that offenders' economic conditions significantly determined their attitudes towards complying, or not complying, with ALLR. The only punishment for driving a vehicle while under ALLR suspension, is a fine of 12 000 NTD (about 350 USD). High-income offenders may feel less threatened than low-income offenders when face with the possibility of being caught while driving under ALLR. This could be the reason high-income offenders were more likely to ignore the ALLR sentence and drive almost same as before. This result also indicates that ALLR has more impact on low-income offenders than on high-income offenders. In other words, ALLR could reduce the ability of low-income earners to make a living, resulting in the exacerbation of misfortune.

Incarceration was also found to be a significant factor in both Models 1 and 2, although

the results of the two models are quite different. In Model 1 the offenders who had been incarcerated were more likely to disregard the no-driving restriction and drive the same as before. However, once they had chosen to abide by the restriction, they were more likely to completely give up driving than those who had not been incarcerated. Civil compensation was found to have no significant effect on offenders' compliance with the penalty of ALLR.

"Duration of ALLR" was found to be a significant factor in Model 2, but not in Model 1. This implies that the decision to drive almost the same as before will not increase, over time. However, for those offenders abiding by the punishment, the possibility of never driving significantly decreased over time. Because of the need to drive, while living in a modern society, as well as the low risk of being caught while driving under ALLR, it seemed to more difficult to refrain from driving as time passed. This might explain the estimated results in Model 2.

The driving purposes of working, commuting and shopping were significant in Model 1, but those variables were not applicable to Model 2. That is, the necessity to drive for working, commuting and shopping were the significant factors to ALLR offenders' in determining whether or not to abide by the penalty. Furthermore, since the female sample was extremely small in this study (only 1.7% of interviewed offenders, n = 13), it was not included in the logistic regression analysis. However, the statistical results showed that all offenders who drove with almost the same frequency as before ALLR were male. We believe that female offenders, who drove almost the same as before ALLR, numbered much fewer than male offenders.

In summary, short-term license S/R has been consistently associated with traffic safety benefits. Many prior studies have concluded that S/R of a driver's license, depriving a person of the right to drive a vehicle, is an effective and appropriate penalty for drunk-driving offenders (Ross, 1991; Williams et al., 1991; Smith and Maisey, 1990), and is even more

effective than sanctions involving jail, education or treatment alternatives (Tashima and Peck, 1986; Sadler and Perrine, 1984; Hagen, 1977; Popkin et al., 1983; Salzberg et al., 1981). However, even for a short-term S/R, one-fifth of the US states rejected the adoption of administrative S/R, because it could lead to loss of employment, in turn impacting the offender's dependents and subsequent social welfare costs (Knoebel and Ross, 1997; Voas and DeYoung, 2002). In Taiwan, the original purpose of ALLR was to protect road users by keeping the disqualified, and therefore, the more dangerous, drivers off the road forever. This study determined that a very severe punishment, such as ALLR, is fairly effective in keeping offenders off the road. However, most of these offenders are the financial backbones of their families and have older or younger family members to take care of. ALLR not only reduces an offender's capacity to make a living, but also brings an excessive burden to his/her innocent family members. Many ALLR offenders complained that the impact of ALLR was not only greater than that of a criminal penalty and civil compensation, but also lasted for the remainder of their lives. ALLR is not enforced in most developed countries, whereas, in under-developed or developing countries, the over-emphasis on traffic safety may over-shadow human rights and neglect more effective deterrents.

Chapter 7 Conclusions

The main contributions of this study are summarized as follows:

(1) In Taiwan, there are some studies explored ALLR by the criminal law professionals based on the viewpoint of law legislation. However, there is very few study probes into ALLR on the aspect of traffic safety. This study is the first article to explore ALLR policy both on law legislation and empirical analysis.

(2) There are many previous studies focus on the effectiveness of license S/R as well as such offenders' driving exposure while under license S/R. However, most previous studies are based on a short-term S/R, there is very few developed country adopted long-term S/R, thus, it lacks of literatures base on a long-term S/R, especially lacks of study base on lifetime license revocation.

(3) This study reminds traffic authorities while making a rigorous punishment to deter a traffic violation must consider both benefits which loss from offenders and gain by the others and make it balance. Especially the human's basic rights that guaranteed by the Constitution must be taken into account.

(4) License S/R was implemented approximately all over the world, whereas, there are very few countries adopted ALLR. The ALLR experience in Taiwan can be provided to the other countries while considering implementing a very long-time license S/R.

