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Effect of Universal Motorcycle Helmet Laws and Speed Limit Laws on Motorcycle Safety

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I. Background

Importance of the Topic
- More than 8 million motorcycles were registered in the United States in 2011, and nearly 500,000 motorcycles were sold in 2012.
- In 2011, 4,612 motorcyclists were killed in crashes and 81,000 were injured.
- Per miles travelled, motorcyclists are 30 times more likely than passenger car occupants to die in a crash.

History of Motorcycle Helmet Laws
- In 1967, the federal government required states to enact universal motorcycle helmet laws to qualify for certain highway safety funds.
- In 1976, Congress revoked federal authority to assess penalties for noncompliance, and states began to weaken helmet laws, adapting them so they applied only to young or novice riders.

History of Motorcycle Speed Limit Laws
- In the mid-1970s Congress established a national maximum speed limit by withholding highway funds from states that maintained speed limits greater than 55 miles per hour.
- Congress repealed the national maximum speed limit in 1995. Since then, 34 states have raised speed limits to 70 mph or higher on some portion of their roadway systems.

II. Research Questions and Hypotheses

Research Questions
- Are helmet laws effective at reducing motorcyclist fatalities?
- Are speed limits effective at reducing motorcyclist fatalities?

Hypotheses
- H1: The existence of a state universal helmet law reduces the motorcyclist mortality rate.
- H2: A high speed limit increases the motorcyclist mortality rate.

III. Data and Research Method

Data Sources
- The motorcyclist mortality & state speed limit data come from the U.S. Department of Transportation.
- The state population data come from the U.S. Census Bureau.
- Data for 48 states were collected between January and September 2013.

Dependent variable
- Motorcyclist mortality rate - the number of motorcyclist fatalities per 10,000 population (Fig. 1).

Independent variables
- Universal helmet law (1 = states that have universal motorcycle helmet laws; 0 = partial helmet laws or no helmet laws) (Fig. 2).
- Speed limit (7 categories) (Fig. 3).

Method
- Since the dependent variable is the continuous variable, the multiple linear regression is used to estimate the model.

IV. Results

Table 1. Regression model of motorcyclist fatalities per 10,000 registered motorcycles, 2013

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>S.E.</th>
<th>t-statistic</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-7.69*</td>
<td>16.03</td>
<td>-0.48</td>
<td>45</td>
</tr>
<tr>
<td>Universal helmet law</td>
<td>-4.11*</td>
<td>1.68</td>
<td>-2.88</td>
<td>45</td>
</tr>
<tr>
<td>Speed limit</td>
<td>0.14</td>
<td>0.14</td>
<td>0.83</td>
<td>45</td>
</tr>
<tr>
<td>No. of observations</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.307</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F-statistic (df) 7.13* (df 47)

Adjusted R2 0.307

Methodology
- Regression model of motorcyclist fatalities per 10,000 registered motorcycles, 2013

V. Conclusion

- On average, approximately 4 fewer fatalities per 10,000 registered motorcycles occurred in states with universal coverage than in states with partial laws or no laws.
- The reinstatement of repealed and reinforcement of weakened helmet laws should be a priority of state public officials and anybody concerned about motorcyclist mortality rates and high medical costs associated with accidents.
- Reducing speed limits in conjunction with educating riders will also lower motorcyclist mortality rates.

VI. Future Research

- Future research should include other variables that are associated with fatalities such as minimum legal drinking age, 0.08 blood alcohol concentration law, adult population, per capita income, and per capita alcohol consumption.

VII. References


VIII. Acknowledgments

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