Towson University
Department of Economics
Working Paper Series

Working Paper No. 2016-17

The Effects of False Identification Laws with a Scanner Provision on Underage Alcohol-Related Traffic Fatalities

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April 2020

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Abstract

We examine the effects of policies aimed at restricting the use of false identification to purchase alcohol on traffic fatalities involving alcohol-impaired underage drivers. We find that the implementation of policies that incentivize alcohol retailers to adopt ID scanners reduces traffic fatalities from accidents involving 16-18 year old drivers with a BAC$\geq$0.08, but we do not find that similar policies like vertical ID laws lead to statistically significant changes in traffic fatalities involving underage impaired drivers. A back-of-the-envelope calculation suggests that if all remaining states passed ID scanner laws, the reduction in underage alcohol-related fatal accidents would generate nearly $730 million in annual economic benefits.

Keywords: Underage alcohol consumption; Drunk driving; Alcohol related traffic fatalities; DWI; False ID; Fake ID; Scanner provisions; Vertical ID laws
JEL Codes: I12, I18

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We thank Kitt Carpenter, Mike Pesko, participants at the 2017 Midwestern Economic Association Meetings, the 2019 American Society of Health Economists Annual Meetings, and a seminar at The Ohio State University for helpful comments.

1 Introduction

Motor vehicle accidents are the leading cause of death among 16 to 20 year olds, and in 2017, 15 percent of 16-20 year old drivers involved in fatal motor vehicle crashes had a blood alcohol content (BAC) of at least 0.08 (Centers for Disease Control and Prevention, 2019). Although all 50 states and the District of Columbia follow the federal minimum legal drinking age (MLDA) and zero-tolerance policies (BAC limit of 0.02 or lower), a significant portion of youths still consume alcohol and participate in drinking and driving (Centers for Disease Control and Prevention, 2019). Many studies examine a wide variety of policies aimed at reducing alcohol use and alcohol-related outcomes, including increases in the MLDA (Carpenter and Dobkin, 2009; McCartt et al., 2010; Yörük and Yörük, 2011, 2013; Voas et al., 2003), zero-tolerance policies (Carpenter, 2004; Zwerling and Jones, 1999), and alcohol taxes (Ruhm, 1996; Chaloupka et al., 2002; Markowitz and Grossman, 2000; Markowitz, 2000, 2005; Markowitz et al., 2012; Cook and Durrance, 2013).

However, there has been little recent variation in most of these policies. For example, all 50 states had passed a MLDA of 21 by 1988; since 1991 the nominal federal alcohol excise tax has remained constant at roughly $0.21 per ounce of alcohol– only a handful of states have increased alcohol taxes in recent decades; and by the late 1990s, all 50 states and the District of Columbia had implemented zero-tolerance policies. In contrast, there has been more recent variation in alcohol-control policies targeting the use of false identification (false ID) to purchase alcohol, which attempt to restrict the supply of alcohol among the underage populace. Relatively few studies examine the effects of these growing number of false ID policies on underage alcohol consumption. Some notable exceptions are Bellou and Bhatt (2013), who study the implementation of vertical ID laws, and Yörük (2014), Zheng (2018), and Yörük (2018), who study laws providing incentives for retailers to adopt scanners to detect false IDs (FSP laws). Yörük (2014)'s study suggests that FSP laws can reduce underage drinking, whereas Zheng (2018) finds no effects of such laws.[1] Hence, there is not yet a consensus regarding the efficacy of false ID laws.

[1]Zheng (2018) raises concerns about the results in Yörük (2014). Among her main critiques are that she finds evidence of pre-trends in Yörük (2014)'s NLSY97 results and suggests that adding in the 1997 wave of the NLSY97 reduces the magnitude and statistical significance of Yörük (2014)'s results. Zheng (2018) also re-estimates the effects of FSP laws on underage alcohol consumption using the Youth Risk Behavioral Surveillance System (YRBSS) and finds no effects of FSP laws on drinking outcomes. Yörük (2018) responds, arguing, among other things, that the sample of respondents in the 1997 wave is too young to be informative in the FSP law debate and that the biannual nature of the YRBSS makes it less appropriate to examine the effects of FSP laws.

In this paper, we extend the analysis of these false ID policies to examine whether these policies reduce alcohol-related traffic fatalities involving an impaired underage driver. We use within-state variation in FSP laws and vertical ID laws in a differences-in-differences model, using administrative data from the National Highway Traffic Safety Administration (NHTSA) from 1998 to 2014 to measure the number of traffic fatalities involving impaired 16-18 year old drivers, 19-20 year old drivers, and 21-24 year old drivers. We collect information on alcohol control policies from the Alcohol Policy Information System (APIS) (National Institute on Alcohol Abuse and Alcoholism, 2020) and Bellou and Bhatt (2013), and we also examine several other state level alcohol laws including distinctive licenses, other provisions to support alcohol retailers in restricting supply of alcohol to minors (seizure of ID, affirmative defense laws, right to sue or detail the minor), BAC 0.08 limits, Sunday sales bans, and beer taxes.

In our main results, we find that the implementation of FSP laws reduces traffic fatalities involving impaired 16-18 year old drivers by between 14 and 23 percent, with less evidence that FSP laws affected traffic fatalities involving impaired 19-20 year old drivers. However, we do not find evidence that vertical ID laws change traffic fatalities involving impaired underage drivers. Our results are stable across a number of different specifications, and we also conduct two falsification tests, examining fatalities involving impaired 21-24 year old drivers and traffic fatalities involving non-impaired 16-18 year old drivers. We do not find statistically significant FSP law coefficients for either of these populations. Event study specifications suggest that FSP laws lead to an immediate and long-lasting decline in traffic fatalities among impaired 16-18 year old drivers, with some evidence of a decrease in the quarter preceding the implementation of FSP laws. We provide evidence that this is explained by retailers adopting ID scanners after the passage of FSP laws but before their implementation.

Our study makes a number of contributions and builds on previous research examining alcohol use and traffic fatalities. Most directly, we provide further evidence to a debate over whether FSP laws reduce underage alcohol consumption. Yörük (2014) and Yörük (2018) argue that FSP laws reduce underage alcohol consumption, while Zheng (2018) argues they do not. While the previous studies are largely based on survey data and questions about underage alcohol use, we study the impact of FSP laws on one of the largest, if not the largest, negative consequence of underage alcohol consumption – alcohol-related fatal deaths. Our data come from administrative records regarding fatal crashes, including detailed information about alcohol use among drivers involved in these fatal crashes. Thus, our study offers a different perspective to evaluate whether FSP laws reduce underage alcohol consumption. The statistically significant reduction in underage alcohol related traffic fatalities after the implementation of FSP laws lends support to Yörük (2014)'s and Yörük (2018)'s findings that FSP laws do in fact reduce underage alcohol use.

Relatedly, we also add to the understanding of the impacts of widespread false ID use among adolescents. Wechsler et al. (2000) and Wechsler et al. (2002) find that between 18% and 21% of college students report having used false ID. Similarly, Martinez et al. (2007) report that use of false ID increases from 17% in the fall semester of freshman year to 32% in the spring semester of sophomore year. Although possession of false ID is quite common among the underage populace in the U.S., little research has been conducted to understand its consequences. While we focus on FSP and vertical ID laws, we also examine other retailer support provisions, notably distinctive licenses and affirmative defense laws, which aid retailers in legal issues related to selling alcohol to a minor. Although we find negative and statistically significant relationships between some of these policies and traffic fatalities involving impaired underage drivers, there is limited variation in these laws within states during our period of analysis and thus we interpret these results with caution.

More broadly, we contribute to a number of studies that have examined the relationship between alcohol control policies, alcohol consumption, and negative consequences from alcohol consumption, including MLDA laws (Cook and Tauchen, 1984; Carpenter and Dobkin, 2009; Dee, 1999; McCartt et al., 2010; Yörük and Yörük, 2011, 2013; Voas et al., 2003; Zhang and Caine, 2011), zero-tolerance policies (Carpenter, 2004; Zwerling and Jones, 1999), alcohol taxes (Chaloupka et al., 1993; Ruhm, 1996; Chaloupka et al., 2002; Cook and Moore, 1993; Cook, 1987; Cook and Durrance, 2013; Pacula, 1998; Markowitz and Grossman, 2000; Markowitz, 2000, 2005; Markowitz et al., 2012; Mast et al., 1999; Son and Topyan, 2011), Sunday alcohol sales (Lovenheim and Steefel, 2011; Stehr, 2010), social hosting laws (Dills, 2010), and BAC laws (Dee, 2001; Eisenberg, 2003; Liang and Huang, 2008; Grant, 2010). Finally, our study also contributes to research examining the determinants of traffic fatalities and public policies which may intentionally or unintentionally affect traffic fatalities. Previous research in this literature has examined the relationship between traffic fatalities and smoking bans (Adams and Cotti, 2008), the minimum wage (Adams et al., 2012), macroeconomic conditions (Cotti and Tefft, 2011), casinos (Cotti and Walker, 2010), and cell phones (Abouk and

Adams, 2013; Cheng, 2015).

The rest of this paper is outlined as follows. Section 2 covers our data sources, Section 3 outlines our identification strategy, Section 4 describes our results, and Section 5 concludes.

2 Data

2.1 Alcohol-Related Fatal Accidents

This study uses data from the Fatality Analysis Reporting Systems (FARS) of the NHTSA from 1998 to 2014. The data reported in FARS is a nationwide census of fatal motor vehicle crashes. For each state, year, and quarter cell, we count the number of fatalities resulting from crashes involving drivers of different age categories. We focus on three age categories of drivers: (1) ages 16-18; (2) ages 19-20; and (3) ages 21-24. The first age category, ages 16-18, will measure the effects among underage drinkers most responsive to FSP laws, according to Yörük (2014), and also novice drivers. The second age category, ages 19-20, will measure the response among older underage drivers, and the third age category serves both as a falsification test (to see if the rate decreases in response to a policy only targeting underage drinkers) and as a test of whether a decrease in traffic fatalities involving impaired underage drivers results in an increase in traffic fatalities involving impaired drivers of legal drinking age a few years later, as more at-risk drivers reach legal drinking age.[2]

The NHTSA classifies accidents in three categories with respect to alcohol involvement: (1) fatal accidents not involving alcohol (BAC=0); (2) accidents where a driver had a BAC level greater than zero but less than 0.08 and; (3) accidents where a driver had a BAC$\geq$0.08. We define an alcohol-impaired driver based on a BAC$\geq$0.08. BAC levels at least 0.08 also represent drivers whose driving abilities are more likely impaired by alcohol use and thus accidents where alcohol played a more prominent role. Nevertheless, our results are robust to defining alcohol-related fatal accidents with a driver's BAC>0, which we discuss more in Section 4.2.

Although federal mandates require the measurement of BAC levels in all traffic accidents resulting in a fatality, BAC levels are unreported for roughly half of fatal accidents. The missing BAC levels in the FARS data set are imputed by using a "General Location Model (GLOM)," which

[2] While our main difference-in-difference models cannot examine this directly, our event study models, which we discuss below, can examine trends in traffic fatalities involving impaired 21-24 year old drivers in the years following the implementation of false ID laws.

models the probability of having a positive BAC level (see Rubin et al. (1998) for more details). The imputed value of the BAC level depends on factors like "age, gender, safety belt or helmet use, license expiration, prior traffic convictions, day of the week, time of the day, the role of the vehicle in the accident, whether the car remains on the road, the type of vehicle driven, and whether police at the accident believed drinking was involved" (Adams et al., 2012).[3] We use the imputation algorithm that is used to calculate the official statistics of NHTSA to impute the missing values of BAC levels and corroborate our statistics with NHTSA's official statistics.