Based on this study, we therefore have made some conclusions as followings:

(1) Driving is a necessity of living for most people in a modern society. Many economic and social activities including working, traveling, shopping and other daily needs highly rely on vehicles. ALLR may decrease the ability of working, diminish the freedom of moving and reduce the power of surviving. Thus, ALLR may not only infringe the right of moving freedom which protected by the Constitution of the Republic of China, but also impact the right to work. Furthermore, in the case of offenders who are professional drivers, losing

driver licenses represent they have to give up their jobs. Finally, ALLR may impact their normal life and decrease their ability of surviving. Therefore, lifetime revocation of a driver's license, with no chance of rehabilitation, may be regarded as infringing on the human rights of offenders.

(2) In the face of the serious traffic violation problems, a common deterrent has been to increase the penalties for offenders. This study has provided a different view, to remind concerned authorities to balance the effectiveness of such deterrents with potential problems that may ensue. Rigorous punishment may lessen traffic violations, but cannot remove the need of offenders to drive. However, if there is no effective means of enforcement or persuasive motivation, offenders may ignore the suspension because of their day-to-day needs.

(3) Overall, the percentage of ALLR offenders who continued to drive was higher than in previous findings, which were based on relatively short-term license S/R. This may reveal the facts that some short-term license suspension/revocation (S/R) offenders may be willing to follow a no-driving restriction to avoid being caught by the police during their license suspension period, in order to protect their future driving privileges. However, a long-term license S/R offender may have little motivation to adhere to such rules, especially when, in the case of ALLR presently in effect in Taiwan, there is no chance for rehabilitation. ALLR offenders therefore have less incentive to stay off the road. Hence, the percentage of ALLR offenders who continue to drive is higher than those with short-term license S/R. This study has provided a different view, to remind concerned authorities to balance the effectiveness of a very rigorous deterrent with potential problems that may ensue.

(4) Compliance with rigorous punishment may be correlated with offenders' social or economic conditions. Aggressive offenders were more likely to ignore ALLR than

conservative offenders. In cases where the fine for driving a vehicle under ALLR is simply a fixed amount, rich offenders may feel justified in disregarding an ALLR sentence, while the poorer individuals are forced to comply. This would seem to introduce one more societal inequity.

(5) Presently, the transportation authority has been requested by the Taiwan Constitutional Court to seriously reconsider whether ALLR offenders should be allowed to re-enter the licensing system if they can demonstrate their ability and willingness to follow the regulations of the road and society. The transportation authority has also undertaken the process of revising the licensing system according to the request of the constitutional court. It is our belief that the ALLR policy will be largely modified in the near future.

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Appendix: Questionnaires

被終生吊銷駕駛執照人對終生吊銷駕駛執照制度之調查問卷

敬啓者：

您好！針對國內終生吊銷駕駛執照之問題，九十年十月十九日大法官會議釋字第 531 號解釋：「中華民國七十五年五月二十一日修正公布之道路交通管理處罰條例第六十二條第二項，汽車駕駛人駕駛汽車肇事致人受傷或死亡，應即採取救護或其他必要措施，並向警察機關報告，不得逃逸，違者吊銷駕駛執照（終生不得考領）、、、與憲法尚無違背。**但對於吊銷駕駛執照之人已有回復適應社會能力或改善可能之具體事實者，是否應提供於一定條件或相當年限後，予肇事者重新考領駕駛執照之機會，有關機關應就相關規定一併儘速檢討，使其更符合憲法保障人民權益之意旨**。」

終生吊銷駕照處分除肇事逃逸外，尚包括酒精過量致人死亡或重傷、、、等，鑑於先進國家多有設計所謂的「駕照恢復機制」，本問卷透過監理系統以抽樣調查方式辦理，旨在蒐集國內被終生吊銷駕照者之經驗與意見，進一步提供政府作爲修正終生吊銷駕照政策之參考。

爲了您個人及全體終生吊銷駕照人的權益，廢除終生吊銷駕照之不合理的情況，敬請撥空提供您寶貴的經驗與看法，並請務必耐心作答；同時麻煩您免貼郵資直接對折寄回，此研究需要您的熱心參與！感謝您！

