

## Evaluation of Policy Alternatives to Reduce Alcohol-Related Traffic Fatalities

Antonio F. Tavares

School of Economics and Management

University of Minho

Braga, Portugal

Tel.: 351-253-604510

[atavares@eeg.uminho.pt](mailto:atavares@eeg.uminho.pt)

### Abstract

This paper reviews the alternative policies to reduce traffic fatalities due to drunk-driving presented in the literature and elaborates on their contradictions to develop a larger, more encompassing program of research to evaluate the effective results of these alternatives when implemented across states and over time. The goals of this research are both societal and scientific.

Five major types of policies are generally presented to accomplish the reduction of alcohol-related fatalities: deterrence policies, alcohol policies, transportation policies, education and rehabilitation policies, and civil liability policies. The literature review on alcohol-related traffic fatalities reveals a large number of studies developed in this area, not always with consensual results. One important idea to retain is that the units of analysis, methods, and data are extremely diverse, which makes any attempt to provide a comprehensive set of policies to solve the problem an extremely complex task.

## **Introduction**

Each year at least one half of traffic fatalities in the United States are alcohol-related and 1.5 million people are arrested for drunk-driving (Meier, 1994). These numbers constitute a sound justification, from society's perspective, for public policy interventions aiming at reducing the number of drunk-driving episodes, either detected or undetected. Additionally, a significant percentage of the approximately 20,000 alcohol-related fatalities are young males, which raises the question of how much national wealth is foregone as a result of these drunk-driving episodes.

As Kenneth Meier (1994) suggested, the states adopted policies during the 1980s that were not proven to be effective. Although we can find a large number of studies dealing with the implications of the adoption of certain types of policies to reduce the number of drunk-driving episodes, a comprehensive theory that identifies what policies are effective and in what circumstances is lacking. Moreover, with a few exceptions (Brown, Jewell, and Richer, 1996), estimations of the effect of different policy instruments have failed to control for exogenous effects in policy adoption, such as the fact that legislation reflects preferences of the electorate because it is either approved by direct referendum or by elected representatives. This study attempts to overcome this insufficiency by using a research design that will allow the estimation of true policy impacts.

We begin by considering the policy alternatives described in the literature. From these distinct alternatives, we created five groups we can characterize as homogenous in their intended goals: deterrence policies, alcohol policies, civil liability policies, education and rehabilitation policies, and transportation policies.

Although similar to the classification established by Applegate et al. (1995), these groups will include various policies not examined or reported in that study.

Additionally, some overlap may occur between these groups, because policies like car impoundment or confiscation may be considered deterrence or transportation policies for example. The reason for the specific policies included in each type will be given in the following sections.

### **Deterrence Policies**

The first type of policies is based on deterrence theory that argues if “...the cost of an undesirable behaviour can be increased, less of it will be consumed” (Jacobs, 1989: 105). The main argument is that the rate of the crime of drunk-driving can be reduced through an increase in the celerity, certainty, and severity of punishments (Gibbs, 1975). In presenting deterrence theory, it is usually useful to distinguish between general and specific deterrence. General deterrence relates to the way the threat of punishment affects the public in general, whereas specific deterrence is linked with behaviour change (even if temporary) that legal punishments trigger in the individuals who suffered them (Homel, 1988).

A substantial part of the literature is dedicated to the evaluation of how effective deterrence policies have been. The results of this evaluation are mixed. In a study of general deterrence, Legge (1990a) studied the impact of the deterrence-based reform of driving under influence (DUI) laws in California in 1982 and concluded that an abrupt downward shift occurred in automobile fatalities when the reform was enacted. In the opinion of the author, the reason for this success was that the public’s perception of the probability of being more severely punished was increased. This piece of legislation included a “mandatory” jail sentence for first offenders, public explanation by judges

and prosecutors for plea-bargaining, and the setting of a minimum blood alcohol concentration of .10 to be considered DUI.

