Do Minimum Wages Really Increase Youth Drinking and Drunk Driving?[*]

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October 2014

[*] The authors thank Dhaval Dave and participants at the 2014 International Health Economics World Congress at Trinity College in Dublin, Ireland for useful comments and suggestions on an earlier draft of this paper. We also thank Brittany Bass, Thanh Tam Nguyen, and Timothy Young for excellent research assistance.

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Abstract

In Volume 94, Number 3 of this journal, Adams, Blackburn and Cotti (ABC) found that increases in minimum wages were positively related to drunk driving-related traffic fatalities for those ages 16-to-20. However, the primary mechanism through which this relationship is hypothesized to occur—increased alcohol consumption caused by minimum wage-induced income gains—remains empirically unexplored. Using data from the National and State Youth Risk Behavior Survey (YRBS) and the Behavior Risk Factor Surveillance Survey (BRFSS) and an identification strategy identical to ABC, we find little evidence that increases in minimum wages lead to increases in alcohol consumption or drunk-driving among teenagers. These results suggest a much smaller set of plausible causal channels to explain ABC's findings.

Keywords: minimum wage, teen drunk driving, alcohol consumption

I. Introduction

In Volume 94, Number 3 of this journal, Adams, Blackburn, and Cotti (2012), hereinafter ABC, find that minimum wage increases are associated with increases in drunk-driving-related traffic fatalities for those ages 16-to-20. These authors estimate a large drunk-driving fatality elasticity with respect to the minimum wage of 0.78, which suggests that a 10 percent increase in the minimum wage would lead to an additional 125 deaths per year. To bolster the case for a causal interpretation of their finding, the authors show that minimum wage increases are unrelated to (i) drunk-driving-related traffic fatalities among those ages 26 and older, a population less likely to be affected by the minimum wage, and (ii) non-alcohol related traffic fatalities. However, ABC do not empirically explore the channels through which a causal link between minimum wages and drunk driving might exist.

ABC argue that minimum wage hikes increase the earnings of some young individuals and, because alcohol is a normal good (Hu and Stowe 2013; Nelson 2013 and Gallet 2007), these earnings gains result in increased alcohol consumption and drunk driving. This mechanism is plausible, but ignores other possible offsetting effects. If some workers lose their jobs after minimum wage hikes (Neumark, Salas, and Wascher 2014; Sabia 2014a; Neumark and Wascher 2008), or if retained workers have their hours reduced (Burkhauser, Couch, and Wittenberg 2000), the net effect of minimum wage increases on youth earnings is ambiguous, and their effects on drinking and driving will be dependent on how these effects impact the distribution of income. Moreover, it is also possible that minimum wage-induced employment effects could affect teen drinking probabilities through substitution of time between labor market work and social activities (Argys, Pitts, and Sen 2014).

The goal of this research is to empirically examine the pathways posited by ABC to explain a causal link between minimum wage increases and drunk driving-related traffic fatalities. Using an identification strategy identical to ABC and data drawn from the Current Population Survey (CPS), the Youth Risk Behavior Survey (YRBS), and the Behavior Risk Factor Surveillance Survey (BRFSS) from 1991-2011, we estimate the effect of minimum wage increases on youth earnings, alcohol consumption, binge driving, and drunk driving. The results from these analyses provide no evidence that increases in the minimum wage increase net earnings of all 16-to-20 year-olds due, in part, to adverse labor demand effects. We find little evidence that increases in the minimum wage are associated with increases in the probability of alcohol consumption, binge drinking, or drunk driving among all, employed, or non-working teens. In addition, we find little evidence that minimum wage increases affect alcohol consumption on the intensive margin. Rather, these results suggest that minimum wage hikes reduce alcohol consumption, even among employed teenagers, particularly during the period examined by ABC. Taken together, the findings of this study shrink the set of plausible channels through which minimum wages could increase drunk-driving-related traffic fatalities.

II. Background

When studies rely on reduced-form models to establish that public policies have unexpected, relatively distant general equilibrium effects, additional research is often necessary to provide evidence for the behavioral chain that produced these effects. The reduced-form work of ABC is intriguing and the falsification tests on older individuals and non-drunk driving-related accidents provide compelling support for the study's hypothesized causal link between

minimum wages and teenage drunk driving-related fatalities. However, their work stops short of empirically establishing the mechanisms through which the effect might occur.

To establish that minimum wage increases lead to an increase in alcohol-related auto deaths via income effects—the pathway that ABC emphasize—one must first empirically document that higher minimum wages increase the earnings of (at least some) teenagers. Next, one must find that increases in minimum wages induce alcohol consumption among teens, who spend their additional income on alcohol. And finally, one must establish that this increased alcohol consumption leads to increased drunk driving. To our knowledge, no study, including ABC, has established that rising minimum wages increase drinking or drunk driving among 16-to-20 year-olds, critical channels that must be present to causally interpret ABC's finding.[1]

Minimum Wages and Teen Employment and Earnings. A wide literature on the low-skilled employment and earnings effects of minimum wages (see Sabia 2014b; Neumark, Salas, and Wascher 2014; Allegretto et al. 2011; Dube et al. 2010; Neumark and Wascher 2008) provides consistent evidence that minimum wage increases in the US are binding for teenagers, particularly younger teens. However, the magnitude of these labor-demand effects is a topic of continuing debate (see Sabia 2014a). In a summary of the post-Card and Krueger (1995) literature, Neumark and Wascher (2008) reviewed over 90 studies in the minimum wage literature and concluded that those studies that (i) identified minimum wage effects using within-state variation in minimum wages and (ii) focused on labor markets where the minimum wage was most likely to bind, produced employment elasticities with respect to the minimum wage

[1] One new working paper, using Canadian data, compares drinking patterns among youths employed in sectors covered by minimum wages to drinking patterns of those not employed or employed in uncovered sectors. Ströbel et al. (2014) find little evidence that employment in the covered sector is associated with increased frequency of alcohol use, but some evidence of increased drunkenness.

(for low-skilled workers, often teenagers) of -0.1 to -0.3. This conclusion marked a return to the "consensus" estimates of several decades prior (Brown 1982).

However, the work of Dube et al. (2010) and Allegretto et al. (2011) reignited the minimum wage debate by challenging the common trends assumption underlying difference-in-difference models used in much of the minimum wage-employment literature. Dube et al. (2010) compared pairs of contiguous counties across state borders with different minimum wages, arguing that these labor markets comprised more comparable treatment and counterfactual groups because they likely share common (often difficult-to-observe) labor market shocks. With this approach, Dube et al. (2010) find no evidence that minimum wage increases reduced low-skilled employment. In the same vein, Allegretto et al. (2011) find that after controlling for spatial heterogeneity—via their preferred controls for state-specific linear time trends and census division-specific year effects—there is little evidence that minimum wage increases reduce teen employment.

While these important studies cast doubt on the presence of adverse labor demand effects from minimum wages, new work by Neumark, Salas, and Wascher (2014) suggests that it is far too soon to conclude that minimum wage increases do not adversely affect labor market opportunities for teens. Neumark et al. (2014) show that geographically proximate counties, while theoretically appealing, may not always comprise the best counterfactuals. When an arguably better control group of counties is chosen based on matching prior economic trends, employment elasticities in the consensus range re-emerge. In addition, Neumark et al. (2014) show that the set of controls for spatial heterogeneity used by Allegretto et al. (2011) may eliminate potentially valid sources of identifying variation.

The presence of adverse employment effects potentially muddies a pathway through which minimum wages could increase drunk driving. If employers respond to minimum wage increases by laying off workers, hiring fewer workers, or reducing hours among employed workers (Burkhauser et al. 2000), then higher minimum wages will not only redistribute earnings from firm owners to minimum wage workers, but also among minimum wage workers, some of whom would see earnings increases and others declines (see Neumark et al. 2005; Neumark and Wascher 2002 for a discussion of the income distribution effects of minimum wages).

However, even in the presence of adverse labor demand effects, it is possible for changes in the distribution of income to lead to greater drunk driving among teenagers if those who experience earnings gains from minimum wage hikes are (i) larger in number than those who experience earnings losses, or (ii) more likely to spend minimum wage-induced earnings gains on alcohol and drive while intoxicated than those who experience minimum wage-induced earnings losses are to reduce alcohol consumption and driving. But this would certainly be a narrower pathway to explain the large drunk-driving death effects observed by ABC.

Income and Alcohol Consumption. While no studies of which we are aware examine the effect of minimum wages on alcohol consumption, there are a number of studies that establish evidence that alcohol is a normal good, both for adults (Hu and Stowe 2013; Nelson 2013; Gallet 2007) and youths (Markowitz and Tauras 2009; Warnaar and Van Pragg 1997). Interestingly, recent evidence suggests there may be heterogeneity in teenage spending on alcohol depending on whether the income comes from labor market employment as compared to parental transfers or allowances. While intergenerational transfers have been found to be negatively related to excessive drinking (Bhatt 2011), increased labor income has been found to be positively

correlated with binge drinking (Darling et al. 2006 and Wu et al. 2003), though these studies have treated both labor income and parental transfers as exogenously determined.