2.2 Alcohol Control Policies

We record the year and quarter in which states implemented FSP laws using data from APIS (National Institute on Alcohol Abuse and Alcoholism, 2020). APIS defines these policies as follows, "State provides incentives to retailers who use electronic scanners that read birth date and other information digitally encoded on valid identification cards. Incentives may include an affirmative defense in prosecutions for sales to minors if the retailer can show that the scanner was used properly."[4] We additionally collect the year in which states mandated vertical IDs for minors from Bellou and Bhatt (2013). We also record the years and quarters in which five additional provisions supporting alcohol retailers went into effect according to APIS: 1) Retailers' power to seize identification without fear of prosecution (even if the identification is valid); 2) Affirmative defense (reducing retailers' liability if they provide alcohol to minors); 3) Providing retailers with the right to sue a minor; 4) Providing retailers with the right to detain a minor; and 5) Mandating distinctive underage licenses.

Table 1 shows the dates that these laws went into effect by state. Laws which appear at the beginning of our time period (1Q 1998) are shown in gray to highlight that there is no within-state variation for that state and policy combination. Currently, 11 states have a FSP law, and all of the states enacted such provisions between 1998 and 2014, the years corresponding to this study. This allows for sufficient within-state variation in FSP laws to identify the effect of FSP laws on

[3]The measure of imputed BAC level has been used by Adams et al. (2012) and Abouk and Adams (2013). The process of multiple imputation performed by the GLOM assumes a condition that non-response is ignorable, meaning that the missing values are independent of the BAC values, but can depend on other variables. The validation tests conducted using multiple imputation procedure in a sample of known BAC values suggested that "multiple imputation procedure is capable of preserving essential features of the BAC distribution" Rubin et al. (1998).

[4]See `https://alcoholpolicy.niaaa.nih.gov/apis-policy-topics/false-identification-for-obtaining-alcohol/39/variables#page-content` (last accessed April 3, 2020) for more information.

alcohol-related motor vehicle fatal crashes. As reported in Bellou and Bhatt (2013) and shown in Table 1, there is also substantial within-state variation in vertical ID laws. Other retailer laws are prevalent in only a handful of states. For instance, only five states have a law that provides retailers with the right to sue minors and only three states give retailers the right to detain minors. Although many states allow a retailers' provision of affirmative defense, there is little within-state variation during the time frame of our study. Similarly, although 26 states have implemented a distinctive license provision, there exists little within-state variation in these laws. Due to the lack of within-state variation, we interpret the effects of these other alcohol control policies with caution and particularly focus on FSP and vertical ID laws.

2.3 State Level Variables

We account for other state-specific alcohol control policies which may be correlated with the introduction of false ID laws and separately affect alcohol-related traffic fatalities. First, we include the combined real federal and state beer tax from the U.S. Brewers Association (2014) and APIS. We also include indicators for whether states had a ban on Sunday alcohol sales (including a local option) and a BAC limit of 0.08 for drunk driving from APIS.[5]

To account for the amount of driving and costs associated with driving we include the vehicle miles traveled for each state and each year from the Office of Highway Policy Information and the real state-level annual gasoline tax rates (per gallon), also from the Office of Highway Policy Information. We account for the implementation of state-level primary seat belt laws using data from the Centers for Disease Control and Prevention (CDC), and we control for state policies on texting while driving using data from Abouk and Adams (2013). Finally, we include an indicator for whether a state has a graduated license law from Karaca-Mandic and Ridgeway (2010).

Following the findings of Ruhm (1996) and Cotti and Tefft (2011), we control for annual state unemployment rates and the natural log of real per-capita income from the Bureau of Labor Statistics and the Bureau of Economic Analysis, respectively. We also include the quarterly state-level minimum wage, originally compiled by Allegretto et al. (2017), following the results from Adams et al. (2012). We convert all nominal dollar values to real 2014 dollars using the consumer price index.

[5] Local option laws are enacted by local governments and are less restrictive than the state law.

Because our dependent variable is a count, we control for the natural log of the age-specific population collected from the National Cancer Institute's SEER population database (National Cancer Institute, 2016) and organized by the National Bureau of Economic Research.

3 Identification Strategy

We follow a basic difference-in-differences framework where identification is generated by within-state variation in FSP and vertical ID laws over time. We estimate a regression model as follows:

$$\begin{aligned} D_{stq} = \exp(&\alpha_0 + \alpha_1 FSP_{stq} + \alpha_2 VID_{stq} + \boldsymbol{A_{stq}\alpha_3} + \boldsymbol{X_{stq}\alpha_4} \\ &+ Ln(pop_{stq}) + \sigma_s + \gamma_t + \eta_q + \theta_s t) + e_{stq} \end{aligned} \tag{1}$$

where D_{stq} represents the count of fatalities resulting from alcohol-related motor vehicle accidents involving impaired drivers for state s in year t and quarter q. Our main independent variables of interest are FSP_{stq} and VID_{stq}, indicator variables taking the value "1" if a state has a FSP or vertical ID law in a given year and quarter and "0" otherwise. We include a vector of other alcohol control policies discussed in Sections 2.2 and 2.3 in $\boldsymbol{A_{stq}}$, $\boldsymbol{X_{stq}}$ is a vector of other state characteristics discussed in Section 2.3, $Ln(pop_{stq})$ is the natural log of state population of 16-18 year olds (or respective age group), with its coefficient constrained to be one, σ_s, γ_t, and η_q refer to state, year, and quarter fixed effects, respectively, $\theta_s t$ represents state-specific linear time trends, and e_{stq} is an error term. We cluster our standard errors at the state level.

Figure 1 presents histograms of the number of traffic fatalities involving impaired 16-18 and 19-20 year old drivers, respectively. The figure demonstrates that the densities of both variables are skewed towards the right and consist of a preponderance of zeros. Given the discrete nature of our dependent variable with zero values, we estimate Equation (1) using a Fixed Effects Poisson (FEP) estimator. The FEP estimator is a quasi-maximum likelihood estimator that belongs to the linear exponential family. An advantage of using a Poisson regression model is that the FEP estimates are consistent even if the count does not follow a Poisson distribution. This model relies under a much weaker assumption that requires conditional mean, $\exp(X\beta)$, to be correctly specified (Cameron and Trivedi, 2009). A drawback of the Poisson regression model is equidispersion, the assumption that the conditional mean and conditional variance are the same. To account for this aspect, we calculate robust standard errors clustered at the state level, and we also test the robustness of our results to alternative estimation strategies, which we describe in more detail in the next section.

3.1 Robustness Tests

Our identification strategy rests on the assumption that in absence of false ID laws, the trend in alcohol-related traffic fatalities in states with false ID laws would be similar to states without false ID laws. A potential threat to the identification strategy is that the decision to implement false ID laws may be endogenous. Specifically, it is plausible that states experiencing a high level of underage drinking and alcohol-related traffic fatalities may decide to adopt false ID laws compared to states with lower levels of underage drinking and alcohol-related traffic fatalities. To account for this and other potential time varying factors that might be correlated with both false ID laws and alcohol-related traffic fatalities, we control for other alcohol control policies and state-level variables. We additionally include state-specific linear time trends in alternative specifications, which should alleviate some concerns regarding the possibility of pre-treatment trends in alcohol related traffic fatalities.

Next, we conduct falsification exercises to test whether false ID laws have any effect on non-alcohol related fatal deaths due to accidents involving drivers in three age groups. If false ID laws are a consequence of high numbers of fatal crashes involving youth and young adult drivers in general, then this may lead to these laws also affecting traffic fatalities in non-alcohol related accidents. Specifically, false ID laws should affect underage drivers, but should have no direct effects on drunk driving accidents among 21-24 year old drivers. Thus, we also examine the effects of false ID policies on non alcohol-related traffic fatalities among our three age groups and alcohol-related traffic fatalities involving 21-24 year old drivers. We also inspect the validity of our FEP estimator by examining the stability of our results when using OLS or fractional response regressions.

As another test of our identifying assumptions, we further leverage the margins of variation to estimate a model similar to a difference-in-differences-in-differences (DDD) model, defined as follows:

$$\begin{aligned}D_{stqa} = \exp(&\beta_0 + \beta_1 FSP_{stq} + \beta_2 VID_{stq} + \beta_3 Age_a \\ &+ \beta_4 FSP_{stq} \times Age_a + \beta_5 VID_{stq} \times Age_a + \boldsymbol{A_{stq}\beta_6} + \boldsymbol{X_{stq}\beta_7} \\ &+ Ln(pop_{astq}) + \sigma_s + \gamma_t + \eta_q + \sigma_s Age_a + \gamma_t Age_a + \eta_q Age_a + \theta_s t Age_a) + e_{astq}.\end{aligned} \tag{2}$$

Here, D_{stqa} represents the count of alcohol-related traffic fatalities for drivers in age group a in state s, year t and quarter q, Age_a is an indicator variable for an age group that is underage, and $FSP_{stq} \times Age_a$ and $VID_{stq} \times Age_a$ are interaction terms between the indicator for whether a state has passed an FSP law or vertical ID law and the indicator for an underage group. The model also includes state by age group fixed effects (to control for patterns of alcohol-related traffic fatalities which are different between underage and legal drinking age drivers across states), year by age group fixed effects (to account for differences in alcohol-related traffic fatalities trends between underage and legal drinking age drivers over time), quarter by age group fixed effects, and state-specific linear time trend by age group effects (to account for linear time-varying unobserved factors which may be correlated with both false ID laws and alcohol-related traffic fatalities and which affect underage and older drivers differently).

The coefficients of interest are β_4 and β_5, showing the differential effect of a false ID law on traffic fatalities involving impaired underage drivers compared to drivers 21-24 years old and underage drivers in states without the false ID law. Thus, the differential effects model uses two control groups: traffic fatalities from impaired underage drivers in states and quarters without false ID laws and traffic fatalities involving impaired 21-24 year old drivers in states with and without false ID laws. In this specification, the only threat to identification would be factors correlated with false ID laws that are differentially affecting alcohol-related traffic fatalities of underage drivers and drivers of legal drinking age.

Finally, we estimate a dynamic event-study model to investigate the effect of the false ID laws in the time periods prior to and after enactment. Instead of the false ID law variables taking a value "1" after adoption, as shown in Equation (1), the model specification includes binary indicators for the quarters prior to and after the implementation of a false ID law. More specifically, we estimate,

$$D_{stq} = \exp(\delta_0 + \sum_{i=-5}^{12} \delta_{1,i} FSP_{stq+i} + \delta_2 VID_{stq} + \boldsymbol{A_{stq}\delta_3} + \boldsymbol{X_{stq}\delta_4} + Ln(pop_{stq}) + \sigma_s + \gamma_t + \eta_q + \theta_s t) + e_{stq} \tag{3}$$

for FSP laws and

$$D_{stq} = \exp(\phi_0 + \sum_{i=-5}^{12} \phi_{1,j} VID_{stq+j} + \phi_2 FSP_{stq} + \boldsymbol{A_{stq}\phi_3} + \boldsymbol{X_{stq}\phi_4} + Ln(pop_{stq}) + \sigma_s + \gamma_t + \eta_q + \theta_s t) + e_{stq} \tag{4}$$

for vertical ID laws. In each equation, our independent variables of interest are now the set of indicators FSP_{stq+i} and VID_{stq+j}. We include indicators for each quarter within five quarters before and 12 quarters after the law implementation, using time periods of at least six quarters before implementation as our omitted category.[6]

4 Results

4.1 Main Results

Table 2 provides descriptive statistics of the variables used in this study. The average numbers of alcohol-related traffic fatalities range from 9.2 fatalities from accidents involving 16-18 year old drivers to 32 fatalities involving 21-24 year old drivers. Approximately 23 percent and 56 percent of state and quarter observations have a FSP law and vertical ID law, respectively, over the time span of this study, and the average beer tax per gallon is \$0.31, which includes both state and federal taxes.