國立交通大學運輸科技與管理學系 張新立教授 吳宗修教授 敬啟

【聯絡人：曾建民、黃建安 聯絡資料：詳最後一頁 P7】

壹、受訪者被終生吊銷駕駛執照之原因、過程及情況：

（請於□內打∨）

1. 您何時被處分終生吊銷駕駛執照？民國_____年_____月
   您被吊銷之駕駛執照是何時取得的？民國_____年_____月

2. 您被吊銷的駕駛執照是：
   □職業駕照：□小客車□小貨車□大客車□大貨車□聯結車□其他：_____
   □普通駕照：□小客車□小貨車□大客車□大貨車□聯結車□機車

3. 您受終生吊銷駕照處分當時所使用之交通工具為：
   □營業用：□小客車□小貨車□大客車□大貨車□聯結車□機車□其他_____
   □自　用：□小客車□小貨車□大客車□大貨車□聯結車□機車□其他_____

4. 您被處分終生吊銷駕駛執照的原因：
   □肇事逃逸：致人 □死亡 □受傷
   □酒精過量：致人 □死亡 □重傷
   □其他（請填寫）：_____

5. 您被處分終生吊銷駕駛執照之前，您清楚那些情況會被終生吊銷駕駛執照嗎？
   □完全清楚 □很清楚 □清楚 □不大清楚 □完全不清楚

6. 您何時知道您所違反之規定會被終生吊銷駕照？

□肇事前已知道；□肇事後由警員口頭告知；□肇事後由他人告知；
□收到裁罰通知書後才知道 □其他（請填寫）：_____

7. 您對事故處理警員之處理方式及過程：
□非常滿意 □很滿意 □滿意 □不大滿意 □非常不滿意
理由（請填寫）：_____
8. 您曾經就終生吊銷駕照的處分申復嗎？□是 □否
向何機關或何人申復（請填寫）：_____
結果如何（請填寫）：_____
9. 您對於您被處分終生吊銷駕駛執照的接受程度如何？
□完全可以接受□大部分可以接受□可以接受□普通□不大能接受□很不能接受
□完全不能接受：理由（請填寫）：_____

10. 您認為終生吊銷駕駛執照制度之設計合不合理？
□完全合理 □很合理 □合理 □普通 □不合理 □很不合理 □完全不合理
理由（請填寫）：_____

11. 您認為您的肇事情況被處分終生吊銷駕駛執照合不合理？
□完全合理 □很合理 □合理 □普通 □不合理 □很不合理 □完全不合理
理由（請填寫）：_____

12. 您對您所犯的肇事行為，後不後悔？
□非常後悔 □很後悔 □頗為後悔 □稍微後悔 □完全不後悔

13. 沒有駕駛執照對您造成生活上的困擾程度：
□非常困擾 □很大的困擾 □頗有困擾 □很小的困擾 □完全沒有困擾

14. 您認為終生吊銷駕駛執照，對您的行動自由度所造成的影響程度如何？
□非常嚴重影響 □嚴重影響 □有影響 □很小影響 □完全沒有影響
理由（請填寫）：_____

15. 被吊銷駕駛執照以後，您如何進行全家之長途旅行或全家之長途返鄉？
□因單身而不需要負擔上述開車工作
□身為家庭之男性家長，上述駕駛工作改由妻子或家人負責
□礙於實際需要，仍然照常違規駕駛
□身為家庭之一員，原本即未負責上述之開車工作
□改以其他如火車、公路客運、飛機代替
□其他（請填寫）：_____

16. 您認為終生吊銷駕駛執照，對您肇事當時之工作所造成的影響程度：
□完全影響（已喪失原有之工作，目前失業中）
□嚴重影響（因吊銷駕照，而離開原有公司，另行就業）
□頗有影響（未離開原有公司，但改調其他部門，且帶來工作上的不便）
□很小影響（未改變原有工作，且工作上的不便亦很小）
□完全不影響：理由（請填寫）：_____

若您喪失或轉換工作，其理由為：
□原為職業駕駛人，無法再從事駕駛員之工作
□原以車輛為謀生工具，不得不放棄原有工作
□原從事外務（外勤）工作，吊照後無法繼續
□其他（請填寫）：_____

若您已經重新找到工作或正要找工作，您認為喪失駕照對您找工作的影響程度為：
□非常嚴重影響 □嚴重影響 □頗有影響 □很小影響 □完全不影響

17. 您認為終生吊銷駕駛執照，對您個人或家庭之生計所造成的影響程度：
□非常嚴重影響 □嚴重影響 □頗有影響 □很小影響 □完全不影響
理由（請填寫）：_____