Drunk Driving. While a large body of literature examines the effects of alcohol and drug policies on drunk driving-related fatalities (Anderson, Hansen, and Rees 2013; Carpenter and Dobkin 2009; Carpenter 2004; Markowitz and Tauras 2009), ABC provide the only evidence of the effect of minimum wage increases on youth or adult drunk driving. There are a few studies suggesting that income in adulthood is positively related to drunk driving (see, for example, Impinen et al. 2011), though most treat income as econometrically exogenous.

Importantly, the effect of minimum wage increases on drunk driving depends not only on the earnings and alcohol consumption effects of minimum wages, but also on the effects of minimum wage increases on driving itself. If there are negative employment effects from minimum wages, this could induce less driving among teens. Or, if time spent in the labor force is a substitute for time spent in social activities that involve greater degrees of driving, then any disemployment effects of a minimum wage increase could induce more driving (or even drinking) among teens.

Taken together, the empirical evidence on the mechanisms through which minimum wage increases may increase drunk-driving-related fatalities is scant. We propose to explore these channels to assess the explanations offered for ABC's findings.

III. Data and Measures

Our main analyses use repeated cross-sectional data from 1991 to 2011 from three national datasets: (i) the Current Population Survey (CPS) Outgoing Rotation Groups, (ii) the National and State Youth Risk Behavior Surveys (YRBS), and (iii) the Behavior Risk Factor

Surveillance Survey (BRFSS). We discuss the advantages and disadvantages of each dataset below.

Current Population Survey. The CPS has been the workhorse of the US minimum wage literature, used by scholars to examine the effects of minimum wages on the wage distribution (Autor et al. 2014), the income distribution (Neumark et al. 2005; Dube 2013; Sabia 2014b), employment (Burkhauser et al. 2000; Dube et al. 2010; Allegretto et al. 2011; Neumark et al. 2014; Sabia 2014a), and work hours (Burkhauser et al. 2000). We use the CPS to establish the effects of minimum wages on wages, employment, usual hours of work per week, and usual weekly earnings for those ages 16-to-20. Table 1A shows weighted means of the key outcomes of interest. Over the sample period, 42.5 percent of respondents ages 16-to-20 were employed. The share employed was larger for older teenagers as compared to younger teens (row 2, column 3 vs. column 2). On average, teenagers worked 10.7 hours per week (row 3, column 1) and 26.8 hours per week conditional on employment (row 4, column 1). Usual weekly earnings, conditional on employment, totaled $350 in 2012 dollars (row 6, column 1). In addition, column (4) of Table 1A shows means of economic outcomes for 26-to-64 year-olds, an older counterfactual group corresponding to ABC's control group.

An important limitation of the CPS, however, is that there are no data on alcohol consumption or drunk driving. For this, we turn to the Youth Risk Behavior Survey (YRBS) and Behavior Risk Factor Surveillance Survey (BRFSS).

YRBS and BRFSS. To estimate the effect of minimum wage increases on teen drinking, we examine repeated cross-sections of the National and State YRBS as well as the BRFSS from

1991 to 2011.[2] The YRBS is coordinated by the Centers for Disease Control and Prevention (CDC) and is administered as an in-school survey to high school students attending 9th through 12th grades. When weighted, these estimates are representative of the population of U.S. high school students.[3] The YRBS asks students a myriad of questions about their health status and risky health behaviors, including alcohol consumption and drunk driving. While the YRBS is largely comprised of those ages 14-to-18, we focus our sample on 16-to-18 year-olds, the younger half of individuals in ABC's treatment group.

There are a few important drawbacks of the YRBS worthy of note. First, there is no information on employment or income in the YRBS, so we cannot examine the effect of minimum wage increases on drinking-related behaviors separately for those who remain employed. Second, because the YRBS is a school-based survey, there may be sample selection bias introduced if minimum wages affect the distribution of teenagers who remain in school and if this selection process is related to alcohol consumption. However, the literature provides little consistent evidence that minimum wage increases affect high school dropout rates (see, for example, Sabia Forthcoming for a discussion).

The BRFSS is an analogous health survey to the YRBS, but is administered via telephone to adults ages 18 to 99. We draw a sample of respondents ages 18-to-20 to mirror the older teenagers captured in ABC's treatment group. When weighted, the BRFSS is designed to be representative of the U.S. population. There are several advantages to the BRFSS over the YRBS. First, because it is not a school-based sample, we avoid concerns that minimum wages

[2]As Anderson (2010) and Sabia and Anderson (2014) show, combining the National and State YRBS maximizes the amount of state level policy variation available for identification given that some states do not appear in the National YRBS but do appear in the State YRBS and vice versa.

[3]To further address issues with combining the national and state YRBS data sets, we collected state-by-year population data from the National Cancer Institute's Surveillance Epidemiology and End Results Program (http://seer.cancer.gov/popdata/). We used these data to assign population weights to each respondent based on state of residence, age, gender, and race.

change the composition of students remaining in school. Second, the BRFSS contains information on employment, which allows us to (i) replicate the CPS-based employment analysis, and (ii) estimate the effect of minimum wages on alcohol-related behavior of employed 18-to-20 year-olds.[4] Third, while the YRBS is an unbalanced panel of states and years (see Sabia and Anderson 2014; Tables 2B and 2C), states represented in BRFSS appear fairly continuously over the 1991-2011 period, allowing us to exploit identifying variation closest to that used by ABC. And finally, the BRFSS contain information on drinking for those ages 26-to-64, which allows for an additional counterfactual analogous to ABC.

Alcohol-Related Behaviors. First, respondents to the YRBS and BRFSS are asked about their drinking behavior in the last 30 days.

> YRBS:
>
> *During the past 30 days, on how many days have you had at least one drink of alcohol? (Possible Responses: 0 to 30 days)*
>
> BRFSS:
>
> *During the past 30 days, have you had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor? (Possible Responses: Yes, No)*

We generate a dichotomous variable equal to one if respondents reported any alcohol consumption in the last 30 days and zero otherwise. Table 1B presents the weighted means of the alcohol variables for the YRBS and BRFSS samples. In the YRBS, 49.8 of individuals between the ages of 16 and 18 reported alcohol consumption in the last 30 days (row 1, column 1); in the BRFSS, 43.1 percent of 18-to-20 year-olds reported previous month drinking (row 1, column 2).

[4] Unfortunately, the BRFSS does not collect information on hours of work or continuous earnings, providing only categorical measures of income that are not particularly informative for low-income teenagers.

Conditional on employment in the BRFSS, drinking probabilities were higher (row 1, column 3), as were drinking participation rates for older individuals (row 1, columns 4 and 5).

In addition, respondents to the YRBS and BRFSS are asked about binge drinking behavior. Specifically individuals are asked:

> *YRBS:*
> *During the last 30 days, how many days did you have 5 or more drinks of alcohol in a row within a few hours?(Possible Responses include 0 to 20 or more days)*
>
> *BRFSS:*
>
> *Considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks on an occasion? (Possible Responses include 0 to 30 days)*

We generate a measure of binge drinking set equal to one if a respondent reported drinking five or more drinks on a single occasion and equal to zero if a respondent reported never binge drinking (or never drinking at all). We also generate a measure of frequent binge drinking, set equal to one if the respondent reported binge drinking at least three times in the last 30 days and zero otherwise. In the YRBS, we find that 32.4 percent of respondents engaged in binge drinking in the last month (row 2, column 1) and 15.4 percent reported frequent binge drinking (row 3, column 1). In the BRFSS, we find that 21.8 percent of older teen respondents reported any binge drinking (row 2, column 2) and 10.9 percent frequent binge drinking (row 3, column 2). Binge drinking rates were only slightly higher for employed as compared to not working teens (rows 2-3, column 3 vs 4) and were lower for older individuals (rows 2-3, columns 5-7).

Finally, we measure drunk driving in each dataset using respondents to the following questionnaire items:

> *YRBS:*

During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol? (Possible Responses: 0 to 6 or more)

BRFSS:
During the past 30 days, how many times have you driven when you've had perhaps too much to drink? (Responses include 0 to 30 days)

We code a dichotomous drunk-driving variable equal to one if the respondent reports any drunk driving in the last 30 days and zero otherwise.[5] Note from the final row of the first panel of Table 1B shows that there is a substantial difference in drunk-driving means across the YRBS and BRFSS, likely due to different wording of the question to individuals. The YRBS question asks about any drinking prior to driving while the BRFSS question requires respondents to assess whether they have "had perhaps too much to drink." A much higher proportion of individuals report drunk driving in the YRBS as compared to the BRFSS (14.9 percent of 16-to-18 year-olds compared to 3.3 percent of 18-to-20 year-olds in the BRFSS). Drunk-driving rates are higher among employed as compared to non-working teens (row 4, column 3 vs 4) and fall with age (columns 5-7).