Table 3 presents the results from estimating Equation (1) for 16-18, 19-20, and 21-24 year olds. We present the findings from three different specifications for each age group. Specification (1) includes non alcohol-related control variables (vehicle miles traveled, real gasoline tax, seatbelt laws, texting bans, graduated license laws, unemployment rate, log of per capita income, real

[6]We begin the event studies five quarters before the implementation date because the earliest state in our sample to enact a FSP law is New York in Q3 1999. Since our sample begins in Q1 1998, all FSP-treated states will be included in the all pre-period indicators.

minimum wage, and log of respective age specific population), and state, year and quarter fixed effects. Specification (2) adds variables pertaining to alcohol-control policies (listed in Table 2), and specification (3) further includes state-specific linear time trends. The coefficients from the Poisson regressions can roughly be interpreted as semi-elasticities, and we additionally report the semi-elasticity for FSP laws and vertical ID laws in brackets as given by the formula $exp(\beta) - 1$.

Our results suggest that FSP laws reduce the number of traffic fatalities involving impaired 16-18 year old drivers by between 14 and 23 percent, and the coefficients are significant at the one percent level. We see less evidence that FSP laws lead to statistically significant reductions in traffic fatalities among impaired 19-20 year old drivers. In the last set of results in Table 3, FSP laws generally lead to very small and not statistically significant changes in traffic fatalities involving impaired 21-24 year old drivers. This provides suggestive evidence that the reduction in traffic fatalities among impaired 16-18 year olds is due to FSP laws and not due to other unobservable state characteristics which affect overall alcohol-related traffic fatalities. This also suggests that the reduction in alcohol-related traffic fatalities among 16-18 year olds does not translate into an increase in fatalities as more at-risk minors reach legal drinking age.[7] Our results here are consistent with Yörük (2014), which indicate that FSP laws decrease alcohol consumption, including binge drinking, among younger teens (16-17 year olds).

Finally, we find little evidence that vertical ID laws reduce traffic fatalities involving impaired underage drivers. The coefficients for vertical IDs, although negative, are small and not statistically significant at conventional levels. However, the coefficients on vertical ID laws are negative and statistically significant for traffic fatalities involving impaired 21-24 year olds in the last specification including state-specific linear time trends.

Although the effects of FSP laws are concentrated among underage drivers, it is possible that the results shown in Table 3 are driven by a reduction in fatal driving accidents in general among states implementing the FSP laws. If this is the case, even in the absence of a FSP law, states that implemented a FSP law would have experienced a reduction in alcohol-related traffic fatalities. To test this possibility, we present falsification tests where we replace the dependent variables in

[7] We also estimate models using the number of fatal crashes, rather than total fatalities, as the dependent variable. Appendix Table A2 shows results from these regressions. Similarly to Table 3, FSP laws reduce the total number of fatal crashes involving impaired drivers aged 16-18 years by between 14 and 17 percent, with less evidence that FSP laws affect fatal crashes involving impaired older drivers.

Table 3 with fatalities resulting from non-impaired drivers of different ages. Table 4 shows results from these regressions and has the same structure as Table 3. We see very small coefficients that are close to zero for 16-18 year old drivers, and the coefficients are not statistically significant for either FSP laws or vertical ID laws. However, we do see a negative and statistically significant relationship between FSP and vertical ID laws among 21-24 drivers, but only in the specification including state-specific linear trends.

We report the effects of the other control variables on alcohol-related traffic fatalities in Appendix Table A1. We find evidence that seat belt laws reduce fatalities involving impaired 19-20 year old drivers. Gas taxes have a positive effect on fatalities involving impaired 16-18 year olds but the expected negative effect for non-alcohol related traffic fatalities among 16-18 and 19-20 year old drivers. The unemployment rate is negatively related to both types of fatalities among 19-20 and 21-24 year old drivers. We also find statistically significant relationships between other retailer-focused alcohol control policies and alcohol-related fatalities. In particular, distinctive licenses and ID seizure laws are consistently related to reductions in traffic fatalities involving impaired 16-18 year old drivers. However, as mentioned before, these estimates should be interpreted with caution due to limited within-state variation in such laws.

4.2 Robustness Tests

We employ a set of robustness checks to further examine the stability of our results of the effects of false ID laws on traffic fatalities involving an impaired 16-18 year old driver. The first set of results from the robustness checks are displayed in Table 5. In the first column, we examine the effect of controlling for non alcohol-related traffic fatalities, following Adams et al. (2012). Adams et al. (2012) argue that inclusion of non alcohol-related traffic fatalities help explain within state variation in alcohol-related traffic fatalities which can be attributed to factors such as changes in lighting, speed limits, weather, and other unobserved state-specific changes which may affect driving accidents in general.[8] In the second column, we redefine "impaired" to be a BAC$>$0 instead of a BAC$\geq$0.08. In the third and fourth columns, we estimate the OLS models using the log rate of alcohol-related traffic fatalities as the dependent variable. Columns (5) and (6) follow specifications

[8] We also run specifications where we include the number of traffic fatalities involving impaired 21-24 year olds as an independent variable. Here again, the coefficient for the effect of FSP laws on traffic fatalities among impaired 16-18 year olds is stable. These results are available upon request.

in Adams et al. (2012) where the dependent variable is the inverse normal function of the rate of alcohol-related traffic fatalities. Column (5) includes population weights and Column (6) excludes them. Finally, Column (7) provides the results from the differential effects model outlined in equation 2.[9] In all our columns, the negative statistically significant relationship between FSP laws and traffic fatalities involving impaired 16-18 year olds is stable.

Next, we examine whether our results are driven by one particular treated state. To this end, we re-estimate our specifications from Column (3) of Table 3, but we systematically drop one of the treatment states. We plot the coefficients and 95% confidence intervals for these regressions in Figure 2. The figure clearly shows that no single state is driving the FSP law effects, as our results are consistently negative and statistically significant when we exclude each treated FSP state in turn for both fatal fatalities and crashes. In contrast, we consistently estimate small and not statistically significant coefficients for vertical ID laws when systematically removing each treated state.

4.3 Event Study Models

In this section, we present results from event study models estimating equations 3 and 4, which estimate the immediate versus the long run-impact of false ID laws and also examine the possibility of pre-existing trends in traffic fatalities among states passing FSP laws and vertical ID laws. We show these results in figures which display the coefficients and 95 percent confidence intervals for the effects of false ID laws on traffic fatalities involving impaired 16-18 year olds and in the quarters leading up to the laws' implementation and the quarters after implementation. The omitted time period is at least six quarters before the law, and the other independent variables are those included in specification (3) from Table 3. The results from these models are plotted in Figures 3, 4, 5, and 6.

Figure 3 suggests that FSP laws lead to an immediate and long-lasting decrease in traffic

[9] The differential effects specifications alleviate concerns that other unobserved factors which are correlated with the implementation of FSP laws are driving the results. For example, consider a scenario of states implementing FSP laws because of campaigns against drunk driving. For the results from the differential effects model to be biased upwards, such campaign would have to affect underage drivers in states with FSP laws more, in comparison to drivers of legal drinking age (21-24 year olds) in those states. This is unlikely to happen given that 21-24 year olds suffer from the highest proportion of alcohol-related accidents. NHTSA (2014) reports that the proportion of fatal crashes was highest for 21-24 year olds, with 33 percent of the total alcohol-related fatal accidents. If anything, such a campaign is likely to be targeted towards 21-24 year olds, which will likely create a downward bias in the results from the differential effects models.

fatalities involving impaired 16-18 year old drivers. The coefficients of interest are close to zero for all prior quarters except one quarter preceding the implementation of FSP laws, but then turn negative and statistically significant for the periods after implementation. We do not find any trends in traffic fatalities before or after the implementation of vertical ID laws.

The decrease in fatalities in the quarter preceding FSP law implementation may result from retailers adopting ID scanner technology before the FSP law's implementation. To provide further evidence regarding whether retailers adopt scanners in anticipation of FSP law implementation, we collect the dates at which each of the FSP laws were signed into law, which range between zero and five quarters before the implementation date. Figure 4 shows results from event study models where we replace the FSP implementation quarter with the FSP law passage quarter. There is no longer a statistically-significant decrease in fatalities involving impaired 16-18 year old drivers in the quarter preceding the laws' passage dates, although we still see some evidence of a drop in anticipation of the law's passage.

We also estimate event study models for traffic fatalities involving impaired 21-24 year old drivers and non-alcohol related traffic fatalities among the three different driver age groups in Figures 5 and 6. We do not see a similar trend before the FSP law implementation quarter for alcohol-related fatalities pertaining to older age groups of drivers in Figure 5 or non alcohol-related fatalities among 16-18 year olds in Figures 6. Nor are there decreases in deaths after FSP law implementations in these figures. Finally, Panel (d) in Figure 5 suggests that the statistically significant decreases in traffic fatalities involving impaired 21-24 year old drivers after the implementation of VID laws seen in Table 3 may be due to a small change in the trend of fatalities after the law and cannot be attributed to the VID laws.[10]

5 Conclusion

In this paper, we examine the effects of laws which aid alcohol retailers in identifying false IDs on traffic fatalities involving impaired underage drivers with a BAC$\geq$0.08. We focus on two policies which previous research has found to reduce underage alcohol consumption: FSP laws (Yörük,

[10] We recreate the event study models using the number of fatal crashes, rather than the number of fatalities, as the dependent variable. Appendix Figures A1, A2, and A3 show results from these models, which are very similar to the models using the number of fatalities as the dependent variable.

2014) and vertical ID laws (Bellou and Bhatt, 2013). FSP laws promote technology enabling alcohol retailers to more easily identify false IDs and not sell alcohol to minors, and vertical ID laws mandate that state-issued IDs for minors be oriented vertically, rather than horizontally. We find that FSP laws lead to about a 14 to 23 percent reduction in traffic fatalities involving 16-18 year old drivers with a BAC$\geq$0.08, but we do not find any statistically significant changes in alcohol-related traffic fatalities after states pass vertical ID laws.

We subject our results to a number of robustness tests and find the effects to be stable. Additionally, falsification tests suggest that FSP laws do not affect traffic fatalities which do not involve alcohol nor traffic fatalities involving impaired drivers of legal drinking age. Finally, results from dynamic event studies suggest that the decrease in alcohol-related traffic fatalities involving 16-18 year old drivers from FSP laws is sustained long after the law's implementation. The event studies also suggest that the drop begins in the quarter immediately preceding the law's implementation, but this is plausibly because stores adopt ID scanners after the law's passage in anticipation of the law's implementation. We see no decreases in either non alcohol-related traffic fatalities from 16-18 year old drivers or in traffic fatalities involving impaired 21-24 year old drivers. These findings provide evidence that the main results pertaining to FSP laws are not driven by other unobserved factors unaccounted for in the model specification.

