Did The Implementation of Texting While Driving Legislation Decrease the Amount of Non-Vehicle Occupant Fatalities?

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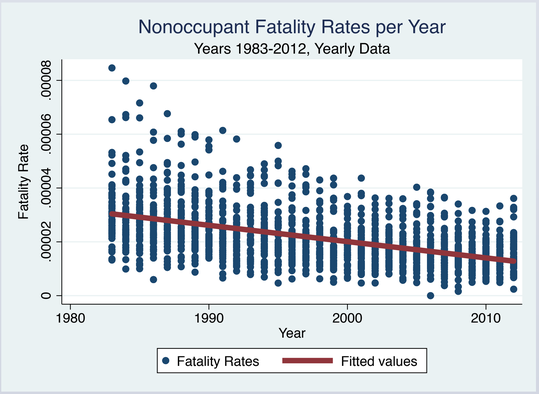
Abstract

After running a staggered-entry fixed effect regression to determine whether non-texting legislation had a decreasing effect on non-occupant fatalities, I failed to find any significant impact, indicating that while nonoccupant fatality rates have decreased over time, it appears this decrease most likely came from other factors. This finding puts into question why this legislation has not achieved its desired effect and if this legislation even applies to nonoccupant fatalities.

Introduction

Distracted driving is an important issue, as just in 2017 alone, it lead to 3,166 deaths (NHTSA, 2019). Of these different forms of distracted driving, cellphone use is associated with a significantly increased crash risk (Owens et. al, 2018), and a reported 2.9% of all drivers used handheld cell phones while driving in 2017 (NHTSA, 2019). Largely buoyed by a story my coworker told me about an individual almost running her over because he was looking at his phone instead of paying attention to the road, I wanted to test to see if non-texting legislation truly had an effect at decreasing non-occupant fatality rates since its implementation.

As I used a dataset which consisted of the yearly traffic fatalities across the 50 states from 1983-2012, I wanted to first observe the trend in nonoccupant fatalities over the years.



Fg.1 Two-way scatterplot with best-fit line demonstrating nonoccupant fatality rates per state by year, which demonstrates a decreasing trend

As seen in the figure above, over the years the total nonoccupant fatality rate had been decreasing, providing an indication that in fact non-texting legislation could have had an impact at decreasing the fatality rate.

Methodology and Data

As my question revolves around whether non-texting while driving legislation leads to a decrease in non-occupant fatality rates, my dependent variable for this model would in fact be non-occupant fatality rates. I created this variable by simply taking the number of nonoccupant fatalities per state and dividing it by the total population of each state. My variable of interest in this model would be the effect of the non-texting legislation in the treatment group indicated by my treatment variable. Additionally, as I wanted to create the most robust and predictive model I could, I constructed the control variables of total vehicle miles traveled, and total density of cars on roads, as both have an impact on amount of accidents independent of the treatment effect. Lastly, I chose to also include the control variable of average age as cellphone use is very prevalent among younger age groups. After setting up my variables, I used the following equation to determine if non-texting legislation had an impact on nonoccupant fatality rates.

$$Y_{it} = \alpha_i + \delta_t + \beta_0 + \beta_1 \chi_{it} + \beta_2 \chi_{it} + \beta_3 \chi_{it} + \beta_4 \chi_{it} + \varepsilon_{it}$$

α_i= State Fixed Effect δ_t= Time Variable β_0= Constant
β_1= Non-Texting Legislation Treatment Effect β_2=Average Age Effect
β_3=Total Vehicles Miles Traveled Effect β_4=Total Density of Cars Effect
ε_{it}= Error Term

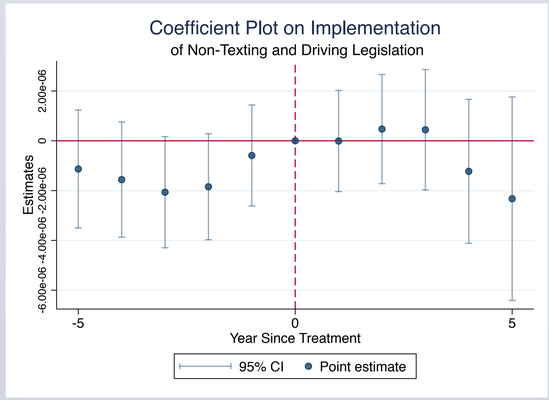
Results

Regressions Determining if Non-Texting Legislation Had an Effect in Decreasing Non-Occupant Fatality Rates