IV. Empirical Methodology

Our identification strategy is identical to that used by ABC in their drunk-driving study. First, we estimate a simple difference-in-difference model of the following form:

$$Y_{ist} = \beta_0 + \beta_1 MW_{st} + \beta_2 \mathbf{Z}_{it} + \beta_3 \mathbf{X}_{st} + \theta_s + \tau_t + \varepsilon_{ist} \qquad (1)$$

[5] It should be noted that in the BRFSS, in contrast to the alcohol consumption questions that are asked every year, the drunk-driving question is asked only in alternate years after the 2000 interview.

where Y_{ist} is an indicator variable for the alcohol-related behavior of individual *i* residing in state *s* at year *t*; MW_{st} is the natural log of the higher of the state or federal minimum wage (averaged over the calendar year); $\mathbf{Z}_{it}$ is a vector of individual demographic controls including age, race/ethnicity, and gender; $\mathbf{X}_{st}$ is a vector of state-specific time-varying economic and policy controls, including the prime-age (ages 25-to-54) male unemployment rate, the prime-age wage rate, state beer taxes, cigarette taxes, zero tolerance laws, and blood alcohol content (BAC08) laws; θ_s is a time-invariant state effect; τ_t is a state-invariant year effect; and ε_{ist} is the error term. Identification of our key coefficient of interest, β_1, comes from within-state variation in minimum wages. During the period from 1991 to 2011, there were three Federal minimum wage increases and 41 states, including DC, increased their minimum wages to wages higher than the prevailing federal minimum wage.[6]

Obtaining an unbiased estimate of β_1 rests on the common trends assumption that has been the subject of much controversy in the minimum wage literature (Allegretto et al. 2011; Addison et al. 2009; Neumark et al. 2014; Sabia 2014a,b).We continue to follow the empirical approach of ABC and test the robustness of our estimates to additional controls for state-specific linear time trends. Further, for the BRFSS analysis, we follow ABC's approach of pooling teenagers and individuals over age 26 into our sample and estimate a difference-in-difference model of the following form:

$$Y_{istj} = \alpha_j + \delta_j MW_{st} + \mathrm{B}_{\boldsymbol{j}}^{'}\boldsymbol{X}_{\boldsymbol{ijt}} + \boldsymbol{\phi}_{\boldsymbol{j}}^{'}\boldsymbol{Z}_{\boldsymbol{sjt}} + \theta_{sj} + \tau_{tj} + \theta_s * t + \varepsilon_{istj} \qquad (2)$$

[6] There were a total of 33 state minimum wage increases above the Federal level during the sample period under study. The Federal minimum wage increases in 1991, 1996-1997, and 2007-2009 are largely captured in the model's year effects, but do contribute some identifying variation due to differential increases due to heterogeneous state minimum wages.

where *j* indexes whether the respondent is in the treatment (teenagers) versus the comparison group (26-to-64 year-olds). In the difference-in-difference-in-differences model, each right-hand-side variable (including state and year fixed effects) is interacted with an indicator for whether the respondent is in the treatment group. The coefficient of interest, δ_{teen}, is the effect of the minimum wage on teen drinking behaviors relative to older individuals' drinking behaviors. While we also augment equation (2) with state-specific linear time trends (θ_s*t) and, in some specifications (available in the appendix) state-by-year fixed effects to more flexibly control for state-specific time-varying shocks common to treatment and comparison individuals.

While our empirical approach is not a structural one, a reduced-form examination of the effect of minimum wage increases on the behavioral pathways through which such hikes are posited to have affected teen drunk driving deaths will better inform our interpretation of the models estimated by ABC.

V. Results

Our main results appear in Tables 2 through 8. All regression models are estimated via ordinary least squares and are weighted by the relevant age-specific state population.[7] Standard errors clustered on the state are in parentheses in each table (Bertrand et al. 2004).

Teen Earnings Results. Before turning to the drinking effects of minimum wages, we begin by estimating the effect of minimum wage increases on wages, employment, hours and earnings in the CPS. The first three columns of Table 2 show results for 16-to-20 year-olds, matching the sample ages in ABC, while columns 4 through 6 show results for the YRBS-aged sample and columns 7 through 9 for the BRFSS-aged sample.

[7]Marginal effects generated from probit models produce a similar pattern of results to those shown below.

Panel I presents difference-in-differences estimates of the effect of minimum wage increases on log wages. The coefficient estimates can be interpreted as elasticities. Across the basic difference-in-differences model (columns 1, 4, 7), the models including state linear time trends (columns 2, 5, and 8), and difference-in-difference-in-differences models using 26-to-64 year-olds as a within-state control group (columns 3, 6, and 9), we find consistent evidence that minimum wage increases are associated with increases in the hourly wages of employed teenagers. The average elasticity is approximately 0.10 for the full sample, but is over twice as large for younger teens (ages 16-to-18) as compared to older teens (ages 18-to-20), suggesting that minimum wages are more likely to bind for less-experienced, younger teens.[8]

Conditional on remaining employed (Panel II), there is some evidence that minimum wage increases are associated with increases in usual weekly earnings, particularly for younger teens (columns 4-6. However, in Panel III, we find no evidence that an increase in the minimum wage increases net unconditional weekly earnings of individuals ages 16-to-20. In fact, difference-in-difference-in-differences models of the form preferred by ABC (columns 3, 6, 9) show minimum wages associated with (statistically insignificant) weekly earnings losses for teens.

Why is there no net gain in earnings for 16-to-20 year-olds from minimum wage increases? One explanation is adverse employment effects. In Panel IV, we provide some evidence that adverse employment effects may be one explanation. Estimated elasticities in the full sample range from -0.07 to -0.10 (columns 1-3), with estimates in columns (1) and (3) statistically distinguishable from zero at conventional levels.[9] The estimated employment elasticities appear largest for younger teenagers (columns 4 through 6), with statistically

[8] Appendix Table 1 shows effects of minimum wage increases on the wages of only workers who were paid hourly. The pattern of findings is similar to that shown in Table 2.
[9] These generated by dividing the coefficient estimate by the mean of the dependent variable.

significant elasticities reaching as high as -0.2, consistent with findings in Neumark and Wascher (2008) and Sabia et al. (2012). When we replicate employment elasticities in the BRFSS (see Appendix Table 2), we find a similar pattern of results.[10]

But adverse employment effects cannot fully explain the earnings losses. The findings in Panels V and VI suggest that minimum wage increases may also be associated with reductions in usual hours of work, even among those who remain employed. For older teens (columns 7-9), we find that, conditional on employment, usual hours of work falls for teenagers relative to individuals ages 26 and older following minimum wage increases, suggesting that earnings losses are possible even among teens who remain employed and receive an increase in their hourly wage.

The results in Table 2 narrow the pathway through which minimum wage increases could increase teen drunk driving deaths. To reconcile the findings in Table 2 with the findings of ABC, one would need to conclude that even as minimum wage increases did not increase net earnings of teenagers, the distribution of earnings gains and losses changed in such a way as to increase alcohol consumption and drunk driving. This could occur if those who see earnings gains outnumber those who see earnings losses or because minimum wage-induced job-loss results in teens substituting time toward social activities that involve alcohol consumption (Argys, Pitts, and Sen 2014).

Alcohol Results. In Table 3, we present estimates of the effect of minimum wage increases on youth alcohol consumption. The first two columns show results for younger teens from the YRBS and the final three columns for older teens from the BRFSS. Across model specifications, we find little evidence that increases in the minimum wage increase the

[10]Appendix Table 3 shows estimates using actual hours rather than usual hours. The pattern of results is quantitatively similar to the results shown in Table 2. Appendix Table 4 shows results for male and female teens.

probability of drinking participation in the last 30 days (Panel I). In the YRBS (columns 1 and 2), the precision of our estimates is such that we can rule out positive drinking participation elasticities of greater than 0.18 to 0.26 with 95 percent confidence. In the BRFSS, difference-in-difference estimates without (column 3) and with (column 4) state linear trends show that minimum wage increases are associated with statistically significant *declines* in drinking participation among older teens. Estimated participation elasticities with respect to the minimum wage range from -0.29 to -0.38 (columns 3 and 4), though these elasticities fall modestly and are less precisely estimated when older individuals are used as a within-state control group (column 5). When we examine binge drinking and frequent binge drinking (Panels II and III), we find no evidence that minimum wage increases significantly increase the probability of binge drinking among younger (columns 1 and 2) or older (columns 3 through 5) teenagers. In fact, the signs on the estimated elasticities are negative.

Finally, in Panel IV, we estimate the effect of minimum wage increases on the probability of drunk driving. For younger teens (columns 1 and 2), difference-in-difference models produce negative drunk driving elasticities. The inclusion of state-specific linear time trends produces a drunk driving elasticity of -0.19, though this estimate is not statistically distinguishable from zero at conventional levels. For older teens (columns 3 through 5), estimated drunk driving elasticities are positive, but are not statistically distinguishable from zero. Note, however, that it is among older teens where there was the weakest evidence that minimum wage hikes increased income or alcohol consumption.

Taken together, the results in Table 3 further shrink the set of pathways through which minimum wage increases increase teen drunk driving deaths. To reconcile the findings of ABC with the evidence we have presented in Tables 2 and 3, minimum wage increases would have to

have induced no net change in alcohol consumption among teens as a group—and even a decline in drinking participation or drunk driving among younger teens—but changed the composition of teen drinkers and drunk drivers so as to increase alcohol-related automobile deaths.

The most likely channel through which our results can be harmonized with ABC is if minimum wage hikes increased alcohol consumption among those teens that retained their jobs and did not have their hours significantly cut. The BRFSS allows us to explicitly explore this possibility by examining working teens and exploring whether minimum wage increases affected their drinking behavior.