Our paper may help resolve a debate in the health economics literature over whether FSP laws reduce underage alcohol consumption. While Yörük (2014) finds that FSP laws reduce alcohol consumption among 16-18 year olds, Zheng (2018) suggests that pre-trends and other issues may affect Yörük (2014)'s results. Both of these papers use data from self-reported survey results, which may also mask the effect of FSP laws or create the false impression of an effect of FSP laws due to misreporting or other survey issues. Our results are less sensitive to issues of misreporting as they use statistics collected and calculated at the administrative level.

One remaining question is why we find effects for FSP laws but not vertical ID laws and why the effects of FSP laws are concentrated among 16-18 year olds. One possibility for the absence of an effect for vertical ID laws is that it is still relatively easy for minors to get false IDs through illicit ID providers when IDs are oriented vertically. This is not true for FSP laws, which incentivize alcohol retailers to scan IDs and would identify false IDs acquired through illicit ID providers. This presents a much larger barrier to finding a false ID that works, and it also suggests why the effects of FSP laws are much smaller among 19-20 year olds. Neither FSP laws nor vertical ID laws affect the ability of minors to use legitimate IDs of friends of legal drinking age to purchase alcohol. It is likely that 19-20 year olds have more acquaintances of legal drinking age and look "older," thus making it less likely that an alcohol retailer would suspect that a minor presenting a friend's ID is not of legal drinking age.

To put our findings in context, Carpenter and Dobkin (2009) calculate that lowering the MLDA will lead to an additional 0.77 alcohol-related traffic fatalities (for every 100,000 18-20 year olds), and Eisenberg (2003) suggests that a reduction in the Blood Alcohol Content (BAC) limit from 0.10 to 0.08 and graduated licensing (for drivers under 21) reduces fatal crash rates by 2.6 and 11.5 percent, respectively. Gilpin (2019) estimates that *minimum intermediate licensing age of 16.5 or older* licensing laws reduce traffic fatalities by about 23 percent. This suggests that our estimate of a 23 percent reduction in traffic fatalities per year (or 2.1 fatalities per year per 100,000 16-18 year olds) is similar to the effect of *minimum intermediate licensing age of 16.5 or older* graduated licensing laws, and about two to three times as large as the effect of the MLDA and other graduated licensing laws on alcohol-related crashes among underage drivers.[11] This is a modest but plausible effect, as Yörük (2014) suggests that FSP laws reduce the probability of binge drinking among teens by 4.4 percentage points.

To present our results the another way, the 40 states which have not passed FSP laws had a total of 351 traffic fatalities involving alcohol-impaired 16-18 year old drivers. If these 40 states passed a FSP law and saw a 22.6 percent reduction in these fatalities, we would expect about 79 fewer alcohol-related traffic fatalities. Adopting the U.S. Department of Transportation's economic value of a statistical life of $9.2 million in 2014, this reduction would translate to over $730 million dollars in annual economic benefits.[12]

Our results suggest that FSP laws may have an important role to play for policy makers in addition to alcohol taxes. While alcohol taxes, a well established mechanism in the literature, reduce alcohol-related fatal crashes by suppressing the demand for alcohol consumption, FSP laws

[11] The estimates from Table 3, Column (3) suggest a 22.6 percent reduction, and there were 195 alcohol-related traffic fatalities involving impaired 16-18 year old drivers, so a 22.6 percent reduction suggests about 57 fewer fatalities, and 2,706,079 16-18 year olds were living in states with FSP laws in 2014. This roughly amounts to a reduction of 2.1 fatal accidents per year for every 100,000 16-18 year olds $(100,000 * (57/2,706,079))$

[12] Please see this document for the U.S. Department of Transportation's economic value of a statistical life: `https://www.transportation.gov/sites/dot.gov/files/docs/VSL2015_0.pdf` (accessed March 31, 2020).

restrict the supply of alcohol. A primary benefit of FSP laws is that they can target a specific population at the highest risk, whereas increases in alcohol taxes are enforced for all drinkers, which increases the deadweight loss if light drinkers are also responsive to these taxes (Pogue and Sgontz, 1989; Shrestha, 2015). Our work calls for future research into the effects of FSP laws and other false ID alcohol-control policies on other alcohol-related outcomes such as crime, educational attainment, child bearing and birth outcomes, and sexually transmitted infections.

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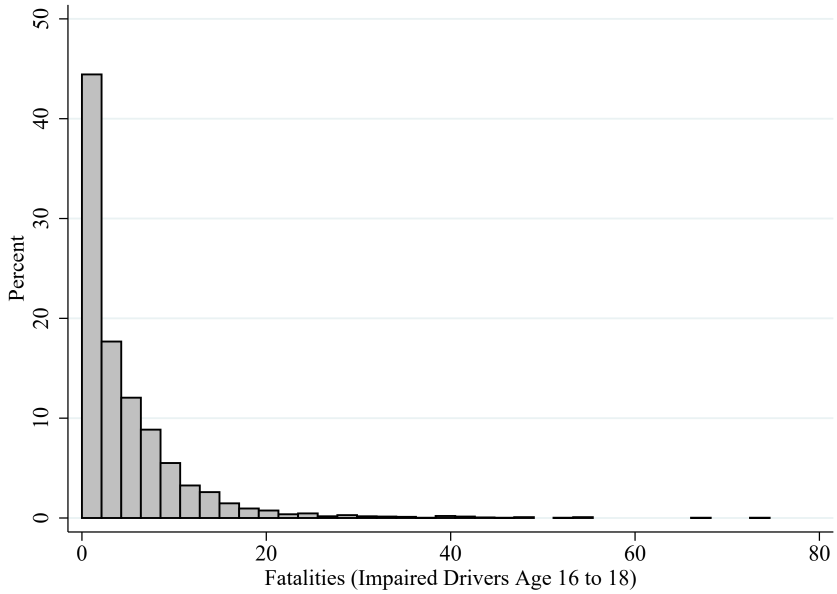
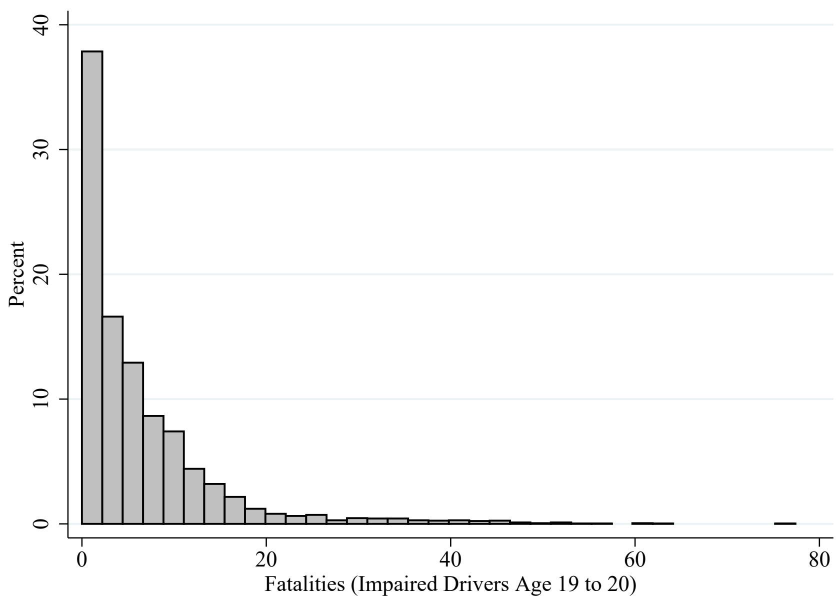
6 Figures and Tables

Figure 1: Histograms of Alcohol-Related Traffic Fatalities

(a) Traffic Fatalities Involving Impaired Drivers Age 16-18



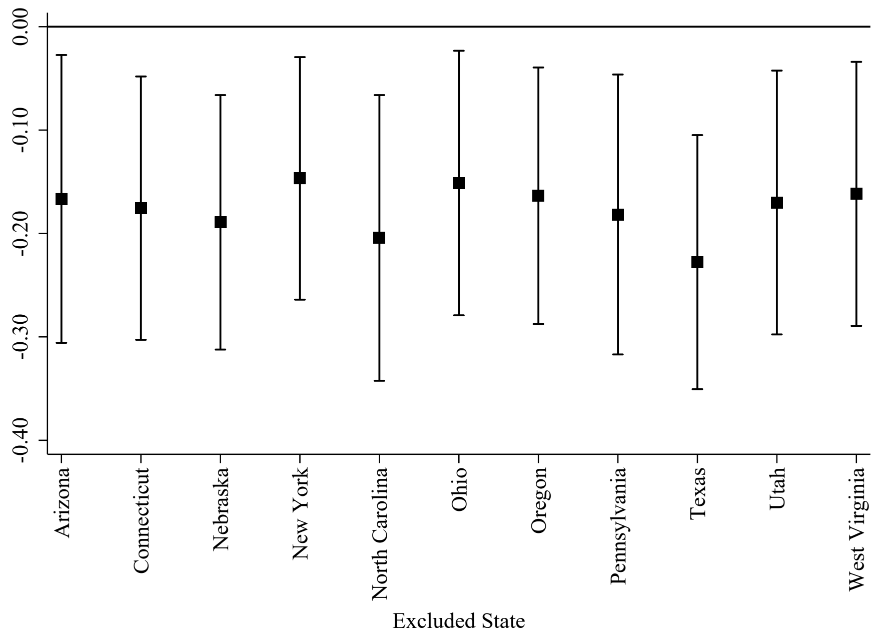
(b) Traffic Fatalities Involving Impaired Drivers Age 19-20



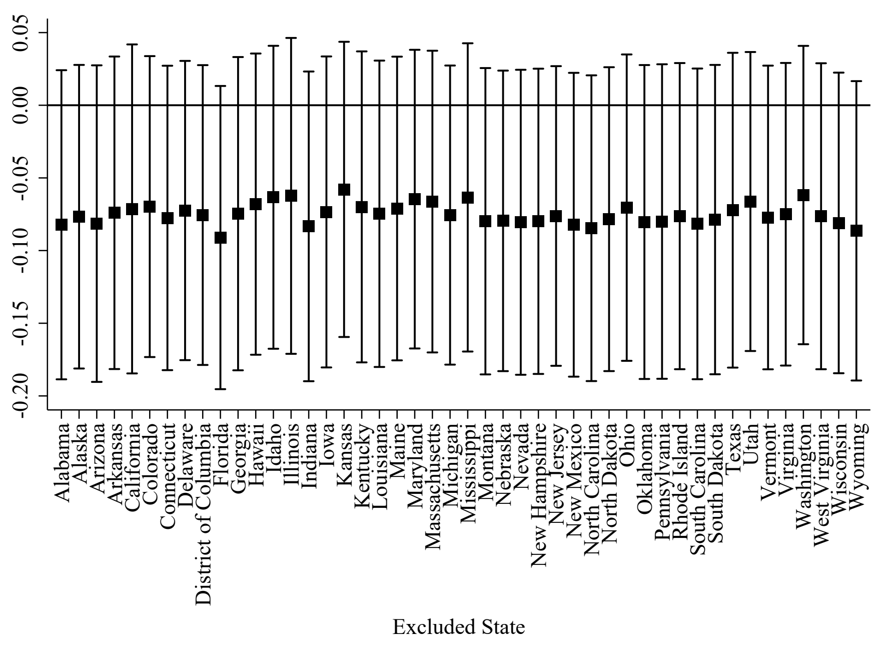
Notes: Data from FARS. This graph shows histograms of traffic fatalities involving impaired drivers age 16-18 and 19-20 at the state and quarter level. Impaired drivers are drivers who had a BAC ≥ 0.08.