The same author (1990b) presents a similar study for the State of New York, concluding that the increased penalties resulting from the legislation approved in 1981 had a long-term effect on the reduction of fatalities. Again, more rigorous law enforcement and an increased certainty of both conviction and financial punishment are presented as the reason. This package of legislation included "...immediate and automatic suspension of the license if two or more alcohol-related driving violations occur within three years; a mandatory fine of \$250 (\$350 if over the .10 blood alcohol limit) and the possibility of prison for the first offense..." (Legge, 1990b: 374).

Yu (1994) used a large sample of the drunk-driving offender population between 1978 and 1988 and concluded that the severity of punishment increases the specific deterrent effect. Additionally, mandatory license withdrawal associated with an increase in fines significantly reduces the chance of drunk-driving recidivism. Chaloupka and Wechsler (1996) used a nationally representative survey of students in U.S. colleges and universities and concluded that strong drunk-driving policies targeting youth significantly reduce drinking and binge drinking in male students.

Neustrom and Norton (1993) used an interrupted-time-series design to evaluate the Louisiana drunk-driving law enacted in January 1983 and found a statistically-significant reduction in night time and daytime fatal and injury accidents that lasted for 36 months after the law passed.

Kenkel (1993) criticizes the use of traffic fatality rates as a proxy for the amount of drunk-driving and utilizes micro data on self-reported drunk-driving reaching conclusions similar to Legge (1990a; 1990b). The policies tested include mandatory jail

sentences for first offenders, license suspension, preliminary breath tests, sobriety checkpoints, and prohibitions of plea-bargaining.

The studies presented so far reveal the success of general and specific deterrence policies. Several authors reached less clear results in studying the impact of deterrence policies on DUI. Ross (1984) and Jacobs (1989) report only short-term effects following the announcement of an increase in the certainty of apprehension or conviction. West et al. (1989) studied the effect of the Arizona DWI (Driving While Intoxicated) law in the city of Phoenix concluding that the decrease in fatalities seems to be related, not only with the law itself, but also with the wide media coverage. The results also indicate that the effect was short-term, with only 10% of the initial reduction remaining after 20 months.

Evans et al. (1991) analysed several deterrence policies and found no evidence of any measurable effect on drunk-driving. Similarly, Wilkinson (1987) reports no marginal effect of deterrence policies in the number of fatalities. Aiken (1986) reviews a series of examples of state laws considered strong that, in practice, did not work, including mandatory jail sentences for first offenders in Connecticut, Tennessee, California, Maine, and Washington, and heavy penalties for repeated offenders in Pennsylvania and Alaska.

Legge and Park (1994) employed pooled cross-sectional time-series regression analysis of the 48 contiguous states to test the effects of the three components of deterrence theory (certainty, severity, and celerity of punishment). The authors concluded that the law per se (certainty variable) and administrative license suspension (celerity variable) had a significant effect in reducing night-time fatalities rates. However, preliminary breath test and DUI arrest rate (certainty variables) and jail for

first conviction, fines for first offenders, and mandatory license suspension (severity variables) were not statistically significant.

### **Summary**

Jacobs (1989) summarizes the impact of deterrence policies highlighting a series of general reasons that may affect their performance. First, the target audience is not always aware of this increase in the probability of being detected. Second, the marginal effect of increasing financial punishment may be zero or close to that value, failing to produce any reduction of drunk-driving criminality. Third, deterrence assumes rationality and weighting of benefits and costs, which does not occur when an individual is drunk and decides to drive.

Homel (1988) supports these conclusions by arguing that these policies can deter illegal behaviour in the short-run, because the perception of legal threat is higher immediately after the approval of legislation. In the long run, however, individuals tend to realize that the legal threat is not as high as they initially thought and readjust their behaviours. In deterrence theory language, it is not enough to increase the severity of punishment, if the celerity and, especially, the certainty of punishment are low. The following section reviews a set of policies linked with deterrence theory, but dealing with physical, geographical and economic alcohol availability.