Table 4 presents these findings when we examine employed (columns 1-2) and non-working (columns 3-4) teens. Our findings point to little evidence that increases in the minimum wage increased alcohol consumption among employed teens and some evidence that they were associated with reduced drinking among non-working teens, perhaps because of adverse labor demand effects. These results hold with the inclusion of full interaction of state and year fixed effects to control for any unmeasured state-specific time shock common across ages (see Appendix Table 5). There is also no evidence that increases in the minimum wage increase the probability of binge drinking or frequent binge drinking, with estimated coefficients negative in seven of eight cases (Panels II and III). However, there is some evidence of a consistently positive relationship between minimum wage increases and drunk driving among employed older teens, though the estimates are insufficiently precise to rule out null effects.

Because employment status is not available in the YRBS, the best approach available is to control for the teen unemployment rate on the right hand-side of the estimating equation. The results, shown in Appendix Table 6 shows little evidence that minimum wage increases are

associated with significant increases in young teen drinking after controlling for the teen unemployment rate.

With little evidence of net increases in drinking, even among workers, the set of plausible channels that explain the findings in ABC shrinks further. One possible explanation might be if minimum wage increases change the distribution of drinkers among employed individuals such that while net drinking among workers does not rise, some workers who experience earnings gains have a greater propensity to consume alcohol and drive dangerously, though this possibility is difficult to empirically test.

Sensitivity of Estimates. One potential explanation for the lack of support for the mechanisms proposed by ABC is that the above analysis focuses largely on the extensive margin of drinking (with the exception of frequent binge drinking). In Table 5, we examine the effect of minimum wage increases on (i) occasions of binge drinking in the last month, both unconditionally (Panel I) and conditional on binge drinking (Panel II), (ii) number of drinks consumed in the last month (Panels III and IV)[11], (iii) and number of times the respondent drank and drove in the last month (Panels V and VI). The pattern of results suggest little evidence that minimum wage increases are associated with increases in alcohol consumption on the extensive margin or with increases in the total number of times the respondent has engaged in drunk driving. The signs are uniformly negative and, on a few occasions, statistically distinguishable from zero.

Another explanation for why our results are at variance with the mechanisms posited by ABC could also be differences in the sample period explored. In Table 6A, we re-estimate our

[11]This measure is only available in the BRFSS. Following Anderson et al. (2013), we calculate number of drinks consumed per month using respondents' answers to the questions, "During the past month, how many days per week or per month did you drink any alcoholic beverages, on the average?" and " On days when you drink, about how many drinks do you drink on average?"

models using the sample years that most closely mirror the time period examined by ABC (1998-2006). For the YRBS, we cannot exactly match ABC sample years, as the survey is only conducted biennially. During this period we continue to find little evidence that increases in the minimum wage increase drinking participation or drunk driving of younger teens (columns 1 and 2), though the coefficients are more mixed in sign than during the 1991-2011 period. For older teens (columns 3 through 5), the evidence points to consistently negative effects of minimum wage increases on drinking participation and binge drinking. These findings are all statistically distinguishable from zero at conventional levels. In Panel IV, we find no evidence that minimum wage increases were associated with increases in youth drunk driving during the ABC period, with estimated coefficients negative in four of five specifications.

In Table 6B, we split the BRFSS sample by employment status for the ABC period. For both workers and non-employed individuals, the evidence suggests negative drinking effects of minimum wages (Panels I through III). While we find no evidence that minimum wage increases are significantly related to the probability of drunk driving, the pattern of estimates suggest more positive effects for employed individuals and negative effects for those who are not working. But note that if one is to believe that there are positive drunk driving effects for employed teens, this result must be reconciled with a net decline in alcohol consumption and binge drinking among this group (Panels I and II). Moreover, when we examine the intensive margin over the ABC sample period (Table 6C), the evidence of a negative relationship between the minimum wage and drinking or drunk driving is stronger.

Next, in Table 7A, we examine the alcohol effects of minimum wage increases by gender, given that drunk-driving-related fatalities are overwhelmingly of males (National Highway Traffic Safety Administration 2013, 2009). For younger teens (columns 1 and 2), there

is no evidence that minimum wage increases significantly increase alcohol consumption or drunk driving for either males or females. Turning to older teens, we find no evidence that increases in the minimum wage lead to increases in net drinking, binge drinking, or drunk driving among males or females (columns 3 through 6) or for employed individuals (columns 7-8). In Table 7B, we restrict the gender-specific analysis to the ABC period. We find that minimum wage increases are associated with significant *declines* in drunk driving for young males (column 1). For older teens, there is consistent evidence that minimum wage increases are associated with a *reduction* in alcohol consumption.

Finally, given the paucity of evidence to support the hypothesis that minimum wage hikes increase alcohol consumption, we explore one other mechanism through which minimum wages could affect driving-related deaths: risky driving. Earnings gains could increase safety if safety is a normal good, but could also decrease safety if safety is a time-intensive investment and higher earnings increase the opportunity cost of time. Our measure of driving riskiness is generated from information on seat belt use. In the BRFSS, respondents are asked:

How often do you use seatbelts when you drive or ride in a car?

If respondents answered "always" or "never drive or ride in a car," *No Seat Belt* is set equal to 0. If respondents offered an answer less frequently than "always," *No Seat Belt* is set equal to 1. The YRBS does not consistently ask questions about seatbelt use, so we focus on the BRFSS for this analysis.[12] Table 8 presents our findings. The results provide little support for the hypothesis

[12]The National YRBS only collects seatbelt data in the years 2001 and 2003. The State YRBS includes information on seatbelt use from only nine states in staggered years: Florida (2001 to 2007), Georgia (2001 to 2011), Indiana (2001 to 2003), Montana (2001 to 2009), New Jersey (2001 to 2003; 2011), North Dakota (2007 to 2011), Ohio (2001 to 2007; 2011), South Dakota (1999 to 2009), and Vermont (1997 to 2007).

that minimum wage increases affect seatbelt use, either in the 1991 to 2011 sample(Panel I), among employed (Panel II) or non-working individuals (Panel III), or during the ABC period from 1998 to 2006 (Panel IV).

VI. Conclusions

A recent study by ABC concluded that minimum wage increases have the unintended consequence of increasing drunk-driving-related traffic fatalities. This research explores the possible mechanisms through which such a causal link might exist.

Using data from the CPS, the YRBS, and the BRFSS, and an identification strategy identical to ABC, we estimate the effect of minimum wage increases on teen earnings, alcohol consumption, binge drinking, and drunk driving. Our results provide little support for the hypothesis that minimum wage increases produce net income gains for teenagers, increase alcohol consumption at either the intensive or extensive margins, or increase drunk driving. In contrast, we find some evidence—particularly for older teens—that minimum wage increases are associated with *declines* in alcohol consumption.

The results of this study are at least somewhat difficult to reconcile with those of ABC. The lack of evidence for an increase in teen drinking caused by minimum wage hikes—and, in fact, evidence for just the opposite during the 1998 to 2006 period examined by ABC—is surprising, particularly given ABC's large drunk-driving fatality elasticity. At a minimum, our findings from the YRBS and BRFSS narrow the plausible channels through which minimum wage increases cause an increase in teenage drunk driving deaths. One possibility is a complicated redistribution of earnings that does not increase drinking or drunk driving (and may, in fact, reduce both) among all teens, but increases drinking among a subset of affected

minimum wage teen workers with the greatest propensity to drink, drive, and die. A second explanation is that the effects on drunk driving are driven entirely by employed younger teens, a population that data limitations do not permit us to test. A third is that the estimates we produce are not sufficiently precise to uncover drinking effects that could explain the drunk-driving results of ABC. And finally, it may be that the identification strategy employed by ABC—and used here—is biased by difficult-to-measure state-specific time shocks that differentially affect teens and cause bias in opposite directions for teenage drunk driving fatalities on the one hand and teenage alcohol consumption on the other. We conclude that while minimum wage policy may have a number of drawbacks for low-skilled individuals (see Sabia 2014a,b), it may be too soon to conclude that drunk driving-related traffic fatalities is one of them.

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Table 1A. Weighted Means of Key Variables, Current Population Survey Outgoing Rotation Groups, 1991-2011

	Age 16-to-20	*Age 16-to-18*	*Age 18-to-20*	*Age 26-to-64*
Dependent Variables				
Wages ($2012)	9.23 (6.26) [241,607]	8.42 (7.17) [123,026]	9.69 (5.35) [169,224]	21.74 (15.56) [2,791,103]
Employment	0.425 (0.494) [569,680]	0.333 (0.471) [360,629]	0.529 (0.499) [322,166]	0.754 (0.431) [4,337,084]
Usual Weekly Hours	10.67 (15.32) [543,390]	6.68 (11.94) [345,481]	14.93 (17.13) [305,334]	29.80 (19.81) [4,055,291]
Usual Weekly Hours|Employment	26.81 (12.54) [222,685]	21.95 (11.55) [111,879]	29.71 (12.03) [157,046]	40.42 (10.13) [3,004,360]
Usual Weekly Earnings ($2012)	146.9 (247.2) [564,104]	84.02 (172.0) [357,436]	211.4 (288.3) [318,835]	860.4 (877.3) [3,916,116]
Usual Weekly Earnings|Employment ($2012)	349.9 (273.1) [243,267]	256.8 (214.51) [123,791]	404.2 (284.6) [170,444]	1,183.0 (822.5) [2,862,005]
Independent Variables				4,337,084
Minimum Wages ($2012)	7.09 (0.694)	7.09 (0.696)	7.10 (0.691)	7.10 (0.697)
Black	0.152 (0.359)	0.156 (0.363)	0.149 (0.356)	0.116 (0.32)
Hispanic	0.157 (0.364)	0.153 (0.36)	0.160 (0.367)	0.118 (0.322)
Age	17.96 (1.419)	16.98 (0.814)	19.00 (0.820)	43.34 (10.64)
Male	0.508 (0.500)	0.511 (0.500)	0.505 (0.500)	0.489 (0.500)
Unemployment Rate	6.04 (2.01)	6.04 (2.007)	6.05 (2.006)	6.05 (2.01)
Prime-Age Wage Rate ($2012)	20.83 (2.25)	20.83 (2.26)	20.83 (2.25)	20.89 (2.24)
State Beer Taxes ($2012)	0.338 (0.257)	0.337 (0.256)	0.339 (0.258)	0.337 (0.258)
Cigarette Taxes ($2012)	0.830 (0.665)	0.833 (0.666)	0.827 (0.663)	0.834 (0.670)
BAC08 Laws	0.623 (0.476)	0.627 (0.475)	0.619 (0.477)	0.627 (0.475)
Zero Tolerance Laws	0.807 (0.386)	0.811 (0.383)	0.804 (0.389)	0.811 (0.384)
N	569,680	360,629	322,166	4,337,084