Figure 2: The Effects of False ID Laws on Traffic Fatalities
Involving Impaired Drivers Age 16-18 – Removing Single Treatment States

(a) FSP Laws and Traffic Fatalities



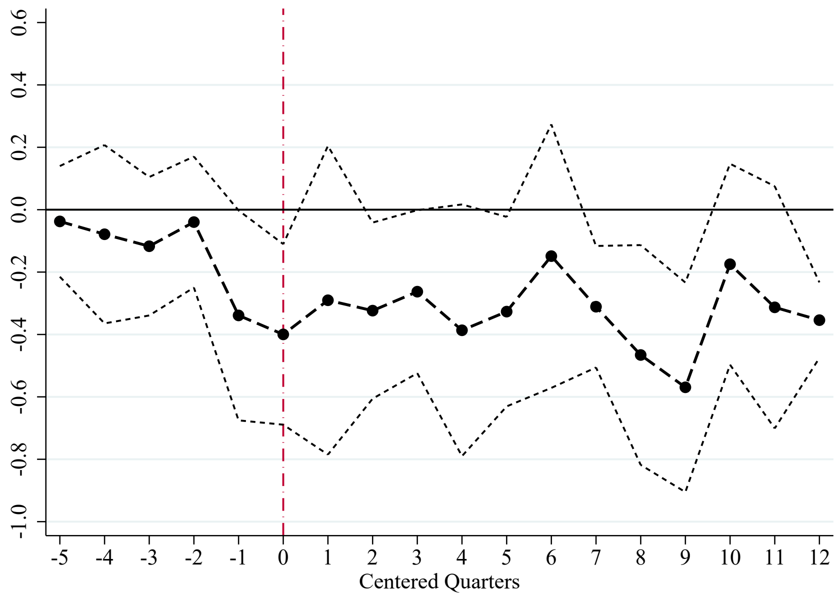
(b) Vertical ID Laws and Traffic Fatalities



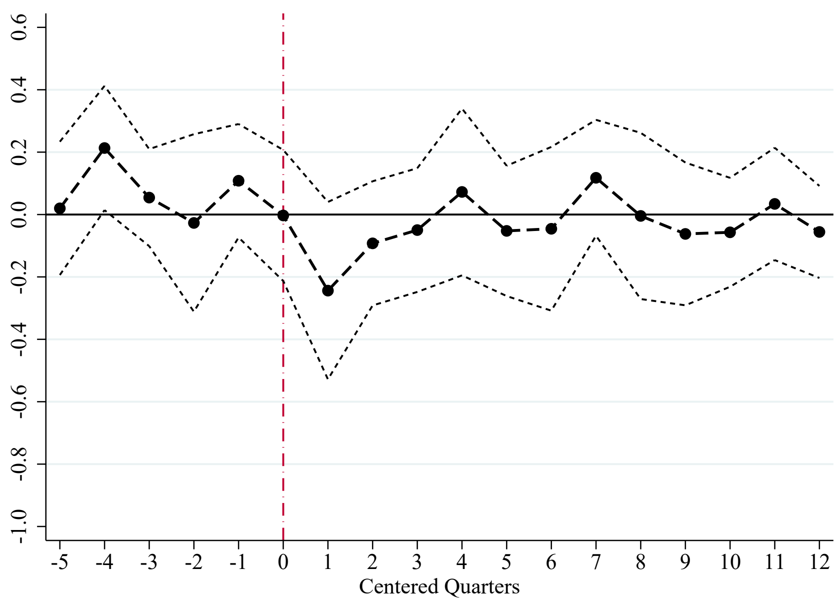
Notes: The graph displays coefficients and the 95 percent confidence intervals for fixed effects Poisson regressions, where the dependent variable and the independent variable of interest are described in the title. Each regression estimates Specification (3) from Table 3 but removes the treated state listed at the bottom. Impaired drivers are drivers who had a BAC ≥ 0.08.

Figure 3: The Effects of False ID Laws on Traffic Fatalities Involving Impaired Drivers Age 16-18

(a) FSP Laws and Traffic Fatalities

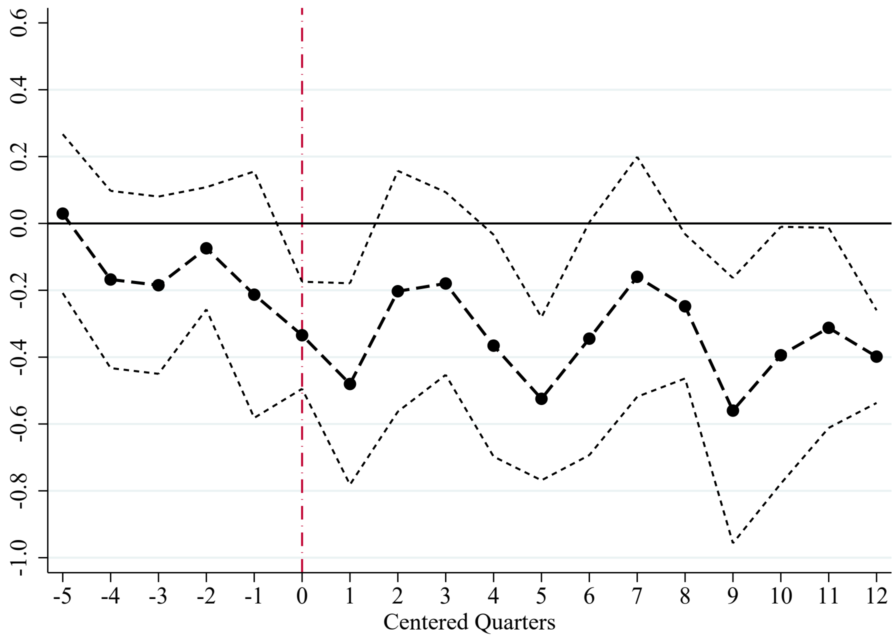


(b) Vertical ID Laws and Traffic Fatalities



Notes: These graphs display coefficients and 95 percent confidence intervals from fixed effects Poisson regressions where the dependent variable is given by the figure title and the independent variables of interest are indicators for the time periods leading up to and after the implementation of the FSP law or vertical ID law. The other control variables are identical to those in Specification (3) from Table 3.

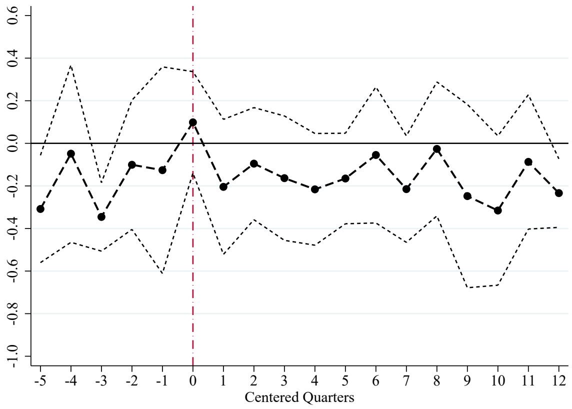
Figure 4: The Effect of FSP Laws Passage Dates on Traffic Fatalities Involving Impaired Drivers Age 16-18



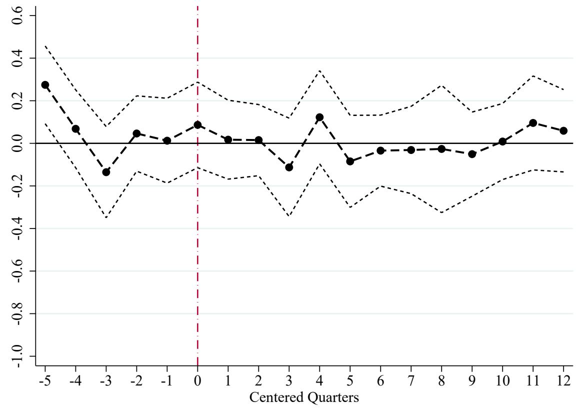
Notes: These graphs are identical to Figure 3, with the exception that the independent variables of interest are indicators for the time periods leading up to and after the passage of the FSP law.

Figure 5: The Effects of False ID Laws on Alcohol-Related Traffic Fatalities (Other Age Groups)

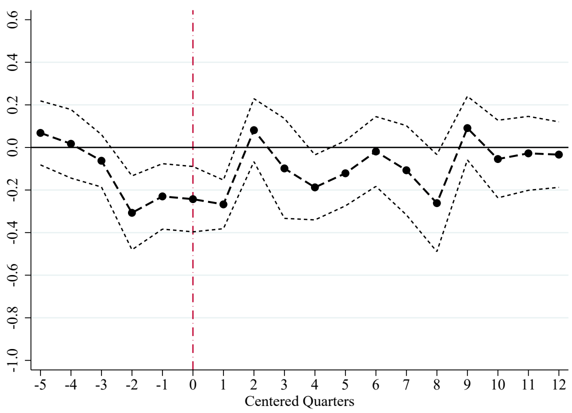
(a) FSP Laws (Impaired Drivers Age 19-20)



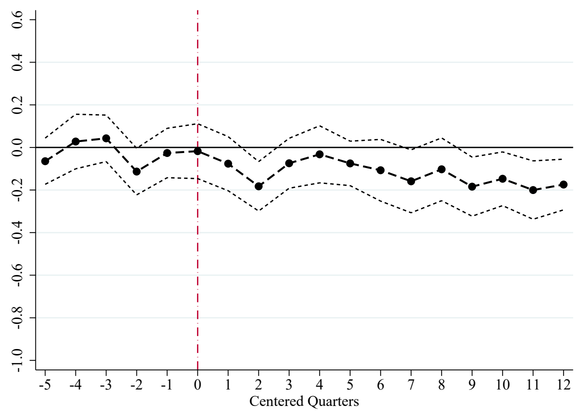
(b) Vertical ID Laws (Impaired Drivers Age 19-20)



(c) FSP Laws (Impaired Drivers Age 21-24)



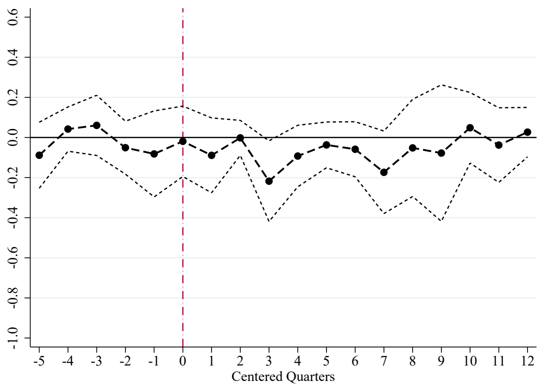
(d) Vertical ID Laws (Impaired Drivers Age 21-24)



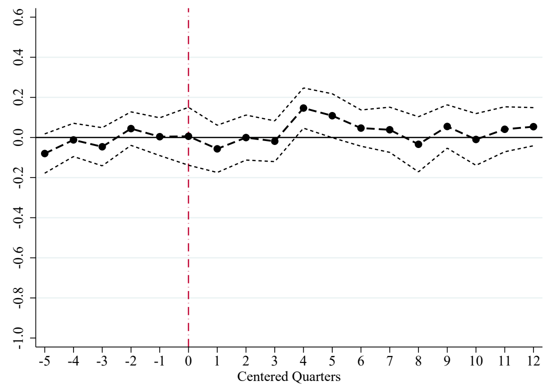
Notes: These graphs are identical to Figure 3, with the exception that the dependent variable measures alcohol-related traffic fatalities involving impaired drivers in different age groups.

