

Does a law of mandatory IID after conviction for the first DUI offense reduce Traffic Fatalities?

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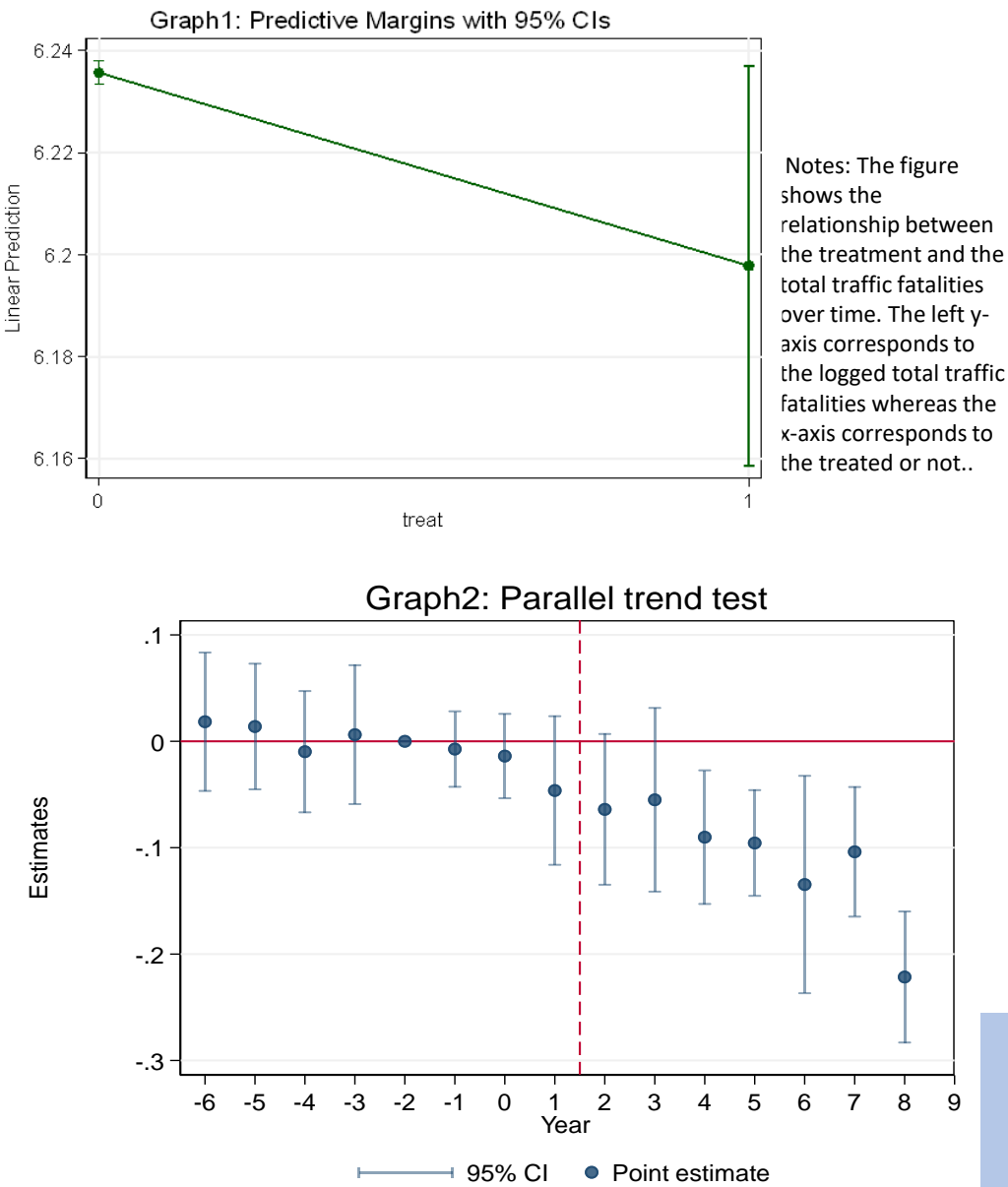
Introduction

Drink driving is an important risk factor for road traffic accidents (RTAs), which cause high levels of morbidity and mortality globally. If a person was arrested for DUI/DWI, he should blow into an ignition interlock device (IID), which measures the alcohol in a person's system. If that amount exceeds a pre-programmed level, then the interlock temporarily locks the vehicle's ignition.

All 50 states and the District of Columbia have ignition interlock device laws. MADD is pushing for all states to require the devices for all DUI/DWI offenses, including all first offenses. As of 2019, 32 states and Washington DC have an all-offender Requires, so anyone arrested with .08 or higher blood alcohol content (BAC) must have an ignition interlock device installed in their vehicle in order to get their full driving privileges back.

A study published in the American Journal of Preventive Medicine called "Ignition Interlock Laws: Effects on Fatal Motor Vehicle Crashes, 1982–2013" IID laws mandating ignition interlock devices for ALL drunk driving offenders resulted in a 7% reduction in the number of drunk driving crashes involving a fatality.

I therefore aimed to assessed whether states set a law to require IID as mandatory after conviction for the first DUI offense between 1983 and 2012 experienced post-law reductions in traffic fatalities.



Notes: The figure shows the relationship between the treatment tau and the total traffic fatalities over time.

Methods and Data

The model I use is **standard differences-in-differences model**. **Main policy independent variable** is whether a state set a law that an ignition interlock is mandatory after conviction for the first DUI offense between 1983 and 2012, which is set as "treated_{it}". This dummy variable takes the value of one if observation I received treatment in period t, and zero otherwise. **Main outcome is Total Traffic Fatalities in those states**, which is "lfatality_{it}".