Notes: Weighted means drawn from the Current Population Outgoing Rotation Groups (CPS) from 1991-2011. Standard deviations are in parentheses and sample sizes in brackets.

Table 1B. Weighted Means of Key Variables, YRBS and BRFSS, 1991-2011

	YRBS	BRFSS					
	Ages 16-18	*Ages 18-20*			*Ages 26-64*		
	All	All	Employed	Not employed	All	Employed	Not employed
Dependent Variables							
Any Alcohol in Last 30 Days	0.498	0.431	0.473	0.402	0.561	0.605	0.485
	(0.500)	(0.495)	(0.499)	(0.490)	(0.496)	(0.489)	(0.500)
	[515,481]	[95,800]	[41,387]	[53,930]	[3,068,562]	[1,871,584]	[1,190,159]
Binge Drinking in Last 30 Days	0.324	0.218	0.245	0.200	0.155	0.173	0.122
	(0.468)	(0.413)	(0.430)	(0.400)	(0.362)	(0.378)	(0.328)
	[536,157]	[94,742]	[40,906]	[53,357]	[3,038,119]	[1,854,037]	[1,177,455]
Frequent Binge Drink in Last 30 Days	0.154	0.109	0.122	0.100	0.062	0.068	0.051
	(0.361)	(0.312)	(0.327)	(0.300)	(0.241)	(0.251)	(0.221)
	[536,157]	[94,742]	[40,906]	[53,357]	[3,038,119]	[1,854,037]	[1,177,455]
Drunk Driving	0.149	0.033	0.038	0.029	0.023	0.027	0.017
	(0.356)	(0.179)	(0.190)	(0.169)	(0.151)	(0.161)	(0.130)
	[526,900]	[57,529]	[25,505]	[31,731]	[1,682,381]	[1,042,587]	[635,785]
Number of Occasions Binge Drinking	1.302	0.924	1.049	.833	0.552	0.581	0.506
	(3.212)	(2.979)	(3.199)	(2.803)	(2.527)	(2.465)	(2.619)
	[536,157]	[94,742)	[40,906]	[53,357]	[3,038,119]	[1,854,037]	[1,177,455]
Number of Occasions Binge Drinking | Occasions > 0	4.325	4.387	4.411	4.363	3.951	3.6947	4.508
	(4.606)	(5.190)	(5.309)	(5.074)	(5.683)	(5.210)	(6.561)
	[161,373]	[19,964]	[9732]	[10,189]	[424,383]	[291,511]	[132,243]
Number of Drinks per Month	N/A	11.536	12.944	10.511	10.997	11.500	10.218
		(39.214)	(40.125)	(38.507)	(31.002)	(29.589)	(33.079)
		[93,495]	[40,294]	[52,729]	[3,019,131]	[1,842,549]	[1,170,086]
Number of Drinks per Month | Drinks > 0	N/A	28.456	28.938	28.014	20.344	19.516	21.985
		(57.547)	(56.006)	(58.836)	(39.848)	(36.460)	(45.779)
		[37,903]	[18,023]	[19,784]	[1,631,964]	[1,085,721]	[543,811]
Frequency of Drunk Driving	0.389	0.094	0.107	0.082	0.049	0.054	0.042
	(1.165)	(0.953)	(0.996)	(0.888)	(0.600)	(0.590)	(0.615)
	[526,900]	[57,529]	[25,505]	[31,731]	[1,682,381]	[1,042,587]	[635,785]

	YRBS	BRFSS					
	Ages 16-18	*Ages 18-20*			*Ages 26-64*		
	All	All	Employed	Not employed	All	Employed	Not employed
Frequency of Drunk	2.620	2.843	2.711	2.920	2.287	2.164	2.592
Driving | Drunk	(1.817)	(4.438)	(4.260)	(4.468)	(3.396)	(3.066)	(4.088)
Driving > 0	[78,168]	[1,887]	[997]	[880]	[35,939]	[25,728]	[10,165]
Independent Variables							
Minimum Wage	7.12	7.12	7.07	7.155	7.11	7.10	7.14
($2012)	(0.680)	(0.733)	(0.706)	(0.749)	(0.725)	(0.716)	(0.740)
Black	0.099	0.136	0.119	0.148	0.105	0.104	0.107
	(0.299)	(0.343)	(0.324)	(0.355)	(0.307)	(0.305)	(0.309)
Hispanic	0.046	0.173	0.170	0.175	0.118	0.112	0.128
	(0.210)	(0.378)	(0.376)	(0.380)	(0.323)	(0316)	(0.334)
Age	16.79	18.93	19.04	18.85	43.40	42.01	45.86
	(0.761)	(0.829)	(0.823)	(0.825)	(10.65)	(9.927)	(11.41)
Male	0.517	0.543	0.580	0.518	0.493	0.534	0.421
	(0.500)	(0.498)	(0.494)	(0.500)	(0.500)	(0.499)	(0.494)
Unemployment Rate	6.25	6.27	6.06	6.42	6.23	6.15	6.38
	(2.14)	(2.07)	(1.94)	(2.14)	(2.05)	(2.01)	(2.11)
Prime-Age Wage Rate	20.84	20.95	20.84	21.03	21.01	21.03	20.99
($2012)	(2.07)	(2.21)	(2.19)	(2.23)	(2.23)	(2.23)	(2.21)
State Beer Taxes	0.298	0.298	0.302	0.296	0.299	0.297	0.302
($2012)	(0.226)	(0.214)	(0.217)	(0.213)	(0.219)	(0.219)	(0.219)
Cigarette Taxes ($2012)	1.06	0.868	0.816	0.904	0.880	0.873	0.893
	(0.862)	(0.683)	(0.641)	(0.707)	(0.694)	(0.691)	(0.699)
BAC08 Laws	0.750	0.671	0.644	0.690	0.678	0.662	0.705
	(0.416)	(0.461)	(0.395)	(0.454)	(0.458)	(0.463)	(0.447)
Zero Tolerance Laws	0.920	0.810	0.798	0.817	0.823	0.818	0.832
	(0.264)	(0.385)	(0.395)	(0.379)	(0.375)	(0.379)	(0.368)
N	536,157	95,800	41,387	53,930	3,068,562	1,871,584	1,190,159

Notes: Weighted means drawn from the Youth Risk Behavior Survey (YRBS) and the Behavioral Risk Factor Surveillance Survey (BRFSS) from 1991-2011. Standard deviations are in parentheses and sample sizes in brackets.

Table 2. Difference-in-Difference Estimates of the Effects of Minimum Wages Increases on Usual Weekly Earnings, Employment, and Hours, Current Population Outgoing Rotation Groups, 1991-2011