Figure 6: The Effects of False ID Laws on Non Alcohol-Related Traffic Fatalities

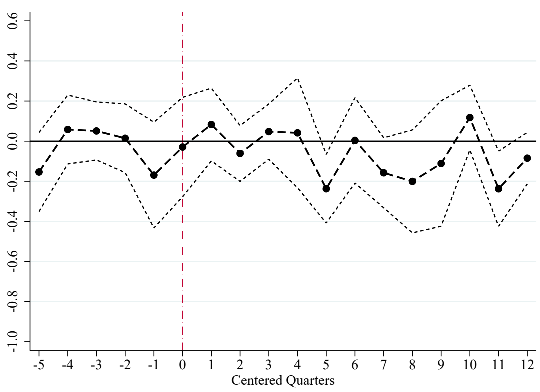
(a) FSP Laws (Non-Impaired Drivers Age 16-18)



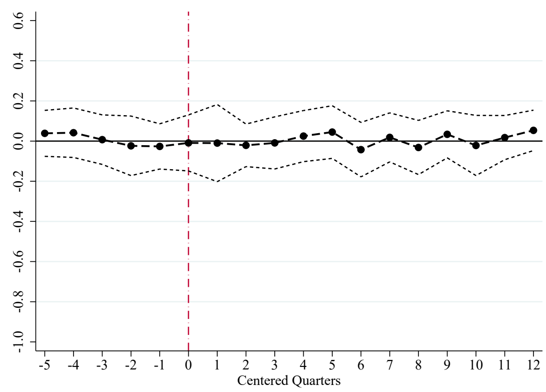
(b) VID Laws (Non-Impaired Drivers Age 16-18)



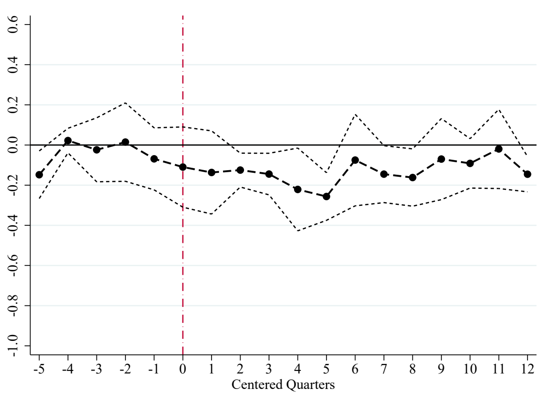
(c) FSP Laws (Non-Impaired Drivers Age 19-20)



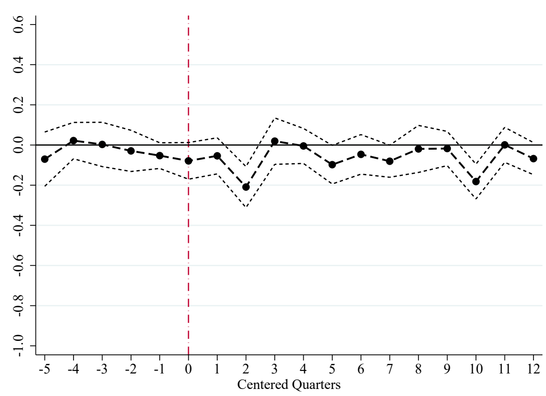
(d) VID Laws (Non-Impaired Drivers Age 19-20)



(e) FSP Laws (Non-Impaired Drivers Age 21-24



(f) VID Laws (Non-Impaired Drivers Age 21-24)



Notes: These graphs are identical to Figure 3, with the exception that the dependent variable pertains to fatalities from accidents with drivers in age groups with a BAC=0.

Table 1: Alcohol Control Policy Effectiveness Dates

State	FSP Law	Vertical ID Laws	Distinctive Licenses	Seizure of ID	Affirmative Defense	Right to Sue Minor	Right to Detain Minor
Alabama		2005					
Alaska		2004	1Q 1998		1Q 1998	3Q 2004	
Arizona	3Q 2005	2001	1Q 1998		3Q 2007		
Arkansas		2006	1Q 1998				3Q 2005
California		2010	1Q 1998	1Q 1999	1Q 1998		
Colorado		1998					
Connecticut	4Q 2001	2002	1Q 1998		1Q 1998		
Delaware		1998					
District of Columbia		2004	1Q 1998		1Q 1998		
Florida		2004					
Georgia		2009					
Hawaii		2005	1Q 1998		1Q 1998		
Idaho		2002	1Q 1998	1Q 1998			
Illinois		2005					
Indiana		2007	1Q 2002		1Q 1998		
Iowa		2001					
Kansas		2004					
Kentucky		2001					
Louisiana		2001					
Maine		2011	1Q 1998	1Q 1998			
Maryland		2003					
Massachusetts		2004					
Michigan		2003					
Minnesota			1Q 1998	3Q 2000	1Q 1998		
Mississippi		2001	1Q 1998		1Q 1998		
Missouri			1Q 1998		1Q 1998		
Montana		2008					
Nebraska	3Q 2010	2003	1Q 1998		1Q 1998		
Nevada		2002					
New Hampshire		2008	1Q 2008		1Q 1998	1Q 2003	
New Jersey		2004					
New Mexico		2000					
New York	3Q 1999		1Q 1998		1Q 1998		
North Carolina	4Q 2001	2008	1Q 1998	1Q 1998	1Q 1998		
North Dakota		2006	1Q 1998	3Q 2011	1Q 1998		
Ohio	3Q 2000	2002	1Q 1998		1Q 1998		
Oklahoma		2003	1Q 1998				
Oregon	1Q 2000				1Q 1998	1Q 1998	
Pennsylvania	4Q 2002	2001			1Q 1998		
Rhode Island		2002	1Q 1998	1Q 1998	1Q 1998		
South Carolina		2011					
South Dakota		2009			1Q 1998		3Q 2000
Tennessee							
Texas	3Q 2005	2001	1Q 1998		1Q 1998		
Utah	3Q 2011	2006	1Q 1998	1Q 1998	1Q 1998	2Q 2009	1Q 1998
Vermont		2003	3Q 2000		3Q 2000		
Virginia		1999					
Washington		2001					
West Virginia	2Q 2003	1999	2Q 2000		1Q 1998		
Wisconsin		2005	1Q 1998	1Q 1998	1Q 1998	4Q 2013	
Wyoming		2005					

Notes: Data from APIS and from Bellou and Bhatt (2013). We are unable to find the exact quarter in which states began issuing vertical IDs, and these laws are coded as beginning in the first quarter of their year of implementation.

Table 2: Summary Statistics

Variable	Mean	Std.Dev
Fatalities in Fatal Accidents		
Fatalities (Impaired Drivers Age 16 to 18)	9.159	9.901
Fatalities (Impaired Drivers Age 19 to 20)	12.883	12.726
Fatalities (Impaired Drivers Age 21 to 24)	32.315	28.676
Fatalities (Non-Impaired Drivers Age 16 to 18)	50.946	43.146
Fatalities (Non-Impaired Drivers Age 19 to 20)	40.084	37.226
Fatalities (Non-Impaired Drivers Age 21 to 24)	60.086	54.095
Other Variables		
FSP Law	0.233	n.a.
Vertical ID Law	0.560	n.a.
Distinctive Licenses	0.508	n.a.
Seizure of ID	0.197	n.a.
Affirmative Defense	0.538	n.a.
Right to Sue Minor	0.022	n.a.
Right to Detain Minor	0.016	n.a.
Real Beer Tax	0.311	0.276
Sunday Alcohol Sales Ban	0.216	n.a.
BAC Level of 0.08	0.846	n.a.
Vehicle Miles Traveled (b)	121.741	93.408
Real Gas Tax	0.251	0.070
Seatbelt Law	0.795	n.a.
Texting Ban	0.246	n.a.
Graduated License Law	0.792	n.a.
Unemployment Rate	6.164	2.138
Log Real Per-Capita Income	3.753	0.137
Real Minimum Wage	7.471	0.769
N	3468	

Notes: Data from FARS, APIS, Bellou and Bhatt (2013), U.S. Brewers Association (2014), the Bureau of Labor Statistics, the Bureau of Economic Analysis, Allegretto et al. (2017), the Office of Highway Policy Information and the CDC. Summary statistics are weighted by state population.

Table 3: The Effect of False ID Laws on Alcohol-Related Traffic Fatalities

	Impaired Drivers Ages 16-18			Impaired Drivers Ages 19-20			Impaired Drivers Ages 21-24		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
FSP Law	-0.155***	-0.151***	-0.256***	-0.080	-0.046	-0.022	-0.050	-0.030	-0.054
	(0.046)	(0.045)	(0.069)	(0.053)	(0.058)	(0.061)	(0.047)	(0.032)	(0.051)
Vertical ID Law	-0.063	-0.079	-0.083	-0.014	-0.033	-0.027	-0.063*	-0.062*	-0.096***
	(0.053)	(0.054)	(0.051)	(0.042)	(0.039)	(0.046)	(0.037)	(0.035)	(0.033)
Semi-Elasticity (FSP)	[-0.143]	[-0.140]	[-0.226]	[-0.077]	[-0.045]	[-0.021]	[-0.049]	[-0.029]	[-0.052]
Semi-Elasticity (VID)	[-0.061]	[-0.076]	[-0.080]	[-0.014]	[-0.032]	[-0.027]	[-0.061]	[-0.060]	[-0.092]
Num Obs.	3468	3468	3468	3468	3468	3468	3468	3468	3468
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year and Qtr Fixed Effects	X	X	X	X	X	X	X	X	X
Other Controls	X	X	X	X	X	X	X	X	X
Other Alcohol Controls		X	X		X	X		X	X
State Trends			X			X			X

Notes: This table shows coefficients and standard errors clustered at the state level in parentheses for fixed effects Poisson regressions where the dependent variable is the number of alcohol-related traffic fatalities from accidents involving impaired drivers in the age groups indicated. Impaired drivers are drivers who had a BAC ≥ 0.08. Semi-elasticities for the FSP Law and vertical ID law coefficients, calculated as $exp(\beta) - 1$, are shown in brackets. Other controls include the vehicle miles traveled for each state and year, the real gasoline tax rate, seatbelt laws, texting while driving bans, graduated licensing laws, unemployment rate, and real minimum wage. Other alcohol controls include the real beer tax, the presence of BAC 0.08 laws, the presence of Sunday sales bans, and the presence of distinctive license laws, false ID seizure laws, affirmative defense laws, right to sue minor laws, and right to detain minor laws. The log of the population of the relevant age group in each state is included in the regression with a coefficient constrained to one. Stars denote statistical significance levels: *: 10%, **: 5%, and ***: 1%.