18. 您被終生吊銷駕駛執照後，您開車的頻次如何？
□照常開車（與吊照之前幾乎相同）
□經常開車（小幅度降低開車頻次）
□很少開車（中幅度降低開車頻次）
□非常少開車（大幅度降低開車頻次）
□完全不再開車**（請跳接第 26.題）**

若您仍然開車，您開車的方式如何？（可複選）
□減少開車頻次，非不得以時不開車
□躲避警察
□改變行駛路線
□改變行駛時間
□避免白天開車
□其他（請填寫）：_____

19. 若您仍然開車，您是在何種情況下開車？（可複選）
□上下班 □工作當中必須使用車輛 □購物 □休閒旅遊 □拜訪親戚朋友 □接送小孩
□其他（請填寫）：_____

20. 您被吊銷駕駛執照後，若您繼續開車，是否有過被警察攔檢的經驗？
□是：□攔檢一次 □攔檢二次 □攔檢三次 □攔檢三次（含）以上
；又攔檢之中，被告發幾次：□告發一次□告發二次□告發三次□告發三次(含)以上
；若被攔檢而未告發，其理由為：□警察同情□警察未發現□其他_____
□否（未被攔檢過）

21. 吊銷駕照後，您有無碰到過警察路邊攔檢且無法繞道之情況？又您如何反應？
□有：□繼續開車不理會 □加速離開 □迅速迴車 □棄車離開另找時間開回
□其他（請填寫）：_____
□無

22. 您被吊銷駕照後，若仍然開車，您是否有再發生車禍的經驗？又有幾次？
□是：□一次 □二次 □三次 □三次（含）以上
□否（未再發生車禍）

23. 您目前雖然無照，若仍然開車，您認為是因為有什麼好處？（請勾選一或二項）
□比較方便　□節省時間　□比較快速　□載家人較方便　□比較便宜
□其他（請至少填寫一項）：_____
；又您認為無照駕車有什麼壞處？（請務必依程度勾選一項或二項）
□會被警察抓到□再告發罰款重□再肇事責任大□會讓家人擔心□會製造交通問題
□其他（請至少填寫一項）：_____

24. 您認為有那些個人、團體、組織或法規，會**贊同**您無照駕車？(請勾選一或二項)
□父母　□配偶　□父母、配偶以外之家人　□親戚　□上司或老闆　□朋友
□其他（請至少填寫一項）：_____

；有那些個人、團體、組織或法規，會**不贊同**您無照駕車？（請勾選一或二項）
□父母□配偶□父母、配偶以外之家人□親戚□警察□交通法規□上司或老闆□朋友
□其他（請至少填寫一項）：_____

25. 您認為有那些因素、時機或狀況會**阻止**您無照駕車？(請勾選一或二項)
□有警察在臨檢時□當父母反對時□當配偶反對時□當父母、配偶以外之家人反對時
□老闆或上司反對時□當交通法規更嚴格時□當自己有理性時□當警察太多時
□當害怕再出事故時 □其他（請至少填寫一項）：_____

；又那些因素、時機或狀況會**促使**您無照駕車？(請務必依程度勾選一項或二項)
□為了方便的緣故□當時機急迫時□上下班時□工作當中必須使用時□為了節省時間
□接送小孩　□購物　□休閒旅遊　□拜訪親友　□警察較少臨檢時
□其他（請至少填寫一項）：_____

26. 如果您不再駕駛汽車，您以何種方式代步？
□改騎腳踏車　□騎機車　□搭乘公車或客運　□改由他人搭載
□其他（請填寫）：_____

27. 若可以重新考取駕照，您對於考取駕照的迫切程度：
□非常迫切　□很迫切　□普通迫切　□不很迫切　□無所謂

28. 您的行車事故有經過鑑定委員會的鑑定嗎？
□有：_____鑑定委員會（請填縣市）；
鑑定結果您爲：□肇事原因□肇事主因□同爲肇事原因□肇事次因□無肇事因素
□沒有
□不知道

29. 若您是被警察以「肇事逃逸」處分終生吊照，請回答下列問題：
a.肇事時您是否有喝酒，又酒精濃度如何？
□是：呼氣酒精濃度：□0.25 以下□0.25-0.55□0.55 以上(或血液酒精濃度為：_)
□否（未喝酒）

b. 您的肇事地點在何縣市？（請填寫）：_____

；又由哪一個交通隊或派出所處理？（請填寫）：_____

c. 您認同事故處理警員對您肇事逃逸的違規事實的認定嗎？（請依事實填寫）
□認同：您逃逸的理由：□心理害怕　□或多或少存著僥倖的心理
□其他（請填寫）：_____
□不認同：理由（請填寫）：_____

