Advertising and Road Safety: A Segmentation Approach

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Abstract

This paper evaluates the effectiveness of a paid advertising campaign on reducing the fatal accident rates in New Zealand using Poisson regression models. The campaign is aimed at changing attitudes towards dangerous driving by focusing on the dramatic consequences of such behaviour and uses a strong appeal to the emotion of fear to achieve the objectives of the campaign. Although other researchers have found that this campaign was not effective in changing behaviour, we argue that a campaign that uses such a strong appeal to fear will be effective but only among some segments of the population. We find that fatal accident rates in New Zealand, related to alcohol, drugs and speed, have been reduced among male drivers aged 15-24, 25-34 and 35-54 and female drivers aged 25-34.

Introduction

With nearly 600 people killed on the road in 1995 and an estimated social cost of $3.6 billion (LTSA 1998), road safety was a major public policy concern in New Zealand. In an effort to reduce the road toll, the Land Transport Safety Authority (LTSA) initiated a Supplementary Road Safety Package (SRSP) in October 1995. The campaign was charged to reduce 80 fatalities, 450 serious injuries and 1600 minor injuries over four full years and was allocated a budget of NZ$50.06 million (LTSA 1998). Although the complete SRSP involves the use of speed cameras, advanced laser speed detectors and compulsory breath testing (CBT), the major feature of the package, at least from a budgetary perspective, is the advertising campaign. It was initially allocated with an annual budget of $7.1 million but it was increased to $8.4 million in the second year (LTSA 1998). The advertising campaign, primarily aired on television, has focused on the themes of drink-driving, speeding and seat belt use, and the primary appeal used in the campaign has been the fear appeal, an approach that highlights the consequences of unsafe driving behaviour in an extremely graphic and shocking manner.

Given the extremely high social cost of the road crashes and the high cost of the campaign, it is crucial to evaluate the campaign in terms of its effectiveness in reaching its goals. Although a number of studies have been conducted to examine the effectiveness of the campaign, no consistent conclusion could be drawn. Macpherson and Lewis (1998), for example, found no evidence to suggest that the advertising campaign had any substantial effect on drink-drive behaviour while other researchers found a significant negative relationship between the advertising campaign and the road toll (Cameron and Vulcan 1998) or drink driving behaviour (Tay 1999).

The purpose of this research is to evaluate the effect of the advertising campaign on the number of fatal accidents related to alcohol, drugs and speed. This research differs from previous efforts in that it examines the effectiveness of the campaign among different gender and age groups. This approach is justified given that previous researchers have found that fear appeals are more effectively used with certain groups and not the entire population (Quinn et al. 1992; Burnett and Wilkes 1980; Burnett and Oliver 1979). This research also differs from previous studies because it uses the Poisson regression model to analyse the data instead of the standard regression techniques utilised by Macpherson and Lewis (1998), Cameron and Vulcan (1998) and Tay (1999). Since the number of accidents is a discrete
variable and is most likely to have a Poisson distribution (Nicholson and Wong 1993), standard regression models will produce estimates that are biased, inconsistent and inefficient (Maddala 1993).

Fear Appeal and the New Zealand Advertising Campaign

Over the past five decades, a great deal of research has been conducted on the use of the fear appeal in advertising and the results thus far have been very mixed. Consequently, even after this prolonged period of investigation on the topic, the research in this area can still be described as confused and confusing (LaTour and Rotfeld 1997). Similar inconsistencies exist regarding the SRSP campaign in New Zealand. While Cameron and Vulcan (1998) and Tay (1999) found some support for the campaign, other researchers found no evidence that it is effective in changing behaviour (Macpherson and Lewis 1998). Furthermore, Rotfeld (1999) argues that by focusing on advertisements of death and destruction instead of raising the threat of law enforcement, the New Zealand governments' misdirected efforts became an example of misplaced social marketing.

