



# Mississippi Log Trucking Liability Insurance Rates: A Hedonic Analysis

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Rising liability insurance rates have negatively impacted log trucking businesses in Mississippi, and consequently timber prices. Business owners were surveyed for data to construct a hedonic regression model to identify log trucking business characteristics influencing annual liability insurance premiums. Attributes' marginal implicit prices were then calculated at the predicted mean premium when all were entered at their sample averages. Exposure on public roads was the more statistically significant factor considered by insurers. Safety and weight violations were the more financially significant factors for log trucking firms. Years in business provided some correction to the mean premium. Investments in safety technologies and practices did not decrease insurance costs per se but reducing failed roadside inspections- and most importantly crashes- limit escalating liability insurance premiums.

## Log Trucking

- Most common transportation mode in USA
- Costliest stump to mill process
- From 2012 to 2022, liability insurance cost per mile increased 40% for the US trucking industry (American Transportation Research Institute)
- Those increases linked to high risk, rising cost of claims from lawsuits, and inflation relating to equipment and medical costs
- Truck premiums increased by 50% for Georgia log truckers- 3 times higher than other freights
- Substantial variation in liability insurance rates paid by individual companies also reported
- Dispersion attributed to adverse in-woods conditions, travelling on rural roads, severity of the accidents, use of older trucks compared to other industries, and inconsistent repair and maintenance procedures
- Mississippi log trucker insurance premiums range from \$4,000 to over \$24,000 per truck per year

## Objectives

- Survey Mississippi log trucking firms regarding organization, structure, and operating characteristics
- Apply hedonic modeling to the determine marginal implicit values of firm traits significantly influencing log trucking liability insurance premiums

## Methods

- Mix-mode survey of Mississippi log trucking businesses
  - Intercept at logger chapter meetings
  - Email
  - QR code
- Hot Deck Imputation estimated missing data except for *safetyvio*, *servicevio*, and *weightvio*
  - Did omissions mean there were no violations? Or was there another reason for not providing the information?
  - n = 85

$$\ln(\text{Truck Premium}) = \ln\alpha_0 + \alpha_1 \ln(\text{yearshauling}) + \alpha_2 \ln(\text{ownerage}) + \alpha_3 \ln(\text{milesperyear}) + \alpha_4 \ln(\text{hauldistance}) + \alpha_5 \ln(\text{loadsperweek}) + \beta_1 \text{numberdrivers} + \beta_2 \text{safetyvio} + \beta_3 \text{servicevio} + \beta_4 \text{weightvio} + \beta_5 \text{safetytechpracts} + \varepsilon$$

$$MIP_x = \left[ \left( \left( e^{\frac{\alpha_i}{\bar{x}_i}} - 1 \right) * 100\% \right) * \bar{Y} \right]$$

$MIP_x$  = Marginal implicit price of logged continuous variables  
 $e$  = Base of Natural Logarithm = 2.7818282  
 $\alpha_i$  = Hedonic regression coefficient associated with  $x_i$   
 $\bar{x}_i$  = Mean of untransformed values of nonlinear continuous predictor variable  $x_i$   
 $\bar{Y}$  = Predicted mean liability insurance premium at the average levels of all  $x$  and  $z$

$$MIP_z = \left[ \left( \left( e^{\beta_j} - 1 \right) * 100\% \right) * \bar{Y} \right]$$

$MIP_z$  = Marginal implicit price of linear discrete variables  
 $e$  = Base of Natural Logarithm = 2.7818282  
 $\beta_j$  = Regression coefficient associated with  $z_j$   
 $\bar{Y}$  = Predicted mean liability insurance rate at the average levels of all  $x$  and  $z$

## Results

Variable	Mean	Median	Min	Max	t value	p value
Truck Premium	\$12,466	\$11,580	\$4,000	\$24,404		
<i>Years Hauling</i>	20.3	18	1	60	-0.1224	0.0442
Owner Age	51.3	52	27	81	0.3249	0.1709
<i>Miles per Year</i>	69,531	70,003	20,000	174,993	0.2709	0.0044
Haul Distance	56.5	59	30	100	-0.2311	0.1595
Loads per Week	16.9	13.5	5	90	0.0578	0.4766
Number Drivers	3.91	3	0	16	-0.0048	0.8064
<i>Safety Violations</i>	0.19	0	0	3	0.2431	0.0118
Out of Service Violations	0.04	0	0	0.67	-0.0546	0.8718
<i>Overweight Violations</i>	0.83	0.57	0	4	0.1031	0.0339
Safety Technologies and Practices	7.03	7	1	16	-0.0097	0.4939

On average...

- A discount of **(\$72.42)** accrued to the mean premium for each year of owner experience
- Every 1,000 miles traveled by log trucks per year contributed **\$50.00** to the mean premium
- Each safety violation impacted the mean premium by **\$3,320**
- An overweight violation affected the mean premium by **\$1,310**

## Implications

- Citations work to decrease crash probability. Reducing log truck traffic accidents is the most reliable way to lower the impact of rising liability insurance rates.
- Challenges associated with rising insurance rates are amplified due to the number of hauls on rural county and state roads. These road classes are comprised of intersections, school zones, and traffic lights. 85% of Mississippi's 74,000 road miles occur in rural areas.
- Accident frequency, severity, along with other variables can provide additional clarity for future hedonic models.