	Ages 16-20			*Ages 16-18*			*Ages 18-20*		
	(1) DD	(2) DD	(3) DDD[a]	(4) DD	(5) DD	(6) DDD[a]	(7) DD	(8) DD	(9) DDD[a]
Panel I: Wages									
Ln(MW)	0.100***	0.117***	0.135***	0.165***	0.178***	0.200***	0.057**	0.075**	0.092***
	(0.024)	(0.026)	(0.023)	(0.029)	(0.029)	(0.025)	(0.028)	(0.033)	(0.027)
N	240,812	240,812	3,031,915	122,563	122,563	2,913,666	168,764	168,764	2,959,867
Panel II: Usual Weekly Earnings|Employment									
Ln(MW)	-6.869	18.681	-8.112	17.956	36.425**	15.432	-20.801	8.283	-21.600
	(10.600)	(12.210)	(17.776)	(13.638)	(14.336)	(19.193)	(13.080)	(15.413)	(19.494)
N	243,267	243,267	3,105,272	123,791	123,791	2,985,796	170,444	170,444	3,032,449
Panel III: Usual Weekly Earnings									
Ln(MW)	-8.375	3.119	-12.252	-3.983	2.875	-7.405	-11.599	5.194	-15.751
	(6.054)	(6.357)	(11.145)	(4.675)	(5.368)	(12.050)	(9.916)	(10.334)	(12.280)
N	564,104	564,104	4,480,220	357,436	357,436	4,273,552	318,835	318,835	4,234,951
Panel IV: Employment									
Ln(MW)	-0.029*	-0.023	-0.041**	-0.054**	-0.048*	-0.066***	0.004	0.011	-0.008
	(0.016)	(0.023)	(0.017)	(0.022)	(0.025)	(0.022)	(0.018)	(0.028)	(0.018)
N	569,680	569,680	4,906,764	360,629	360,629	4,697,713	322,166	322,166	4,659,250
Panel V: Usual Weekly Hours									
Ln(MW)	-0.960*	-0.863	-1.371***	-1.016**	-1.285**	-1.421***	-1.039	-0.622	-1.449**
	(0.525)	(0.565)	(0.489)	(0.450)	(0.484)	(0.484)	(0.756)	(0.892)	(0.703)
N	543,390	543,390	4,598,681	345,481	345,481	4,400,772	305,334	305,334	4,360,625
Panel VI: Usual Weekly Hours|Employment									
Ln(MW)	-1.474*	-0.399	-1.400*	-0.766	-0.894	-0.715	-2.020**	-0.536	-1.935*
	(0.774)	(0.775)	(0.825)	(0.851)	(0.973)	(0.904)	(0.956)	(0.992)	(1.027)
N	222,685	222,685	3,227,045	111,879	111,879	3,116,239	157,046	157,046	3,161,406
State Trends?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1A as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 3. Difference-in-Differences Estimates of the Effects of Minimum Wage Increases on Alcohol Consumption and Drunk Driving

	YRBS		BRFSS		
	Ages 16-18		*Ages 18-20*		
	(1) DD	(2) DD	(3) DD	(4) DD	(5) DDD[a]
Panel I: Alcohol Consumption in Last 30 Days					
Ln(MW)	0.023	0.042	-0.126**	-0.162**	-0.071
	(0.034)	(0.044)	(0.054)	(0.076)	(0.044)
N	515,481	515,481	95,800	95,800	3,164,362
Panel II: Binge Drinking in Last 30 Days					
Ln(MW)	-0.012	0.017	-0.066	-0.082	-0.051
	(0.030)	(0.033)	(0.062)	(0.065)	(0.047)
N	536,157	536,157	94,742	94,742	3,132,861
Panel III: Binge Drinking 3 or More Times in Last 30 Days					
Ln(MW)	-0.024	0.001	-0.054	-0.067	-0.045
	(0.033)	(0.037)	(0.044)	(0.040)	(0.036)
N	536,157	536,157	94,742	94,742	3,132,861
Panel IV: Drunk Driving					
Ln(MW)	-0.012	-0.028	0.032	0.015	0.026
	(0.025)	(0.034)	(0.021)	(0.025)	(0.017)
N	526,900	526,900	57,529	57,529	1,739,910
State Trends?	No	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 4. Difference-in-Differences Estimates of the Effects of Minimum Wage Increases on Alcohol Consumption and Drunk Driving Among Workers, BRFSS, 1991-2011

	Employed		Not Employed	
	(1)	(2)	(3)	(4)
	DD	DDD[a]	DD	DDD[a]
Panel I: Alcohol Consumption in Last 30 Days				
Ln(MW)	-0.148	-0.032	-0.172**	-0.086
	(0.090)	(0.053)	(0.084)	(0.054)
N	41,387	1,912,971	53,930	1,244,089
Panel II: Binge Drinking in Last 30 Days				
Ln(MW)	-0.020	0.013	-0.116	-0.081
	(0.072)	(0.047)	(0.081)	(0.069)
N	40,906	1,894,943	53,357	1,230,812
Panel III: Binge Drinking 3 or More Times in Last 30 Days				
Ln(MW)	-0.041	-0.030	-0.073*	-0.050
	(0.072)	(0.057)	(0.041)	(0.033)
N	40,906	1,894,943	53,357	1,230,812
Panel IV: Drunk Driving				
Ln(MW)	0.017	0.048	0.022	0.018
	(0.043)	(0.037)	(0.020)	(0.011)
N	25,505	1,068,092	31,731	667,516
State Trends?	Yes	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of employed individuals ages 26-to-64.

Table 5. Difference-in-Difference Estimates of Relationship Between Minimum Wages and Frequency of Binge Drinking and Drunk Driving

	YRBS	BRFSS					
	Ages 16-18	*Ages 18-20*					
	All	All		Employed		Not Employed	
	(1) DD	(2) DD	(3) DDD[a]	(4) DD	(5) DDD[a]	(6) DD	(7) DDD[a]
Panel I: Number of Occasions Binge Drinking							
Ln(MW)	-0.190	-0.659	-0.513	-0.130	-0.009	-0.983**	-0.864**
	(0.336)	(0.427)	(0.361)	(0.768)	(0.548)	(0.455)	(0.372)
N	536,157	94,742	3,132,861	40,906	1,894,943	53,357	1,230,812
Panel II: Number of Occasions Binge Drinking | Binge Drink = 1							
Ln(MW)	-0.606	-1.463	-1.097	-0.609	-0.550	-1.897	-1.624
	(0.731)	(1.080)	(1.003)	(2.270)	(1.645)	(1.643)	(1.327)
N	161,373	19,964	444,347	9,732	301,243	10,189	142,432
Panel III: Number of Drinks per Month							
Ln(MW)	N/A	-4.231	-3.842	-1.326	2.870	-4.544	-8.170
		(5.282)	(3.537)	(8.877)	(6.381)	(6.608)	(4.935)
N		93,495	3,112,626	40,294	1,882,843	52,729	1,222,815
Panel IV: Number of Drinks per Month | Drinking = 1							
Ln(MW)	N/A	-6.800	-6.236	-0.161	6.176	-7.937	-16.186
		(10.805)	(7.979)	(20.199)	(13.655)	(12.604)	(10.666)
N		37,903	1,669,867	18,023	1,103,744	19,784	563,595
Panel V: Frequency of Drunk Driving							
Ln(MW)	-0.122	-0.225	-0.098	-0.012	0.074	-0.178	-0.085
	(0.102)	(0.149)	(0.108)	(0.279)	(0.221)	(0.162)	(0.130)
N	526,900	57,529	1,739,910	25,505	1,068,092	31,731	667,516
Panel VI: Frequency of Drunk Driving | Drunk Driving = 1							
Ln(MW)	-0.257	-12.303**	-5.999*	-4.350	-1.139	-8.139	-2.017
	(0.173)	(5.401)	(3.430)	(6.861)	(4.580)	(6.055)	(4.459)
N	78,168	1,887	37,942	1,002	26,790	883	11,094
State Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Linear Trends?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses.

[a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 6A. Sensitivity of Difference-in-Difference Estimates of Effects of Minimum Wage on Alcohol Consumption and Drunk Driving to ABC Sample Period

	YRBS		BRFSS		
	Ages 16-18		*Ages 18-20*		
	1997-2005		1998-2006		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	DD	*DD*	*DD*	*DD*	*DDD*[a]
Panel I: Alcohol Consumption in Last 30 Days					
Ln(MW)	0.001	0.014	-0.354**	-0.603**	-0.357**
	(0.039)	(0.086)	(0.161)	(0.262)	(0.145)
N	236,551	236,551	44,444	44,444	1,353,238
Panel II: Binge Drinking in Last 30 Days					
Ln(MW)	-0.008	0.062	-0.215*	-0.360*	-0.227**
	(0.049)	(0.062)	(0.121)	(0.198)	(0.110)
N	243,106	243,106	44,019	44,019	1,342,953
Panel III: Binge Drinking 3 or More Times in Last 30 Days					
Ln(MW)	0.007	0.096	-0.143**	-0.294**	-0.152**
	(0.039)	(0.085)	(0.067)	(0.111)	(0.057)
N	243,106	243,106	44,019	44,019	1,342,953
Panel IV: Drunk Driving					
Ln(MW)	0.044	-0.050	-0.033	-0.053	-0.047
	(0.036)	(0.048)	(0.046)	(0.071)	(0.047)
N	244,704	244,704	44,019	44,019	1,342,953
State Trends?	No	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 6B. Sensitivity of Difference-in-Difference Estimates of Effects of Minimum Wage on Alcohol Consumption and Drunk Driving to ABC Sample Period (1998-2006), BRFSS

	Employed			Not Employed		
	(1)	(2)	(3)	(4)	(5)	(6)
	DD	DD	DDD[a]	DD	DD	DDD[a]
Panel I: Alcohol Consumption in Last 30 Days						
Ln(MW)	-0.429***	-0.604**	-0.425***	-0.305	-0.626*	-0.285
	(0.158)	(0.258)	(0.142)	(0.190)	(0.317)	(0.171)
N	20,462	20,462	842,042	23,796	23,796	508,487
Panel II: Binge Drinking in Last 30 Days						
Ln(MW)	-0.197*	-0.065	-0.204**	-0.210	-0.598**	-0.219
	(0.099)	(0.172)	(0.086)	(0.169)	(0.275)	(0.158)
N	20,246	20,246	835,906	23,589	23,589	504,394
Panel III: Binge Drinking 3 or More Times in Last 30 Days						
Ln(MW)	-0.041	-0.060	-0.051	-0.187**	-0.450***	-0.190**
	(0.068)	(0.137)	(0.061)	(0.084)	(0.134)	(0.075)
N	20,246	20,246	835,906	23,589	23,589	504,394
Panel IV: Drunk Driving						
Ln(MW)	0.081	0.068	0.074	-0.089	-0.097	-0.110*
	(0.067)	(0.082)	(0.069)	(0.062)	(0.102)	(0.061)
N	11,930	11,930	484,544	13,580	13,580	290,420
State Trends?	No	Yes	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 6C. Difference-in-Difference Estimates of Relationship Between Minimum Wages and Frequency of Binge Drinking and Drunk Driving, ABC years