## **Alcohol Policies**

In this section we discuss all the policies targeted to reduce traffic fatalities through the reduction of alcohol consumption. Review of the impact of prices and taxation, availability, and alcohol control policies, again, finds mixed results. The assumption is that there is a positive relation between alcohol consumption and traffic fatalities so that, in order to reduce the later, policies should address the former.

### **Alcohol Availability**

We begin by addressing the issue of alcohol availability, leaving alcohol taxation for the second part of this section. The definition of alcohol availability includes not only the legislation concerning the minimum age drinking, but also the physical or geographical availability. Although, the literature is far from being impressive, the conclusions are more consensual than in the case of alcohol taxation or deterrence policies.

Fowles and Loeb (1992) used cross sectional state data for the 48 contiguous states and found that the interaction between altitude and alcohol consumption has a pronounced effect on traffic fatalities. The conclusion that can be drawn is that, reducing or cutting alcohol availability in high altitude counties can help to decrease the number of fatalities in alcohol-related crashes.

Brown, Jewell, and Richer (1996) found that “dry” counties in Texas have 2145 fewer alcohol-related traffic fatalities than “wet” counties per year. Winn and Giacomassi (1993) reached similar results for Kentucky’s “dry” counties. Jewell and Brown (1995) suggested that limitation in the number of licensed alcohol vendors could induce a reduction in traffic fatalities. These studies seem to indicate that the trade-off

between having to drive to a “wet” county to get alcohol and the reduction in consumption due to “dry” laws produces a decrease in alcohol-related fatalities.

McCarthy (1999) used a panel data of 418 incorporated cities and 57 unincorporated areas over a 108 months period from 1981 to 1989 to analyse the effect of alcohol availability in fatal accidents. The author concluded that increases in the number of alcohol licenses leads to more traffic fatalities. In addition, the imposition of a ban on common site sale of alcohol and gasoline increases the number of alcohol-related fatalities in incorporated cities outside metropolitan areas but not elsewhere.

In a different context, Chaloupka and Wechsler (1996) suggest that the availability of alcoholic beverages for free in college and university campuses is conducive to heavy drinking. The authors also point out the existence of a large number of licensed vendors close to the campuses, which seem to be related to the large demand for alcohol. However, the literature does not report any study relating alcohol-related traffic fatalities and college campuses.

Lee, Jones-Webb, Short, and Wagenaar (1997) analyzed the influence of drinking location and alcohol source in high school seniors impaired driving. Lee and her associates concluded that outdoors drinking and consumption in a moving car or truck contributed to an increase in the risk of alcohol-impaired driving. The alcohol source variables were not statistically significant.

As far as studies concerning the minimum legal drinking age (MLDA), the literature reports some contradictory results. Kenkel (1993) found results indicating a reduction of drunk-driving by 13 percent in young males and by 21 percent in young females as a consequence of the introduction of the national MLDA in 1986. Laixuthai and Chaloupka (1993) examined the frequency of youth drinking and heavy drinking in 1982 and 1989 and concluded that increases of minimum legal drinking age decrease



youth alcohol consumption. However, the authors also concluded that states that raise the MLDA, witnessed decreases in the price sensitivity of youth drinking. Legge and Park (1994) analyzed single-vehicle night-time fatality rates concluding that MLDA has a significant impact in the reduction of fatalities.

In his study of the New York State highway safety reform, Legge (1990b) found that raising the MLDA from 18 to 19 had no statistically significant impact in traffic fatalities of all categories. In contrast, the increase in the MLDA from 19 to 21 produced a statistically significant impact in all categories except in fatalities of back seat passengers.

### **Alcohol Taxation**

Another type of alcohol policy is taxation. The argument favouring the increase in alcohol prices through taxation is that higher prices will decrease consumption and, in turn, alcohol-related fatalities. In addition, this is a tax policy generally seen as popular and easy to levy (Meier, 1994). Strangely, the increases in alcohol prices have been more the result of a necessity of states to raise revenues than to discourage alcohol abuse. As a consequence, the real prices of alcohol beverages declined significantly over time. The studies of the response of consumption to higher taxes have reached contradictory conclusions as far as elasticity of demand. Next, we turn to some examples of this research.