Since the data is panel data which contains both time-series variable (δ_t) and cross-sectional variables, where α_i is the state unit fixed effect, so I select **the Fixed Effects regression model**, and make transformations for some variables.

First, I set a cross-sectional model with time fixed effect regression, and notice that there is a negative relationship between treatment and total traffic fatalities. As showing in the **Graph1**, after the policy treated, the traffic fatalities decreases, so the law makes effects, but this model includes bias.

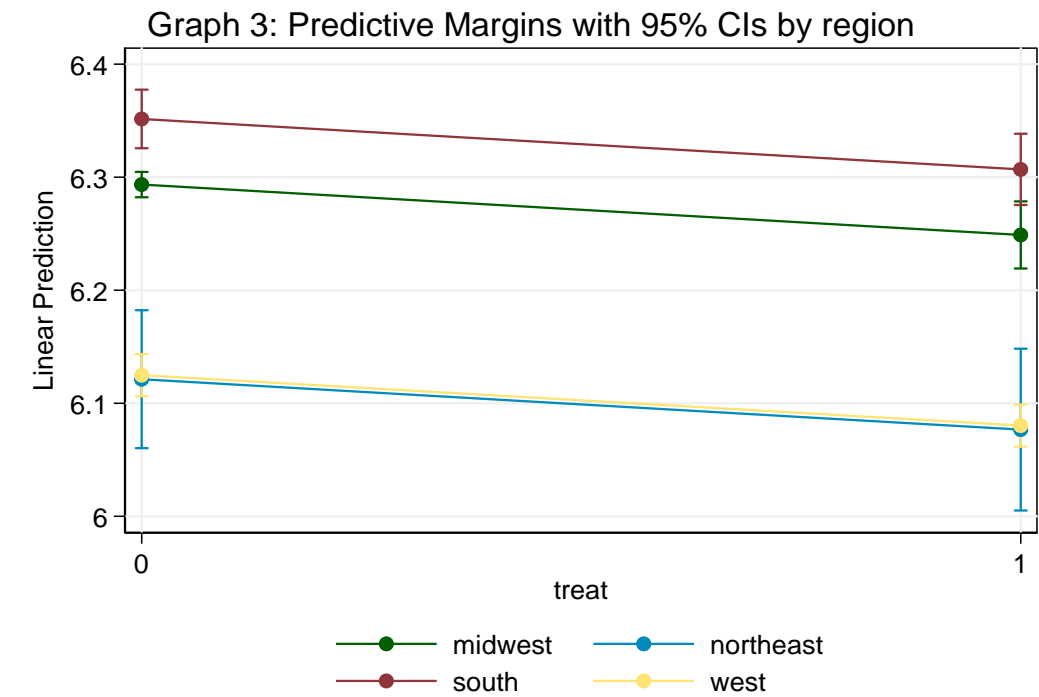
Then, I added other control variables to avoid omitted variable bias and alleviate endogeneity. Per capita personal income (dollars) (lincome_{it}), unemployment rate (unemprte_{it}) in a state and number of violent crimes (lviolent_{it}) may influence the total traffic fatalities.

Regression model:

$$\text{lfatality}_{it} = \alpha_i + \delta_t + \beta_1 \text{treated}_{it} + \beta_2 \text{lincome}_{it} + \beta_3 \text{unemprte}_{it} + \beta_4 \text{lvioleat}_{it} + \varepsilon_{it}$$

Next, the key assumption of DID is that in the absence of treatment, the evolution of the outcome variable for the treated group would have been the same as for the control group, so I conducted parallel trends test showing in the **Graph2**. The coefficients for the negative values of tau (pre-treatment) are insignificant, so there is evidence that the parallel trends assumption is likely to hold.

I conduct the regression model at region level. I set different states into different region as **West, Midwest, Northeast and South** and run the final regression.



Results

As showing in the table, Column 1 of Table 1 shows the relationship between treatment and the logged traffic fatalities including time controls. The result indicates that after mandatory ignition interlock law treated, the traffic fatalities changes in -3.79 percentage points, but not statistically significant. Column 2 of Table 1 reports the results when controlling time trend and other control variables. The result indicates that after mandatory ignition interlock law treated, a -4.46 percentage points decrease happens in the traffic fatalities. In region-level FE regressions, I control for unobserved cross-sectional variation between observations and combined with adding time dummies.

Therefore, I conclude that there is a negative relationship between treatment of the interlock law and the total traffic fatalities. As Graph3 shows, at region level, the negative relationship exists.

Table 1: regressions of "whether a state set a law that an ignition interlock is mandatory after conviction for the first DUI offense" on the logged total traffic fatalities

VARIABLES	(1)	(2)
	(log) traffic fatalities	(log) traffic fatalities
Treated	-0.0379 (-1.786)	-0.0446** (-3.533)
(log)income		0.280 (0.819)
Unemployment rate		-0.0170 (-2.257)
(log) number of violent crimes		0.262*** (16.82)
Constant	6.293*** (142.3)	1.398 (0.421)
Observations	1,530	1,530
R-squared	0.394	0.540
Number of state1	51	51
States FEs	Yes	Yes
Time FEs	Yes	Yes

Note: Standard errors clustered at the region level are in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Conclusions

After my analysis, the treatment, whether states set a law to require IID as mandatory after conviction for the first DUI offense has a post-law reduction in traffic fatalities. Therefore, based on the current situation, if each state requires the IDD as mandatory after the first DUI offence, the fatalities of traffic accidents will be smaller than before.

References

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