	YRBS	BRFSS					
	Ages 16-18	*Ages 18-20*					
	1997-2005	*1998-2006*					
	All	All		Employed		Not Employed	
	(1) DD	(2) DD	(3) DDD[a]	(4) DD	(5) DDD[a]	(6) DD	(7) DDD[a]
Panel I: Number of Occasions Binge Drinking							
Ln(MW)	-0.641	-3.265**	-0.513	-1.035	-0.746	-4.850***	-2.057**
	(0.550)	(1.429)	(0.361)	(1.778)	(0.944)	(1.387)	(0.896)
N	243,106	44,019	3,132,861	20,246	835,906	23,589	504,394
Panel II: Number of Occasions Binge Drinking | Binge Drink = 1							
Ln(MW)	-2.673*	-6.837**	-3.090	-1.712	-0.194	-9.487***	-5.114*
	(1.375)	(2.804)	(2.056)	(4.318)	(3.603)	(2.793)	(2.616)
N	78,754	10,029	187,291	5,086	130,585	4,924	56,436
Panel III: Number of Drinks per Month							
Ln(MW)		-61.140*	-31.146**	-43.120	-19.888	-70.313**	-37.008**
	N/A	(32.699)	(14.901)	(37.032)	(15.967)	(31.768)	(16.572)
N		43,506	1,336,316	19,990	831,832	23,336	501,894
Panel IV: Number of Drinks per Month | Drinking							
Ln(MW)		-91.345*	-49.492*	-47.810	-20.081	-115.041**	-69.265***
	N/A	(52.233)	(25.037)	(62.677)	(31.019)	(49.385)	(24.713)
N		19,017	729,155	9,417	491,602	9,562	236,524
Panel V: Frequency of Drunk Driving							
Ln(MW)	-0.375***	-0.364	-0.098	0.499	0.274	-0.405	-0.180
	(0.116)	(0.253)	(0.108)	(0.451)	(0.496)	(0.461)	(0.270)
N	244,704	25,626	1,739,910	11,930	484,544	13,580	290,420
Panel VI: Frequency of Drunk Driving | Drunk Driving							
Ln(MW)	-1.112***	-11.024*	-6.372	-8.249	1.709	6.912	12.248
	(0.361)	(6.517)	(7.445)	(7.590)	(6.705)	(11.526)	(8.962)
N	40,460	909	17,585	493	12,567	419	4,994
State Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Linear Trends?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 7A. Sensitivity of Difference-in-Difference Estimates of Effects of Minimum Wage Increases on Alcohol Consumption and Drunk Driving by Gender, 1991-2011

	YRBS		BRFSS							
	Ages 16-18		*Ages 18-20*							
	All		All				Employed		Not Employed	
	Males	Females	Males		Females		Males	Females	Males	Females
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	DD	DD	DD	DDD[a]	DD	DDD[a]	DDD[a]	DDD[a]	DDD[a]	DDD[a]
Panel I: Alcohol Consumption in Last 30 Days										
Ln(MW)	0.065	0.016	-0.203**	-0.130*	-0.137	-0.028	-0.022	-0.048	-0.210**	-0.012
	(0.056)	(0.046)	(0.095)	(0.071)	(0.087)	(0.063)	(0.083)	(0.076)	(0.090)	(0.081)
N	256,400	259,081	45,507	1,275,567	50,293	1,888,795	816,214	1,096,757	456,284	787,805
Panel II: Binge Drinking in Last 30 Days										
Ln(MW)	-0.010	0.045	-0.110	-0.078	-0.067	-0.032	0.082	-0.090	-0.187	0.003
	(0.046)	(0.035)	(0.079)	(0.066)	(0.069)	(0.054)	(0.060)	(0.062)	(0.112)	(0.073)
N	267,958	268,199	44,869	1,258,659	49,873	1,874,202	806,292	1,088,651	449,401	781,411
Panel III: Binge Drinking 3 or More Times in Last 30 Days										
Ln(MW)	0.006	-0.006	-0.099*	-0.079	-0.035	-0.011	-0.022	-0.048	-0.126**	0.009
	(0.051)	(0.025)	(0.055)	(0.053)	(0.034)	(0.028)	(0.079)	(0.047)	(0.056)	(0.038)
N	267,958	268,199	44,869	1,258,659	49,873	1,874,202	806,292	1,088,651	449,401	781,411
Panel IV: Drunk Driving										
Ln(MW)	-0.055	-0.000	0.031	0.035	-0.005	0.012	0.064	0.028	0.019	0.008
	(0.061)	(0.020)	(0.043)	(0.024)	(0.019)	(0.020)	(0.055)	(0.030)	(0.030)	(0.021)
N	263,600	263,300	27,210	707,572	30,319	1,032,338	461,655	606,437	244,135	423,381
State Trends?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 7B. Sensitivity of Difference-in-Difference Estimates of Effects of Minimum Wage Increases on Alcohol Consumption and Drunk Driving by Gender, ABC Sample Period

	YRBS		BRFSS			
	Ages 16-18		*Ages 18-20*			
	1997-2005		*1998-2006*			
	Males	Females	Males		Females	
	(1) DD	(2) DD	(3) DD	(4) DDD[a]	(5) DD	(6) DDD[a]
Panel I: Alcohol Consumption in Last 30 Days						
Ln(MW)	0.073	-0.069	-0.480**	-0.318**	-0.799**	-0.437**
	(0.093)	(0.087)	(0.235)	(0.151)	(0.346)	(0.173)
N	117,517	119,034	20,517	548,613	23,927	804,625
Panel II: Binge Drinking in Last 30 Days						
Ln(MW)	0.005	0.117	-0.416*	-0.277**	-0.319	-0.162
	(0.067)	(0.102)	(0.231)	(0.134)	(0.194)	(0.113)
N	121,393	121,713	20,256	542,750	23,763	800,203
Panel III: Binge Drinking 3 or More Times in Last 30 Days						
Ln(MW)	0.069	0.102	-0.394***	-0.178**	-0.197*	-0.118*
	(0.081)	(0.098)	(0.128)	(0.086)	(0.111)	(0.067)
N	121,393	121,713	20,256	542,750	23,763	800,203
Panel IV: Drunk Driving						
Ln(MW)	-0.156***	0.057	-0.089	-0.090	-0.020	-0.004
	(0.055)	(0.069)	(0.096)	(0.081)	(0.049)	(0.034)
N	122,323	122,381	11,914	314,717	13,712	461,736
State Trends?	Yes	Yes	Yes	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Table 8. Difference-in-Difference Estimates of the Relationship between Minimum Wage Increases and the Probability of Driving without a Seatbelt for Those Ages 18 to 20, BRFSS

	(1) DD	(2) DD	(3) DDD[a]
Panel I: 1991-2011 Period			
Ln(MW)	-0.045	0.036	-0.024
	(0.084)	(0.072)	(0.061)
N	50,929	50,929	1,648,963
Panel II: 1991-2011 Period, Employed			
Ln(MW)	0.003	0.111	0.016
	(0.137)	(0.128)	(0.100)
N	21,420	21,420	990,843
Panel III: 1991-2011 Period, Not Employed			
Ln(MW)	-0.079	-0.017	-0.063
	(0.085)	(0.107)	(0.080)
N	29,259	29,259	654,948
Panel VI: ABC Sample Period (1998-2006)			
Ln(MW)	-0.186	-0.133	-0.073
	(0.182)	(0.109)	(0.144)
N	12,295	12,295	413,427
State Trends?	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses.

Appendix Table 1. Difference-in-Difference Estimates of the Effects of Minimum Wages Increases on Last Week's Earnings, Employment, and Hours for Teens Paid by Hourly Rates, Current Population Outgoing Rotation Groups, 1991-2011

	Ages 16-20			*Ages 16-18*			*Ages 18-20*		
	(1) DD	(2) DD	(3) DDD[a]	(4) DD	(5) DD	(6) DDD[a]	(7) DD	(8) DD	(9) DDD[a]
Panel I: Wages									
Ln(MW)	0.125***	0.139***	0.169***	0.184***	0.188***	0.230***	0.075**	0.096***	0.119***
	(0.025)	(0.021)	(0.020)	(0.030)	(0.026)	(0.025)	(0.028)	(0.027)	(0.024)
N	225,596	225,596	1,818,803	116,747	116,747	1,709,954	156,813	156,813	1,750,020
Panel II: Weekly Earnings|Employment									
Ln(MW)	0.578	14.591	-13.956	13.400	-22.713**	-3.537	-11.563	6.340	-26.421*
	(9.110)	(9.934)	(13.385)	(12.301)	(9.410)	(16.831)	(9.672)	(12.679)	(13.230)
N	210,026	210,026	1,667,352	1,667,352	1,667,352	1,566,060	145,942	145,942	1,603,268
Panel III: Weekly Hours|Employment									
Ln(MW)	-1.154*	-0.017	-0.875	-0.364	-0.575*	-0.089	-1.638**	-0.415	-1.360**
	(0.587)	(0.700)	(0.539)	(0.337)	(0.305)	(0.812)	(0.687)	(0.930)	(0.629)
N	210,026	210,026	1,667,352	1,667,352	1,667,352	1,566,060	145,942	145,942	1,603,268
State Trends?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1A as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Appendix Table 2. Difference-in-Difference Estimates of the Effects of Minimum Wage Increases on Employment, BRFSS, 1991-2011

	(1) DD	(2) DD	(3) DDD[a]
Ln(MW)	-0.101	-0.019	-0.118**
	(0.063)	(0.078)	(0.055)
N	110,872	110,872	3,498,334
State Trends?	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of employed individuals ages 26-to-64.