Chaloupka, Saffer, and Grossman (1993) used a multi-year panel of state cross sectional data and concluded that beer taxes had a significant impact on the reduction of fatalities rates. Chaloupka and Wechsler (1996) found that drinking practices of male college students are insensitive to changes in beer prices, but underage drinking by female students responds significantly (but modestly) to price. Mast (1996) used cross-

sectional and times-series data of alcohol-related traffic fatalities for the years 1984-1992 arguing that, controlling for societal attitudes toward drinking, beer taxes have very small effects on traffic deaths by drivers of all ages.

Johnson and Meier (1989) found a relation between beer taxes, wine taxes and distilled liquor taxes consistent with consumption trade-offs. A 1-percent increase in taxes on liquor reduces its consumption by .783 percent. A 1-percent increase in beer taxes is accompanied by .738 percent increase in the consumption of distilled liquors. A similar relation was identified for wine taxes. This suggests that policies targeted to reduce the consumption of alcohol should incorporate all types of beverages and not specific types. However, Johnson and Meier present data proving that, higher overall tax rates on alcohol have little effect on consumption.

Comparing the benefits and costs of deterrence and alcohol policies, Kenkel (1993) concluded that the demand for drunk-driving is relatively inelastic with respect to the price of alcohol (-.74 for males and -.81 for females). The same author (1996) estimated the optimal tax rate on alcohol, concluding that this rate is over 100 percent of the net-of-tax price. The author argues, however, that alcohol taxation constitutes a second-best solution to the drunk-driving problem. The optimal tax could be reduced either if punishment was more certain and severe or if government provided additional information on the health consequences of heavy drinking.

### **Summary**

Clearly, there is no consensus about the effect of the increase of alcohol taxation in alcohol-related traffic fatalities. More important than this is the fact that there is not even consensus about how we should tax alcohol. Jacobs (1989) argues that light and moderate drinkers are the ones who will suffer the most if the price of alcohol is

increased substantially. This policy would affect a much larger group than the one initially intended. This author also points out that the alcohol market always involved a certain percentage of home brew and bootlegged alcohol. With a large increase in the price, we may face an increase in the bootlegged portion of the market.

Still another problem with alcohol taxation is the accusation that it tends to be regressive, affecting especially lower income classes. Cook and Moore (1994) suggest that alcohol taxes are necessary because it is only fair that heavy drinkers pay more for the cost they impose on society. Additionally, the authors argue that lower income households may benefit from these higher taxes if the heavy drinker cuts on this or her consumption. However, this idea seems to be class biased and flawed because it assumes that lower classes are more prone to drinking problems and that alcohol is not an addiction. Next, I review the literature on policies oriented to decrease traffic fatalities based on transportation rules and safety regulations.

### **Transportation Policies**

In this type of policies, the literature generally includes all the measures oriented to change traffic rules and vehicle safety: mandatory seat belt, airbags, 55 mph speed limit, raising driving age to 21, cars with interlock system, car impoundment, and confiscation. Some of these policies were never adopted, but are reported in the literature as possibly having an impact on the reduction of alcohol-related traffic fatalities. First, we report results of studies measuring the effects of changes in speed limits. Second, the literature on seat belt laws is reviewed with special attention to primary and secondary enforcement laws. As we shall point out later, it is important to distinguish between these two types of enforcement, even if most of the literature

neglects this difference. Finally, a small number of studies is reviewed, reporting more unusual policies, including interlock systems, car impoundment, and confiscation.

Lave and Elias (1997) used a resource allocation perspective to evaluate the impact of the 65mph speed limit in interstate highways and concluded that the fatality rate dropped between 3.4% and 5.1% nation wide as a result of the speed limit increase. McCarthy (1999) also estimated the impact of speed limit and seat belt use laws on alcohol-related traffic fatalities and found no statistically significant results.