Table 4: Falsification Test: The Effect of False ID Laws on Non Alcohol-Related Traffic Fatalities

	Non-Impaired Drivers Ages 16-18			Non-Impaired Drivers Ages 19-20			Non-Impaired Drivers Ages 21-24		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
FSP Law	-0.035	-0.029	-0.055	-0.025	0.003	-0.024	-0.073*	-0.052	-0.113***
	(0.035)	(0.035)	(0.037)	(0.039)	(0.042)	(0.059)	(0.040)	(0.034)	(0.039)
Vertical ID Law	0.048	0.048	0.032	0.007	0.007	-0.003	-0.012	-0.013	-0.053**
	(0.031)	(0.032)	(0.030)	(0.030)	(0.028)	(0.026)	(0.026)	(0.027)	(0.024)
Semi-Elasticity (FSP)	[-0.034]	[-0.028]	[-0.054]	[-0.025]	[0.003]	[-0.024]	[-0.070]	[-0.051]	[-0.107]
Semi-Elasticity (VID)	[0.049]	[0.050]	[0.032]	[0.007]	[0.007]	[-0.003]	[-0.012]	[-0.013]	[-0.052]
Num Obs.	3468	3468	3468	3468	3468	3468	3468	3468	3468
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year x Quarter Fixed Effects	X	X	X	X	X	X	X	X	X
Other Controls	X	X	X	X	X	X	X	X	X
Other Alcohol Controls		X	X		X	X		X	X
State Trends			X			X			X

Notes: This table shows coefficients and standard errors clustered at the state level in parentheses for fixed effects Poisson regressions where the dependent variable is the number of traffic fatalities from accidents involving non-impaired drivers of the age groups indicated. Non-Impaired drivers are drivers who had a BAC=0. Aside from the dependent variables, the specifications are identical to those in Table 3. Stars denote statistical significance levels: *: 10%, **: 5%, and ***: 1%.

Table 5: Robustness Tests: The Effect of False ID Laws on Traffic Fatalities Involving Impaired Drivers Ages 16-18

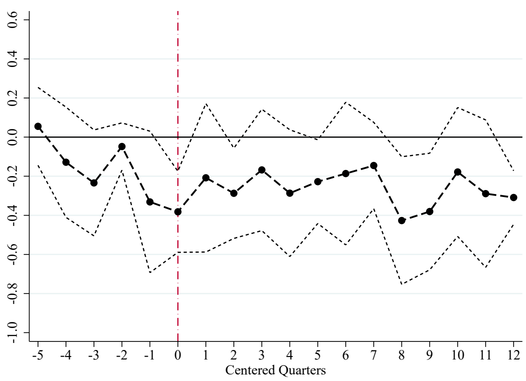
	Controlling for Non-Alc Rel Traffic Fat	Defining Alc Rel as Driver BAC>0	Using Logged Rt of Alc Rel Traffic Fat w/ Weights	Using Logged Rt of Alc Rel Traffic Fat w/o Weights	Using Inv. Normal Rt of Alc Rel Traffic Fat w/ Weights	Using Inv. Normal Rt of Alc Rel Traffic Fat w/o Weights	Differential Effects Model
FSP Law	-0.256***	-0.217***	-0.221***	-0.272***	-0.062***	-0.093***	-0.202**
	(0.072)	(0.051)	(0.063)	(0.067)	(0.016)	(0.024)	(0.085)
Vertical ID Law	-0.087*	-0.072*	-0.133***	-0.061	-0.020*	0.007	0.012
	(0.050)	(0.043)	(0.048)	(0.050)	(0.012)	(0.025)	(0.062)
Semi-Elasticity (FSP)	[-0.226]	[-0.195]	[-0.198]	[-0.238]	[-0.265]	[-0.265]	[-0.173]
Semi-Elasticity (VID)	[-0.084]	[-0.070]	[-0.124]	[-0.059]	[-0.088]	[-0.088]	[0.011]
Num Obs.	3468	3468	3468	3468	3468	3468	6936

Notes: This table shows coefficients and standard errors clustered at the state level in parentheses. The dependent variable in the first two columns is the number of traffic fatalities involving impaired 16-18 year old drivers. In the second two columns it is the logged rate of traffic fatalities involving impaired 16-18 year old drivers, and in columns (5) and (6) it is the inverse normal distribution transformation of the rate of traffic fatalities involving impaired 16-18 year old drivers. Column (7) implements a differential effects analysis comparing changes in traffic fatalities involving impaired 16-18 year old drivers, compared to traffic fatalities involving impaired 21-24 year old drivers. Unless otherwise noted, specifications follow Specification (3) in Table 3. Stars denote statistical significance levels: *: 10%, **: 5%, and ***: 1%.

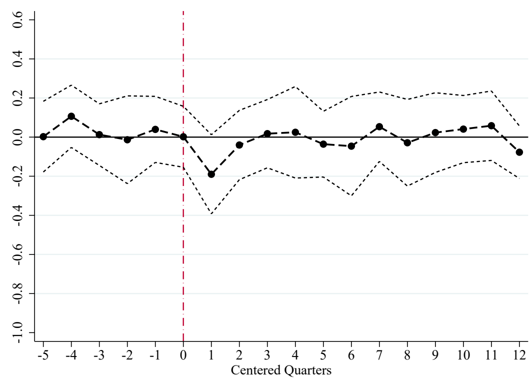
7 Appendix Figures and Tables

Figure A1: The Effects of False ID Laws on Alcohol-Related Fatal Crashes

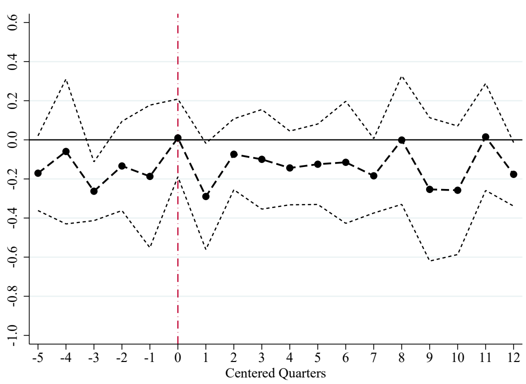
(a) FSP Laws (Imp. Drivers Age 16-18)



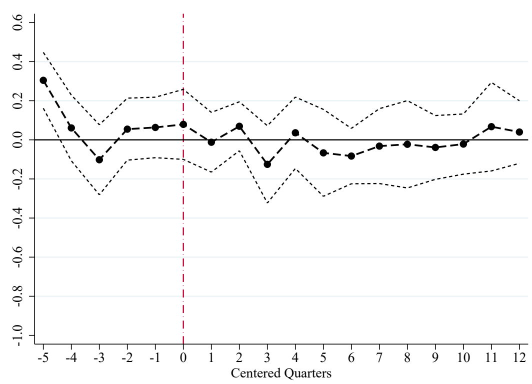
(b) Vertical ID Laws (Imp. Drivers Age 16-18)



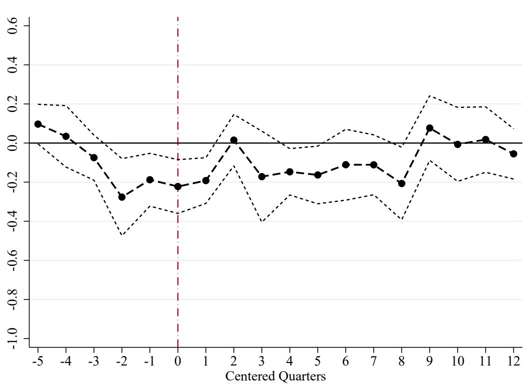
(c) FSP Laws (Imp. Drivers Age 19-20)



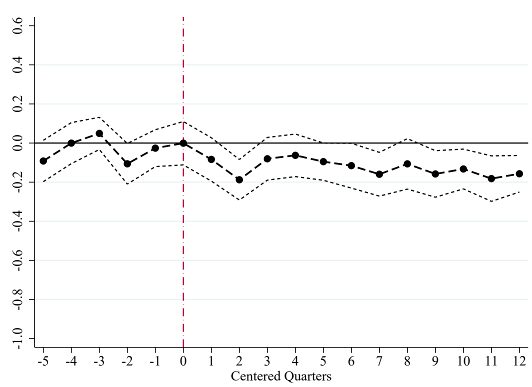
(d) Vertical ID Laws (Imp. Drivers Age 19-20)



(e) FSP Laws (Imp. Drivers Age 21-24)



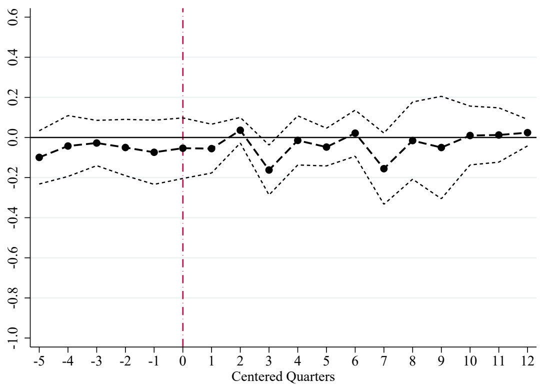
(f) Vertical ID Laws (Imp. Drivers Age 21-24)



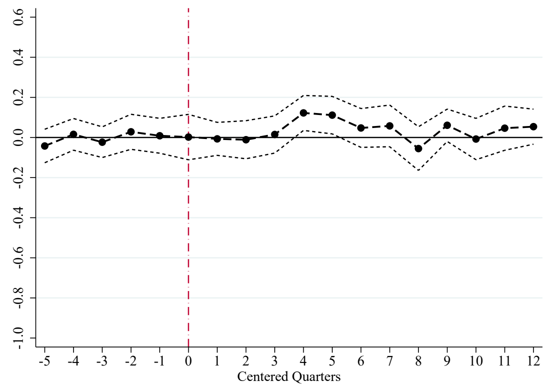
Notes: These graphs are identical to Figures 3 and 5, with the exception that the dependent variable of interest pertains to fatal crashes involving impaired drivers in the different age groups.

Figure A2: The Effects of False ID Laws on Non Alcohol-Related Fatal Crashes

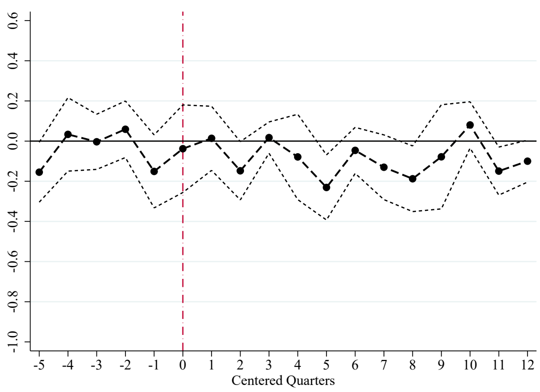
(a) FSP Laws (Non Imp. Drivers Age 16-18)



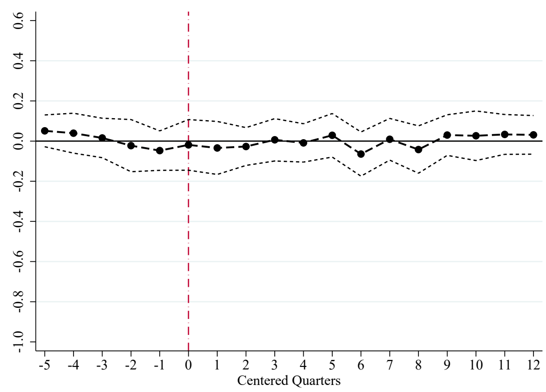
(b) VID Laws (Non Imp. Drivers Age 16-18)