Appendix Table 3. Difference-in-Difference Estimates of the Effects of Minimum Wages Increases on Last Week's Earnings, Employment, and Hours, Current Population Outgoing Rotation Groups, 1991-2011

	Ages 16-20			*Ages 16-18*			*Ages 18-20*		
	(1) DD	(2) DD	(3) DDD[a]	(4) DD	(5) DD	(6) DDD[a]	(7) DD	(8) DD	(9) DDD[a]
Panel I: Wages									
Ln(MW)	0.100***	0.117***	0.135***	0.165***	0.178***	0.200***	0.057**	0.075**	0.092***
	(0.024)	(0.026)	(0.023)	(0.029)	(0.029)	(0.025)	(0.028)	(0.033)	(0.027)
N	240,812	240,812	3,031,915	122,563	122,563	2,913,666	168,764	168,764	2,959,867
Panel II: Weekly Earnings|Employment									
Ln(MW)	-6.511	10.495	-62.430***	11.747	24.320*	-45.200**	-18.146*	1.865	-73.907***
	(9.033)	(11.322)	(19.091)	(13.092)	(12.462)	(21.284)	(9.879)	(14.114)	(18.715)
N	224,566	224,566	2,775,757	114,341	114,341	2,665,532	157,287	157,287	2,708,478
Panel III: Weekly Earnings									
Ln(MW)	-10.263**	-2.920	-47.694***	-7.015*	-3.089	-43.529***	-14.113*	-4.343	-52.296***
	(4.416)	(5.590)	(14.974)	(3.790)	(4.531)	(15.547)	(7.248)	(7.928)	(15.682)
N	545,135	545,135	4,147,991	347,833	347,833	3,950,689	305,510	305,510	3,908,366
Panel IV: Employment									
Ln(MW)	-0.029*	-0.023	-0.041**	-0.054**	-0.048*	-0.066***	0.004	0.011	-0.008
	(0.016)	(0.023)	(0.017)	(0.022)	(0.025)	(0.022)	(0.018)	(0.028)	(0.018)
N	569,680	569,680	4,906,764	360,629	360,629	4,697,713	322,166	322,166	4,659,250
Panel V: Weekly Hours									
Ln(MW)	-1.003*	-1.344**	-1.397***	-1.134**	-1.555***	-1.507***	-0.968	-1.374	-1.377*
	(0.509)	(0.617)	(0.491)	(0.502)	(0.521)	(0.514)	(0.730)	(0.874)	(0.687)
N	552,141	552,141	4,596,564	351,646	351,646	4,396,069	309,917	309,917	4,354,340
Panel VI: Weekly Hours|Employment									
Ln(MW)	-1.265*	-0.212	-1.174*	-0.511	0.326	-0.446	-1.683**	-0.681	-1.578**
	(0.633)	(0.694)	(0.643)	(0.854)	(0.885)	(0.889)	(0.728)	(0.906)	(0.741)
N	231,920	231,920	3,228,186	118,385	118,385	3,114,651	161,867	161,867	3,158,133
State Trends?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1A as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Appendix Table 4. Sensitivity of Difference-in-Difference Estimates of the Effects of Minimum Wage Increases on Last Week's Earnings, Employment, and Last Week's Hours by Gender for those Ages 16 to 20, CPS 1991-2011

	Males			Females		
	(1) DD	(2) DD	(3) DDD[a]	(4) DD	(5) DD	(6) DDD[a]
Panel I: Wages						
Ln(MW)	0.063**	0.087**	0.100***	0.134***	0.148***	0.170***
	(0.027)	(0.037)	(0.029)	(0.028)	(0.025)	(0.024)
N	119,171	119,171	1,528,817	121,641	121,641	1,503,098
Panel II: Last Week's Earnings|Employment						
Ln(MW)	-10.988	24.296	-1.829	-2.821	14.302	-10.211
	(12.637)	(17.598)	(24.781)	(11.091)	(11.967)	(15.004)
N	120,595	120,595	1,573,354	122,672	122,672	1,531,918
Panel III: Last Week's Earnings						
Ln(MW)	-13.443*	3.942	-7.723	-2.959	2.760	-13.597
	(6.740)	(9.206)	(16.664)	(7.959)	(7.448)	(14.857)
N	283,184	283,184	2,090,294	280,920	280,920	2,389,926
Panel IV: Employment						
Ln(MW)	-0.034**	-0.015	-0.045**	-0.022	-0.028	-0.035
	(0.016)	(0.023)	(0.017)	(0.023)	(0.028)	(0.026)
N	286,963	286,963	2,367,748	282,717	282,717	2,539,016
Panel V: Last Week's Hours						
Ln(MW)	-1.264**	-0.934	-1.825***	-0.569	-0.686	-0.922
	(0.548)	(0.693)	(0.607)	(0.670)	(0.651)	(0.724)
N	273,454	273,454	2,185,565	269,936	269,936	2,413,116
Panel VI: Last Week's Hours/Employment						
Ln(MW)	-1.196	-0.139	-1.130	-1.697**	-0.592	-1.607**
	(1.007)	(1.231)	(1.101)	(0.815)	(0.734)	(0.759)
N	110,947	110,947	1,670,209	111,738	111,738	1,556,836
State Trends?	No	Yes	Yes	No	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 1% level

Notes: All models include controls listed in Table 1A as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.

Appendix Table 5. Difference-in-Differences Estimates of the Effects of Minimum Wage Increases on Alcohol Consumption and Drunk Driving, 1991-2011

	YRBS	**BRFSS**	
	Ages 16-18	*Ages 18-20*	
	(1)	(2)	(3)
	DD	DD	DDD[a]
Panel I: Alcohol Consumption in Last 30 Days			
Ln(MW)	0.035	-0.159**	-0.066
	(0.042)	(0.074)	(0.042)
N	515,481	95,800	3,164,362
Panel II: Binge Drinking in Last 30 Days			
Ln(MW)	0.016	-0.083	-0.052
	(0.032)	(0.063)	(0.045)
N	536,157	94,742	3,132,861
Panel III: Binge Drinking 3 or More Times in Last 30 Days			
Ln(MW)	-0.002	-0.065*	-0.045
	(0.038)	(0.038)	(0.034)
N	536,157	94,742	3,132,861
Panel IV: Drunk Driving			
Ln(MW)	-0.031	0.018	0.030*
	(0.034)	(0.024)	(0.016)
N	526,900	57,529	1,739,910
State Trends?	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses.

Appendix Table 6. Robustness of Difference-in-Difference-in-Difference Estimates to Controls for State and Year Fixed Effects Interactions

	All		Employed		Not Employed	
	Males	Females	Males	Females	Males	Females
	(1) DDD[a]	(2) DDD[a]	(1) DDD[a]	(2) DDD[a]	(1) DDD[a]	(2) DDD[a]
Panel I: Alcohol Consumption in Last 30 Days						
Ln(MW)	-0.129*	-0.025	-0.022	-0.046	-0.209**	-0.013
	(0.071)	(0.062)	(0.078)	(0.080)	(0.098)	(0.083)
N	1,275,567	1,888,795	816,214	1,096,757	456,284	787,805
Panel II: Binge Drinking in Last 30 Days						
Ln(MW)	-0.079	-0.029	0.073	-0.095	-0.192*	0.010
	(0.063)	(0.053)	(0.055)	(0.066)	(0.112)	(0.068)
N	1,258,659	1,874,202	806,292	1,088,651	449,401	781,411
Panel III: Binge Drinking 3 or More Times in Last 30 Days						
Ln(MW)	-0.071	-0.012	-0.008	-0.049	-0.130**	0.009
	(0.049)	(0.028)	(0.072)	(0.046)	(0.051)	(0.038)
N	1,258,659	1,874,202	806,292	1,088,651	449,401	781,411
Panel IV: Drunk Driving						
Ln(MW)	0.036	0.014	0.060	0.026	0.019	0.012
	(0.024)	(0.019)	(0.052)	(0.032)	(0.032)	(0.020)
N	707,572	1,032,338	461,655	606,437	244,135	423,381
State Trends?	Yes	Yes	Yes	Yes	Yes	Yes

***Significant at 1% level **Significant at 5% level *Significant at 10% level

Notes: All models include controls listed in Table 1B as well as state and year fixed effects. Estimates are weighted and standard errors corrected for clustering on the state are in parentheses. [a]The within-state control group for difference-in-difference-in-difference models is comprised of those ages 26-to-64.