Legge (1990a) studied the California mandatory seat belt law of 1986 and found no statistically significant impact of the law in single and multiple vehicle fatalities of front and back seat passengers in weekdays. A statistically significant coefficient was obtained for single vehicle fatalities of male drivers at night. Legge (1990b) studied the equivalent law in the State of New York, approved in 1985 and reached contradictory conclusions. The mandatory seat belt law has positive impact in reducing front seat drivers and passengers fatalities, and single vehicle fatalities of male drivers at night. Additionally, when taking the overall effect, the law produces statistically significant reductions in all fatalities. In the pooled cross-sectional study of American states of 1994, Legge and Park found virtually no impact of the seat belt law in single vehicle night time fatalities.

One explanation for the failure of mandatory seat belt laws to produce effects on traffic fatalities is that the certainty of punishment is low, and secondary enforcement has been the rule. Primary enforcement, that is, the possibility of stopping a driver for not using the seat belt was never a current practice.

Weinrath (1997) studied the effect of an ignition interlock program in drunk-driving recidivism and concluded that program participants had lower recidivism rates

(impaired convictions, serious driving offenses, and injury collisions) and higher survival rates when compared with the control group.

The car impoundment policy is also included in the transportation group. Aiken (1986) argued that this policy could be particularly useful to determine who was driving a car in the case of accidents caused by alcohol where the driver flees the crime scene. No data was available to confirm this hypothesis. The same author presents an example of a confiscation policy that seems to work, even if no quantitative analysis is presented. In Brooklyn, repeat offenders get their cars confiscated and sold at an auction, with the proceeds going to the victim.

### **Summary**

The literature review on this group of policies clearly reveals that more studies are needed in transportation policies, especially in those related to traffic regulation. On the other hand, it is frequently argued that the adoption of preventive technological devices such as interlock systems would impose unnecessary costs in the majority of drivers that do not drink and drive. This argument may generate significant controversy in policy formulation, but ultimately devices already adopted (seat belts, airbags, among others) may provide a sound justification for the adoption of interlock systems. These technological solutions can contribute to the reduction of drunk-driving episodes and deserve careful consideration. In the next section we will see how education, prevention, and rehabilitation policies have dealt with the problem of drunk-driving.

## **Education and Rehabilitation Policies**

The use of formal governmental programs to reduce alcohol-related traffic fatalities is also built upon the concepts of general and specific deterrence.

Educational policies include school-based programs, public health television advertisements or tax money to anti drunk-driving groups such as MADD (Mothers Against Drunk-Driving). These policies are essentially primary preventive strategies designed to have an impact in all population, including non-offenders (general deterrence). Mann, Vingilis, and Stewart (1988: 250-251) define these strategies as the attempt "...to divert or dissuade a large proportion of [individuals] who are potential drunk-drivers from undertaking such behaviour." The authors present a summary of the empirical analyses of the effectiveness of these programs arguing that they seem to have beneficial effects only in the short-term.

Wolfson (1995) showed that anti drunk-driving groups have more potential of successful intervention if certain legitimacy characteristics are present. Among these features, the author found that the president's victim status and the percentage of victim membership are more likely to influence the passage of anti drink and driving legislation, specifically the 21-year old drinking age legislation. Additionally, legislative activity by the group was also found to have significant impact.

McCarthy and Wolfson (1996) studied the roles of agency (effort), strategy, organizational structure, and nature of national affiliation in the mobilization of resources by local social movement organizations against drinking and driving. The measures of effort are significant predictors of resource mobilization.

In his study of 1993, Kenkel included a variable related to educational goals, health knowledge, measured by the number of correct responses for whether heavy

drinking causes a list of three illnesses. He found that health knowledge had no effect on young-adults heavy drinking habits.

