Highway Loss Data Institute Bulletin

Motorcycle Collision Coverage Claims in States with Required Motorcycle Rider Training

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INTRODUCTION

Motorcycles are less stable and less visible than automobiles and tend to have higher power-to-weight ratios. When motorcycles crash, their riders lack the protection of an enclosed vehicle, so they are more likely to be injured or killed. The National Highway Traffic Safety Administration (2008) estimates that per mile traveled in 2006, the number of deaths on motorcycles was about 35 times the number in automobiles. Since 1997 motorcyclist deaths have more than doubled, and motorcyclists accounted for 14 percent of all motor vehicle crash deaths in 2008. More motorcyclists were killed in crashes in 2008 than in any other year since 1975. In contrast, fewer passenger vehicle occupants died (25,428) in crashes in 2008 than in any year during this time period.

Because motorcycles do not have an enclosed occupant compartment, a key to reducing injuries and fatalities is to reduce the number of crashes. One countermeasure aimed at reducing motorcycle crashes is safety training. Three states currently require training for riders of all ages: Florida, Maine, and Rhode Island. The requirement in Florida is relatively new, enacted July 1, 2008. There also are 16 states that require rider education for license applicants younger than a specified age. Appendix A lists the states with training requirements and applicable ages. The purpose of this Highway Loss Data Institute (HLDI) bulletin was to determine whether states requiring rider education have lower motorcycle crash risk for those subject to the requirement than states without a requirement.

METHODS

Regression analysis was used to quantify the effect of state level training requirements on motorcycle collision claim frequency while controlling for other covariates. Covariates included vehicle age (defined as the calendar year minus the model year), motorcycle class, rated driver (rider) gender, vehicle density (defined as the number of registered vehicles per square mile in the garaging location of the motorcycle), deductible range, and control frequency (defined as the frequency of riders ages 30-59 by state). The claim frequency for riders ages 30-59 in the model was added to control for variations in state level claim frequencies unrelated to rider education programs (e.g., length of riding season).

For the purposes of this analysis, states were separated into two groups: the 28 states without training requirements, and states with training requirements for riders younger than 21. Florida was included in the group of states with training requirements for riders younger than 21, and data from 2008 were eliminated from analysis after the requirement was extended to all ages. Massachusetts was excluded from analysis because the HLDI database does not contain driver ages for that state. States with training requirements for riders younger than 18 or 16 were excluded from analysis because the amount of exposure in the HLDI database for these riders was too low to allow for credible analysis. The District of Columbia was also excluded due to sparse data. Due to very limited exposure and no claims in the chopper and sport touring classes for the under 21 age group those classes were omitted from this study.

Claim frequency was modeled using a Poisson distribution with a logarithmic link function. Reference categories for the categorical independent variables were assigned to the values with the highest exposure. Reference categories were defined as follows: motorcycle class = cruiser, gender = male, density = 100-499 registered vehicles per square miles, and deductible range = $251-$500. The key independent variable in the model, rider education requirement, was treated as categorical (either 0 or 1, depending on state and year).

RESULTS

Summary results of the regression analysis of motorcycle collision claim frequencies for riders younger than 21 using the Poisson distribution are listed in Table 1. The control group claim frequency, vehicle age, motorcycle class, vehicle density, and deductible

TABLE 1 SUMMARY RESULTS OF LINEAR REGRESSION ANALYSIS

	DEGREES OF FREEDOM	CHI-SQUARE	P-VALUE
Control Claim Frequency	1	18.620	<.0001
Vehicle Age	1	92.170	<.0001
Motorcycle Class	7	647.560	<.0001
Rider Gender	2	5.070	0.079
Vehicle Density	2	6.650	0.036
Deductible Range	6	43.720	<.0001
Rider Education	1	2.340	0.126

range all had significant effects on the frequency of collision claims of young riders (p-values <0.05). The p-value for rider gender was 0.0793, suggesting it also affects claim frequency. The p-value for the rider education requirement was 0.1257.

Detailed results of the regression analysis using collision claim frequency for riders younger than 21 as the dependent variable are listed in Table 2. Also listed are the estimates and significance levels for the individual values of the categorical variables. To make results more illustrative, a column was added that contains the exponents of the estimates. The exponent of the intercept equals 0.000113 claims per day, or 4.13 claims per 100 insured vehicle years. The intercept outlines claim frequencies for riders younger than 21, where the values of the continuous variables are set to 0 and the reference (baseline) categories: the estimate corresponds to the claim frequency for a new cruiser class motorcycle, ridden by a male, with a deductible of $251-$500 and garaged in a state without an education requirement in an area with 100-499 registered vehicles per square mile.