Since the advertising campaign utilises a very strong appeal to the emotion of fear, we argue that it will be effective only among certain segments of New Zealand society. This argument is based on evidence from several areas of the fear appeal literature. First, previous research found that an appeal to fear is more effectively used with certain segments and not the entire population. In a review of earlier literature, Higbee (1969) found that differences in the age, sex and education of the subjects accounted partially for variations in reactions to a fear arousal. In addition, Burnett and Oliver (1979) and Burnett and Wilkes (1980) tied audience responses to brochures from a health maintenance organisation to various audience segmentation variables and found that the facilitating effect of fear seems to be somewhat different when viewed on a segment by segment basis. Furthermore, Quinn et al (1992) also found that a student's sex, educational level and smoking habits each had an impact on the students' response to an appeal to fear, related to the issue of smoking.

Second, a number of researchers have argued that a strong appeal to fear will be more effective among audience members for whom the subject has less relevance. In other words, people who are highly involved in a topic can be motivated by a relatively small amount of fear, whereas a more intense level of fear is required to motivate uninvolved people (LaTour and Rotfeld 1997). Third, previous research found that the subjects' psychological traits, such as self-esteem and coping style, also have a significant moderating effect on the acceptance of the advertising message (Higbee, 1969).

Research Methodology

This study will therefore adopt a segmentation approach to evaluate the effectiveness of the SRSP advertising campaign. Since the campaign was targeted mainly at male drivers, especially those between the ages of 18 and 24, this study will use both the sex and age of the drivers as means to segment the market. Four age segments will be used and consist of 15-24 year olds, 35-34 year olds, 35-54 year olds and those above 54 years old. It may be surmised that the strong appeal to fear used in the LTSA advertising campaign will be more effective for younger drivers than for older drivers. This is because younger drivers are less likely to see themselves as being vulnerable to the consequences of unsafe driving behavior. Similarly, the campaign is hypothesized to be more effective on male drivers than on female drivers.
The dependent variable \( Y \) is the number of total fatal accidents in New Zealand related to alcohol, drugs and speed and is assumed to have a Poisson distribution with mean \( \lambda = \beta X \) where \( X \) is a vector of independent variables and \( \beta \) is a vector of parameters to be estimated. The main independent variable is a dichotomous variable, \( Advert \), for the advertising campaign. The estimated coefficient is expected to be negative and statistically significant for some groups of drivers, especially young male drivers, but insignificant for others. To isolate the effect of the advertising campaign from the other components of the SRSP, two other dummy variables are used: \( CBT \) to denote the introduction of compulsory breath testing and \( SpCam \) to delineate the use of speed cameras. Both these policies are expected to have a negative effect on fatal crashes. In addition, it is also necessary to account for the fluctuations in exposure due to traffic and economic activities. The number of registered vehicles, \( NumVeh \), is used in our model because it is the only widely used measure for traffic activity that is well recorded by Statistics New Zealand. It is expected to have a positive coefficient. As suggested by Ruhm (1994), the number of unemployed will serve as a proxy for economic activity and is expected to have a negative effect on fatal crashes. Furthermore, two other major factors, weather conditions and alcoholic beverage consumption, were often to have confounding effects on accident rates. Weather conditions will be captured in our model by the number of wet days in a month, \( Rain \) (Brannas 1995), and alcoholic beverage consumption will be represented by amount of beer, spirits and wine available for consumption, \( Alcohol \). Both factors are expected to have positive coefficients.

The above model will be estimated using monthly data from January 1988 to December 1996. The number of fatal crashes involving at least one driver of the specified gender and sex group is extracted from the Accident Investigation System provided by the LTSA. It should be noted that there are some overlaps in the models because some crashes involve multiple drivers from different gender and age groups. The main explanatory variable, \( Advert \), will be zero for the series from January 1988 to September 1995 and one for series beginning from October 1995. The other dummy variables, \( CBT \), will have zero values before April 1993 and ones thereafter, and the same procedure will be used for \( SpCam \) that was implemented in October 1993. The measure of monthly alcoholic beverage consumption is constructed by using quarterly alcoholic ready to consumed beverage sales, provided by Statistics New Zealand. The quarterly figures are converted into a monthly series using the 1997 monthly distribution figures provided by the Distilled Spirits Association of New Zealand. Lastly, the number of unemployed and the number of vehicles registered are gathered from Statistics New Zealand.