On the other hand, rehabilitation policies are targeted to the offending population and constitute a component of punitive sanctions. These are secondary prevention strategies because they intend to reduce recidivism. Mann, Vingilis, and Stewart (1988) examined treatment and rehabilitation programs in terms of knowledge and attitudes, drinking behaviour and lifestyle, and drunk-driving recidivism. They concluded that some benefits were obtained in knowledge and attitudes and, to a lesser degree, in drunk-driving recidivism. In contrast, no benefits were found for drinking behaviour and lifestyle variables, which may suggest that social drinking habits are harder to change. Nichols et al. (1978) evaluated the programs of the Alcohol Safety Action Project (ASAP) concluding that these had no effect on recidivism, and only 10 percent of the social drinkers in the programs changed their habits. Holden (1983) found no significant impact of treatment on recidivism for all types of offenders. The exception was the case of individual oriented long-term programs for heavy drinking recidivists, where some improvement was detected.

Langworthy and Latessa (1996) compare the post-release success rates of the Turning Point project in Cincinnati to treat chronic drunk drivers with others who have been at risk for over four years. All the success criteria (new offenses, new alcohol offenses, new DUI) indicate a positive effect of the program in reducing recidivism, but none is statistically significant in the general model. However, for offenders with three or more prior DUI convictions the coefficients are positive and statistically significant.

## **Summary**

The empirical analyses of education and rehabilitation programs are not abundant in the literature. They essentially focus on located short-term experiences, without much information on long-term behavioural changes. Next, we address the last group of policies aiming at reducing alcohol-related traffic fatalities.

### **Civil Liability Policies**

An important discussion in the context of the anti drunk-driving literature is the civil liability of third party dispensers of alcoholic beverages. Over the years, commercial dispensers have opposed dram shop laws that held them responsible for third parties injuries or fatalities due to alcohol consumption by their clients. All the victims had to prove was that the person intoxicated had bought the alcoholic beverage(s) in the vendor being sued (Jacobs, 1989).

The theory behind dram shop laws is that civil liability will force alcohol vendors and dispensers to control the drinking behaviour of their customers. The idea may be simple to understand, but the way it can be implemented and enforced is much less unanimous, and generates opposition from several groups in society, such as liquor store owners, bar, restaurant, and club owners, and tourism operators. Moreover, Applegate et al. (1995) report that a survey in the Greater Cincinnati area reveals that expanding civil liability is largely opposed by the respondents that believe the responsibility for alcohol-related traffic fatalities belongs to the driver and not to those that sold the alcohol.

Jacobs (1989: 142) argues that, “for dram shop liability to produce a significant marginal deterrent effect, there must be a significant probability that lawsuits will be



brought.” In the case of civil liability for social hosts it is more likely that monitoring can occur. But even here it may be difficult to control alcohol consumption by the guests, if we think that some social gatherings such as weddings, fraternity parties, or company celebrations involve a large number of people.

We were not able to find many contributions in the literature to dram shop liability in the case of heavy drinking and driving. Chaloupka, Saffer, and Grossman (1993) reported that dram shop laws reduced both motor vehicle and other types of alcohol-related deaths. Other authors present contributions of the effect of tort liability and insurance in this context. Sloan, Reilly, and Schenzler (1995) used self-reported data on patterns of alcohol consumption among individuals from the 1989-90 Behavioural Risk Factor Surveys and concluded that mandatory purchase of third-party insurance discouraged binge drinking, especially in states that combine this policy with a surcharge for DUI. These authors did not find any evidence that dram shop laws affected the number of binge drinking episodes.

Although controversial, civil liability involves a mixture of deterrence and education policies that can contribute to long-term changes in attitudes and norms (Jacobs, 1989).

### **Perspectives for Future Research**

The literature review on alcohol-related traffic fatalities reveals a large number of studies developed in this area, not always with consensual results. One important idea to retain is that the units of analysis, methods, and data are extremely diverse, which makes any attempt to provide a comprehensive set of policies to solve the problem an extremely complex task. We argue however that, a national study comparing the results of policy adoptions across states and over time would help to

identify benchmark policies. The undertaking of this project requires the use of pooled cross sectional time series data to estimate the impact of policy variables in alcohol-related traffic fatalities and controlling for a certain number of socio-demographic variables.

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