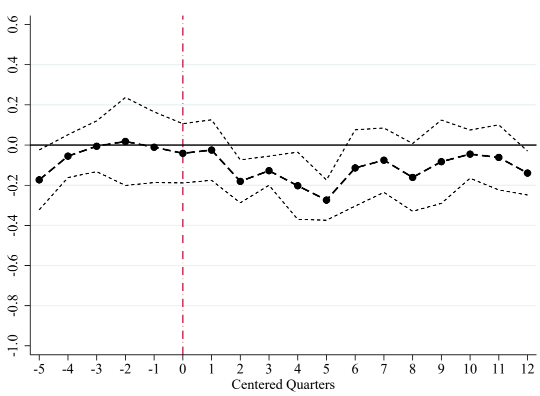
(c) FSP Laws Ages (Non Imp. Drivers Age 19-20)



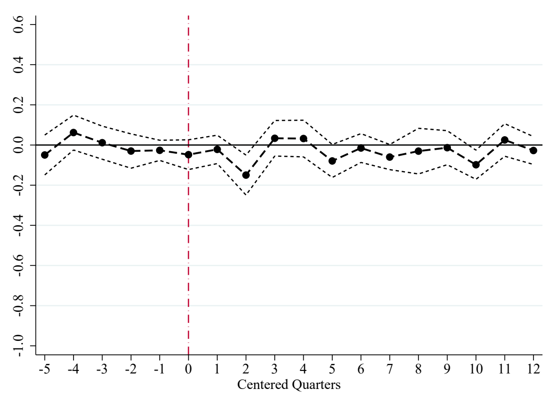
(d) VID Laws (Non Imp. Drivers Age 19-20)



(e) FSP Laws (Non Imp. Drivers Age 21-24)

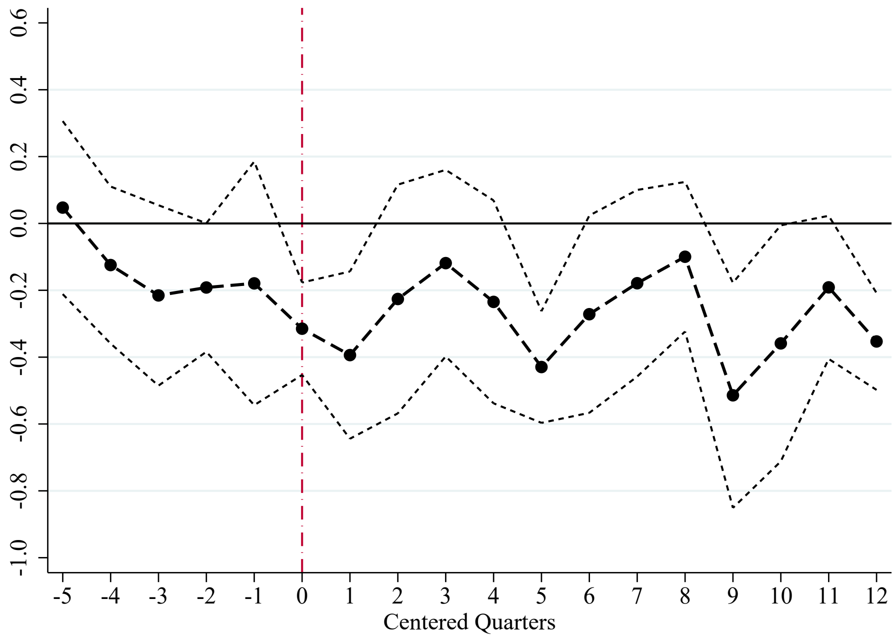


(f) VID Laws (Non Imp. Drivers Age 21-24)



Notes: These graphs are identical to Figure 6, with the exception that the dependent variable of interest pertains to fatal crashes involving drivers in the age groups with a BAC=0.

Figure A3: The Effect of FSP Laws Passage Dates on Fatal Crashes Involving Impaired Drivers Age 16-18



Notes: This graph is identical to Figure 4, with the exception that the dependent variable of interest pertains to fatal crashes.

Table A1: The Effect of False ID Laws on Traffic Fatalities
Other Alcohol Policies and Control Variables

	Alcohol-Related Fatalities			Non-Alcohol-Related Fatalities		
	Ages 16-18	Ages 19-20	Ages 21-24	Ages 16-18	Ages 19-20	Ages 21-24
Real Beer Tax	0.388	-0.117	-0.227**	0.122	-0.246***	-0.024
	(0.242)	(0.115)	(0.111)	(0.123)	(0.058)	(0.074)
Sunday Alcohol Sales Ban	-0.043	0.036	-0.017	-0.129***	0.015	-0.032
	(0.125)	(0.098)	(0.046)	(0.047)	(0.068)	(0.063)
BAC Level of 0.08	-0.070	0.066	0.015	0.003	0.011	0.032
	(0.084)	(0.057)	(0.036)	(0.028)	(0.037)	(0.026)
Vehicle Miles Traveled (b)	0.000	0.004	0.001	0.002*	0.001	0.003***
	(0.003)	(0.004)	(0.002)	(0.001)	(0.002)	(0.001)
Real Gas Tax	0.931**	0.166	-0.216	-0.704***	-0.815***	-0.197
	(0.442)	(0.473)	(0.318)	(0.240)	(0.273)	(0.261)
Seatbelt Law	-0.096	-0.122**	-0.052	0.002	-0.000	-0.035
	(0.070)	(0.055)	(0.048)	(0.036)	(0.032)	(0.023)
Texting Ban	-0.117	-0.034	-0.052	-0.087***	-0.035	-0.016
	(0.072)	(0.076)	(0.049)	(0.033)	(0.052)	(0.036)
Graduated License Law	-0.050	0.108**	0.052	-0.028	-0.059	0.020
	(0.067)	(0.049)	(0.036)	(0.037)	(0.039)	(0.026)
Unemployment Rate	-0.019	-0.055**	-0.045***	-0.019	-0.049***	-0.026**
	(0.023)	(0.023)	(0.012)	(0.014)	(0.014)	(0.011)
Log Real Per-Capita Income	2.649**	1.847**	0.533	1.000*	0.672	0.757*
	(1.054)	(0.816)	(0.806)	(0.549)	(0.462)	(0.387)
Real Minimum Wage	0.007	0.035	-0.016	0.013	-0.002	-0.017
	(0.040)	(0.042)	(0.025)	(0.021)	(0.027)	(0.017)
Distinctive Licenses	-0.347**	0.127	-0.191**	-0.059	0.029	0.011
	(0.136)	(0.160)	(0.081)	(0.072)	(0.103)	(0.100)
Seizure of ID	-0.412**	-0.172***	-0.027	-0.017	0.180***	-0.059
	(0.192)	(0.063)	(0.079)	(0.042)	(0.060)	(0.055)
Affirmative Defense	0.254**	-0.570***	-0.316***	-0.127***	-0.411***	-0.269***
	(0.120)	(0.147)	(0.039)	(0.036)	(0.052)	(0.035)
Right to Sue Minor	-0.388	0.138	-0.039	0.172**	0.286**	-0.175**
	(0.334)	(0.167)	(0.104)	(0.076)	(0.136)	(0.086)
Right to Detain Minor	0.232*	0.168	-0.146***	-0.059**	-0.183	0.158
	(0.131)	(0.219)	(0.038)	(0.025)	(0.118)	(0.107)
Num Obs.	3468	3468	3468	3468	3468	3468

Notes: These regressions show coefficients and standard errors for the other controls not shown in Table 3 and Table 4 and refer to Specification (3) for each age group. Stars denote statistical significance levels: *: 10%, **: 5%, and ***: 1%

Table A2: The Effect of False ID Laws on Alcohol-Related Fatal Crashes

	Ages 16-18			Ages 19-20			Ages 21-24		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
FSP Law	-0.148***	-0.131***	-0.183**	-0.078	-0.045	-0.026	-0.041	-0.028	-0.069*
	(0.048)	(0.043)	(0.072)	(0.055)	(0.059)	(0.065)	(0.038)	(0.033)	(0.039)
Vertical ID Law	-0.003	-0.022	-0.034	-0.030	-0.049	-0.051	-0.076**	-0.075**	-0.094***
	(0.047)	(0.046)	(0.044)	(0.038)	(0.035)	(0.041)	(0.034)	(0.032)	(0.027)
Semi-Elasticity (FSP)	[-0.138]	[-0.123]	[-0.167]	[-0.075]	[-0.044]	[-0.026]	[-0.041]	[-0.027]	[-0.067]
Semi-Elasticity (VID)	[-0.003]	[-0.022]	[-0.034]	[-0.030]	[-0.048]	[-0.050]	[-0.074]	[-0.072]	[-0.090]
Num Obs.	3468	3468	3468	3468	3468	3468	3468	3468	3468

Notes: These models are identical to Table 3, with the exception that the dependent variable of interest pertains to alcohol related fatal crashes.

Table A3: Falsification Test: The Effect of False ID Laws on Non Alcohol-Related Fatal Crashes

	Impaired Drivers Ages 16-18			Impaired Drivers Ages 19-20			Impaired Drivers Ages 21-24		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
FSP Law	-0.014	-0.009	-0.009	-0.045	-0.030	-0.051	-0.046	-0.033	-0.092***
	(0.035)	(0.036)	(0.032)	(0.035)	(0.037)	(0.049)	(0.035)	(0.034)	(0.030)
Vertical ID Law	0.040	0.041	0.032	0.005	0.010	-0.008	-0.002	-0.001	-0.033*
	(0.026)	(0.027)	(0.027)	(0.027)	(0.026)	(0.027)	(0.022)	(0.024)	(0.020)
Semi-Elasticity (FSP)	[-0.014]	[-0.009]	[-0.009]	[-0.044]	[-0.029]	[-0.050]	[-0.045]	[-0.033]	[-0.088]
Semi-Elasticity (VID)	[0.041]	[0.042]	[0.032]	[0.005]	[0.010]	[-0.008]	[-0.002]	[-0.001]	[-0.032]
Num Obs.	3468	3468	3468	3468	3468	3468	3468	3468	3468

Notes: These models are identical to Table 4, with the exception that the dependent variable of interest pertains to alcohol related fatal crashes.

Table A4: Robustness Tests: The Effect of False ID Laws on Fatal Crashes Involving Impaired Drivers Ages 16-18

	Controlling for Non-Alc Fat Acc	Defining Alc Rel as Driver BAC>0	Using Logged Rt of Alc Rel Fat Acc w/ Weights	Using Logged Rt of Alc Rel Fat Acc w/o Weights	Using Inv. Normal Rt of Alc Rel Fat Acc w/ Weights	Using Inv. Normal Rt of Alc Rel Fat Acc w/o Weights	Differential Effects Model
FSP Law	-0.181**	-0.154***	-0.128**	-0.172***	-0.043***	-0.076***	-0.112
	(0.075)	(0.052)	(0.048)	(0.047)	(0.017)	(0.020)	(0.079)
Vertical ID Law	-0.038	-0.033	-0.056	-0.022	-0.008	0.012	0.084
	(0.043)	(0.039)	(0.036)	(0.035)	(0.010)	(0.021)	(0.057)
Semi-Elasticity (FSP)	[-0.166]	[-0.143]	[-0.120]	[-0.158]	[-0.192]	[-0.192]	[-0.098]
Semi-Elasticity (VID)	[-0.038]	[-0.032]	[-0.054]	[-0.022]	[-0.037]	[-0.037]	[0.079]
Num Obs.	3468	3468	3468	3468	3468	3468	6936

Notes: These models are identical to Table 5, with the exception that the dependent variable of interest pertains to alcohol related fatal crashes.