30. 您的行車事故有被法院判以刑事處分嗎？
□有：□判刑（緩刑）：_____個月　□判刑（未緩刑）：_____個月
□沒有

31.您的行車事故民事部份如何解決？
□有民事賠償：□法院判決賠償____萬元□私下和解賠償：____萬元
□無民事賠償

32. 若將您的行車事故對您造成的責任追究或衝擊，區分為（1）刑事的處分、（2）民事的處分或賠償、（3）駕照的終生吊銷、（4）道德良心的譴責。您認為對您造成的衝擊程度如何？（請於衝擊程度之方格內打勾）

衝擊的程度由大至小 / 項目	極大的衝擊	很大的衝擊	頗有衝擊	普通的衝擊	稍有衝擊	很小的衝擊	無任何衝擊
1. 刑事處分	7	6	5	4	3	2	1
2. 民事的處分或賠償	7	6	5	4	3	2	1
3. 駕照的終生吊銷	7	6	5	4	3	2	1
4. 道德良心的譴責	7	6	5	4	3	2	1

33.若以下列四種方案，代替現行之終生吊銷駕照處分，而可以重新考取駕照，您所選擇的優先順序為何？

A.吊照滿三年後，得考領臨時駕照，取得臨時駕照並駕車（但駕駛受到一定程度的限制），取得臨時駕照後連續三年未違規，方能考領永久駕照。

B.嚴格之道安講習二週，每日講習上課八小時，成績優良並通過考試者。

C.參與社區交通安全宣導或交通安全服務工作四週，每日八小時，成績優良者。

D.假日（工作日以外），參與社區勞動服務合計六個月，成績優良者。

您的優先順序為：_____（越前面為越優先選擇方案）

貳、受訪者基本資料

1. □男　□女

2. □已婚　□未婚

3. 職業：□工　□商　□農　□軍公教　□學生　□其他

4. 目前最高教育程度：□國小　□國中　□高中（職）　□大專　□研究所

5. 年齡：_____歲

6. 共同生活人數：_____人；其中未成年子女____人；65 歲以上老人____人

7. 您是否為一家之主：□是　□否

8. 家中是否有未成年或老年親屬必須由您扶養：□是　□否

9. 您須扶養的人口數：□0 人　□1 人　□2 人　□3 人　□4 人　□4 人以上

10. 家中目前固定收入來源共：□1 人　□2 人　□3~4 人　□4 人以上

11. 個人每月所得（或零用錢）平均是多少元？
□一萬以下 □一至二萬元 □二至三萬 □三至五萬 □五至八萬 □八萬以上

到此您已經完成了整份問卷的回答，請於**9 月 25 日**前寄回問卷，問卷直接對折（第 8 頁朝外），**免貼郵票**即可寄回，或傳真至 03-5720844。非常謝謝您的熱心參與及協助。您的意見及困擾我們將適時地向相關單位表達，在此謹代表全體參與人員再次向您致上深深的謝意。

參、下一階段調查徵求自願

為利於終生吊銷駕駛執照制度之改善，使取消或修正「終生」吊銷駕駛執照措施，您的意見極為重要，懇請您接受本研究下一階段的調查訪問，若承蒙您的同意，敬請留下您的資料，我們會與您聯繫：

（自願者）

姓名：

電話：

聯絡地址：

行動電話(可不填)：

E-mail(可不填)：

我們的連絡人員資料：

曾建民：
電話：049-2341545；03-5712121 轉 57238
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Vita

Chien-Ming Tseng was born in Hsinchu, Taiwan, on May 10, 1958. After graduation from Hsinchu Senior High School, he entered National Cheng Kung University, Tainan, and received his Bachelor degree in Transportation management in June of 1980. He entered the graduate school of Asia Institute of Technology in September of 1989 and got his Master degree in April of 1990. After a period of working, he studied in the Ph.D. program of Transportation Technology and Management of National Chiao Tung University in 1998. His major interests are Transportation safety, Transport policy evaluation, Safety engineering and management, and Car accident reconstruction. He received his Ph.D. degree in May of 2006.

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簡歷

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學　　歷：

民國95年5月　國立交通大學運輸科技與管理系博士班畢業

民國80年4月　泰國亞洲理工學院地質技術及交通工程研究所畢業

民國69年6月　國立成功大學交通管理科學系畢業

民國65年6月　省立新竹中學畢業