The remaining estimates are in the form of multiples, or ratios relative to the reference categories. For example, the estimate corresponding to the super sport class equals 1.68, so super sport motorcycles had estimated collision claim frequencies 5.4 times that of cruisers. The estimate for the control group claim frequency (0.155) indicates that an increase of 1 claim per day for this group results in a 17 percent increase in claim frequency for the study group.

Table 2 Detailed Results of Linear Regression Analysis of Collision Claim Frequencies

Parameter	Estimate	Exponent Estimate	Standard Error	Chi-Square	P-Value
Intercept	-9.086	0.000	0.134	4581.080	<.0001
Control Frequency	0.155	1.168	0.035	20.090	<.0001
Vehicle Age	-0.225	0.799	0.024	85.140	<.0001
Motorcycle Class					
Dual Purpose	-1.123	0.325	0.363	9.550	0.002
Scooter	-0.309	0.734	0.239	1.680	0.195
Sport	1.001	2.721	0.111	81.000	<.0001
Standard	0.907	2.476	0.210	18.660	<.0001
Super Sport	1.679	5.361	0.092	336.220	<.0001
Touring	-0.418	0.658	0.507	0.680	0.410
Unclad Sport	1.203	3.331	0.138	75.800	<.0001
Cruiser	0	1	0		
Rated Driver Gender					
Female	-0.304	0.738	0.142	4.590	0.032
Unknown	-0.002	0.998	0.056	0.000	0.968
Male	0	1	0		
Vehicle Density					
0-99	-0.130	0.878	0.059	4.870	0.027
500+	0.019	1.019	0.063	0.090	0.762
100-499	0	1	0		
Deductible Range					
$51-$100	-0.1566	0.8550	0.1339	1.37	0.2423
$501-$1,000	-0.1274	0.8804	0.0641	3.95	0.0470
$101-$200	-0.5206	0.5942	0.1458	12.75	0.0004
$201-$250	0.2885	1.3344	0.079	13.33	0.0003
$1-$50	0.1169	1.1240	0.3106	0.14	0.7066
>$1,001	-1.1632	0.3125	0.5015	5.38	0.0204
$251-$500	0	1	0		
Rider Education					
<21	0.097	1.102	0.063	2.370	0.124
None	0	1	0		

Motorcycle class was highly significant in predicting motorcycle collision claim frequency. Among the statistically significant estimates, exponent values ranged from 0.35 for dual purpose to 5.4 for super sport. Motorcycles with the highest deductibles were estimated to have claim frequencies approximately 70 percent lower than those with the reference deductible. The highly significant estimate for vehicle age corresponded to a decrease in predicted claim frequencies of 20 percent per year. Female riders had estimated claim frequencies 26 percent lower than those for males. Motorcycles garaged in areas with the lowest vehicle density were predicted to have claim frequencies 12 percent lower than those for the reference category, whereas the estimate for motorcycles in the highest density areas was not statistically different from that for the reference category.

The estimate corresponding to rider education (0.0971) was not statistically significant. However, contrary to the intent of training laws, it suggests a 10 percent increase in collision claim frequencies for riders younger than 21 in states where they are subject to an education requirement. The lack of statistical significance means it cannot be said with confidence that the collision claim frequencies of riders subject to a state education requirement actually are more likely to crash than riders of a similar age. However, if the increase is in fact real, one potential explanation might be that in some states, a participant is fully licensed upon completion of a course. This could, in practice, shorten the holding period for the permit and hasten riding.

It is important to emphasize that this analysis does not answer the question of whether riders who voluntarily take rider education courses have higher or lower crash risk. To conduct that analysis, HLDI would need to know which rated drivers (riders) had training and which did not. This is not a data element currently in the HLDI database.

REFERENCE

National Highway Traffic Safety Administration. 2008. Traffic safety facts, 2007. Washington, DC: US Department of Transportation.

Appendix A Motorcycle Training Requirements by State

No training requirements
Alabama
Alaska
Arkansas
Colorado
D.C.
Georgia
Hawaii
Indiana
Kansas
Kentucky
Louisiana
Massachusetts
Mississippi
Missouri
Montana
Nebraska
Nevada
New Jersey
New York
North Carolina
Oklahoma
Pennsylvania
South Carolina
South Dakota
Tennessee
Utah
Vermont
Virginia
West Virginia
Wyoming

Univeral training requirements
Florida (after July 2008)
Maine
Rhode Island

Training required for riders younger than 21
California
Florida (before July 2008)
Idaho
Oregon

Training required for riders younger than 18
Connecticut
Delaware
Illinois
Iowa
Maryland
Michigan
Minnesota
New Hampshire
New Mexico
Ohio
Texas
Washington
Wisconsin

Training required for riders younger than 16
North Dakota

Other requirements on training
Arizona requires either parental certification of at least 30 hours of supervised riding or training

The Highway Loss Data Institute is a nonprofit public service organization that gathers, processes, and publishes insurance data on the human and economic losses associated with owning and operating motor vehicles.

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