**Results**

The estimation results are reported in Table 1. Four of the eight models fitted the data fairly well whereas the others possessed no significant explanatory power. Except for females aged between 25 and 34, the SRSP and the enforcement campaigns seemed to have no impact on female drivers. These campaigns also did not seem to have any impact among older drivers above 55 years old. These results were expected as female and older drivers were not part of the target audience for most of these campaigns. The CBT campaign, however, was effective in reducing the number of fatal crashes involving male drivers between the ages of 25 and 34 while the speed camera program was effective among males aged between 15 and 24. The variable of interest in this study, \( Advert \), was found to be negative and significant for all males under the age of 55 but only significant among female aged between 25 and 34.
Table 1: Estimation Results

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<tbody>
<tr>
<td>NumVeh</td>
<td>0.0129 c</td>
<td>0.012 c</td>
<td>0.010</td>
<td>0.006 b</td>
<td>0.006 b</td>
<td>0.005 a</td>
<td>0.006 b</td>
<td>-0.005</td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.003</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.005</td>
</tr>
<tr>
<td>Rain</td>
<td>-0.002</td>
<td>0.009</td>
<td>0.001</td>
<td>-0.002</td>
<td>-0.003</td>
<td>-0.023</td>
<td>-0.003</td>
<td>-0.009</td>
</tr>
<tr>
<td>Unemp</td>
<td>-0.004 c</td>
<td>-0.004 c</td>
<td>-0.002</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.003</td>
<td>-0.002</td>
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<tr>
<td>CBT</td>
<td>-0.032</td>
<td>-0.443 b</td>
<td>-0.196</td>
<td>-0.309</td>
<td>-0.493</td>
<td>0.001</td>
<td>-0.537</td>
<td>-0.409</td>
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<tr>
<td>SpCam</td>
<td>-0.367 b</td>
<td>0.072</td>
<td>0.015</td>
<td>0.129</td>
<td>0.203</td>
<td>0.152</td>
<td>0.431</td>
<td>0.192</td>
</tr>
<tr>
<td>Advert</td>
<td>-0.343 c</td>
<td>-0.290 b</td>
<td>-0.349 b</td>
<td>0.010</td>
<td>-0.366</td>
<td>-1.051 c</td>
<td>-0.449</td>
<td>-0.072</td>
</tr>
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Note: Estimated coefficients are reported in the first row and standard errors in the second row; a,b,c denotes statistical significant at $\alpha = 0.1, 0.05$ and 0.01 levels.

Discussion

Our results indicate that the LTSA advertising campaign reduced fatal accident rates in New Zealand, related to alcohol, drugs, and speed, among male drivers aged 15-24, 25-34, and 35-54. Thus, our hypothesis related to age is partially supported. The campaign was also effective in reducing such accidents among female drivers aged 25-34. Thus, our hypothesis related to sex is only partially supported.

Although not the primary focus of this study, the other tools used by the LTSA were only marginally effective. The CBT campaign was effective in reducing the number of fatal crashes involving male drivers between the ages of 25-34. The speed camera program was only effective among males between the ages of 15 and 24.

Our results confirm earlier work by Cameron and Vulcan (1998) and Tay (1999), who found a significant negative relationship between the advertising campaign and the road toll. We also found that the campaign was effective, but only among particular segments of the driving public. Our finding also confirms earlier research on the use of fear appeals, which indicated that fear appeals are only effectively used with certain groups and not the entire population. Thus, public policy makers should continue to use caution in developing social marketing campaigns that utilise fear as the primary appeal. In designing marketing campaigns, segments of the public need to be evaluated in terms of their likely response to different intensities of threats and on the relevance of potential hazards (e.g., dying in a car accident, being caught by a law enforcement officer, paying a fine).

References