	(1)	(2)	(3)
VARIABLES	Fatality Rate	Fatality Rate	Fatality Rate
Total Density of Cars			-1.15e-06
			(9.55e-07)
Total Vehicle Miles Travelled			-8.25e-11***
			(0)
Average Age		6.22e-07**	-5.73e-07**
		(2.56e-07)	(2.91e-07)
Treatment	-1.23e-06	9.15e-07	1.03e-06
	(1.34e-06)	(6.86e-07)	(6.68e-07)
Constant	3.21e-05***	1.09e-05	5.60e-05***
	(1.31e-06)	(8.76e-06)	(1.03e-05)
Observations	1,530	1,530	1,500
R-squared	0.253	0.599	0.622
Number of States		50	50

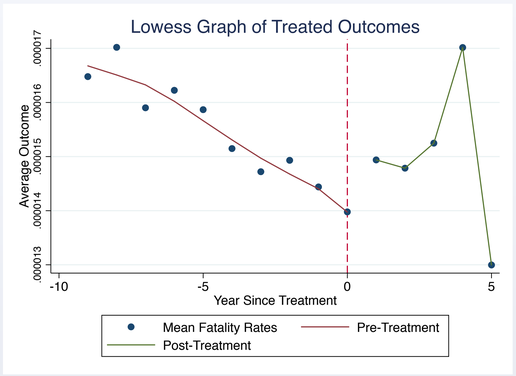
Model 1 Regression is a Pooled OLS without controls, Model 2 &3 Regressions are Fixed Effects with Controls. Omitted from this table are the dummied out time variables.
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As seen in the table above, after running two simpler regressions before ultimately arriving at our final regression, I fail to come to the conclusion that the treatment variable is statistically significant, and as a result fail to reject the null hypothesis that non-texting legislation did not effect non-occupant mortality rates. This implies that this legislation does not appear to have any effect.



Fg. 2 Coefficient plot demonstrating the point estimates of fatality rates in years before and after treatment.

As I wanted to measure the validity of my model, I ran a coefficient plot to determine if my model suffered from an ashenfelter's dip or from a failure to satisfy the assumption of parallel trends. As seen in the figure above, there appears to be no violation of the parallel trends assumption as the point estimates do not reach 0 until after the treatment year. Secondly there is no sudden jump between points indicating that there is not an ashenfelter's dip present.



Fg. 3 Depiction of average nonoccupant fatality rates before and after treatment, displays rapid increase then fall.

Lastly as I wanted to test for the endogenous timing of adoption, I used a lowess graph to restrict our sample to the treated units and to compute the average outcome for each time relative to treatment. From this graph one can see that leading up to the treatment year, the average outcome rates were decreasing, but after the treatment was implemented, these rates actually increased, before decreasing to rates that resembled the trajectory before the treatment was even implemented. This observation mirrors the conclusion from the regression table that non-texting while driving legislation appears to not have not had an effect on fatality rates.

Conclusions

After conducting this study into determining into whether non-texting while driving legislation had an effect on decreasing the nonoccupant fatality rate, I ultimately came to the conclusion that it did not appear to have an effect. This begs to ask further questions surrounding this legislation, specifically in aspects such as if it was simply nonoccupants who were not effected by this legislation, or whether there is a failure to enforce such a difficult policy for police officers to measure.

As a result of the implication of this study I believe that policymakers should move to take additional steps to tackle the issue of cellphone use while driving. This should specifically include looking for more ways to monitor individuals while driving, as non-compliance appears to be most obvious reason why in this study non-texting legislation appeared to not have an effect nonoccupant fatality rates.

References

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Owens, J.M., Dingus, T.A. , Guo, F. , Fang, Y. , Perez, M. & McClafferty, J. (2018). Crash Risk of Cell Phone Use While Driving: A Case – Crossover Analysis of Naturalistic Driving Data. *AAA Foundation for Traffic Safety.*