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The fatal toll of driving to drink: The effect of minimum legal drinking age evasion on traffic fatalities

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ABSTRACT

There is a sizeable literature on the effect of minimum legal drinking age (MLDA) restrictions on teenage drunk driving. This paper adds to the literature by examining the effect of MLDA evasion across states with different alcohol restrictions. Using state-of-the-art GIS software and micro-data on fatal vehicle accidents from 1977 to 2002, we find that in counties within 25 miles of a lower-MLDA jurisdiction, a legal restriction on drinking does not reduce youth involvement in fatal accidents and, for 18 and 19-year-old drivers, fatal accident involvement actually increases. Farther from such a border, we find results consistent with the previous literature that MLDA restrictions are effective in reducing accident fatalities. The estimates imply that, of the total reduction in teenager-involved fatalities due to the equalization of state MLDAs at 21 in the 1970s and 1980s, for 18-year olds between a quarter and a third and for 19-year olds over 15 percent was due to equalization. Furthermore, the effect of changes in the MLDA is quite heterogeneous with respect to the fraction of a state's population that need not travel far to cross a border to evade its MLDA. Our results imply the effect of lowering the MLDA in select states, such as has been proposed in Vermont, could lead to sizeable increases in teenage involvement in fatal accidents due to evasion of local alcohol restrictions.

1. Introduction

In part to reduce alcohol-related driving fatalities, Congress passed the National Minimum Drinking Age Act in 1984 that mandated all states must increase their minimum legal drinking age (MLDA) to 21 or forfeit federal highway funds. At the time of passage, only 20 states had an MLDA of 21, while 18 states had an MLDA of 19, 8 states (including the District of Columbia) had an 18-year-old MLDA, and 5 states had an MLDA of 20. By 1987, all states had adopted a minimum drinking age of 21.

Although the move to a uniform 21-year-old MLDA occurred more that 20 years ago, it is becoming policy-relevant again today as some states are considering reducing the drinking age. For example, in March 2008 the Vermont State Senate passed legislation creating a task force to consider lowering the MLDA to 18. South Dakota and Missouri also are now discussing whether to lower their drinking ages. Recently, 100 college presidents in the United States called on lawmakers to reduce the national MLDA to 18. One of the critical components of the debate over whether to reduce the legal drinking age is whether to enact a national reduction or whether to leave it up to individual states.

An important but unexamined policy parameter in this debate is the degree to which cross-state *differences* in minimum legal drinking ages induce teenage drunk driving. The introduction of the uniform 21-year-old minimum legal drinking age in the United States has generated a large volume of controversy and research over the effectiveness of this change in reducing teen traffic fatalities, but most of this research addresses the effect of *raising* (in a majority of states) the drinking age to 21, while little attention has been paid to the fact that the National Minimum Drinking Age Act also served to *equalize* drinking ages across most localities in the country. For example, in 1980, the MLDA in Ohio was 18 but was 21 in Michigan, Indiana, Pennsylvania, and Kentucky. These differences were reduced when Ohio raised its MLDA to 19 in 1983 and were eliminated completely in 1987 when Ohio raised its MLDA to 21. While Virginia had an MLDA of 18 until 1983 and then of 19 until 1985, Washington, DC had an 18-year-old MLDA until 1986, when all cross-state differences were eliminated.

If the presence of nearby lower-MLDA localities induces teenagers[1] to avoid local restrictions by crossing a border to buy alcohol, driving to get the alcohol (and more importantly driving

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[1] Throughout this analysis, we refer to "teenagers" as those who are 18, 19, or 20 years old.

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back often under the influence) makes alcohol-related accidents more likely. The act of cross-border evasion of the local MLDA therefore can itself undermine the main objective of state alcohol policies—the prevention of alcohol-related automobile accidents, especially among young drivers. Depending on the extent of cross-border evasion, introducing MLDA variation—for a given average level of the MLDAs—across states can be quite costly in terms of lives lost.

The possibility that variation in state policies can induce cross-border evasion that undermines the effectiveness of individual state policies is widely understood. The extent and impact of cross-border shopping has been studied largely in the context of taxation, where inter-jurisdictional tax differences induce consumers to purchase goods in nearby localities. Much of this literature has focused on avoidance of state excise taxes on cigarettes (Lovenheim, 2008; Stehr, 2005; Merriman, forthcoming; Coats, 1995; Slemrod, 2008; Goolsbee et al., forthcoming) and alcohol (Stehr, 2007; Beard et al., 1997) due to the large interstate excise tax differentials on these commodities, and without exception the literature concludes that this phenomenon is widespread and varies with the potential monetary savings. The tax avoidance is symptomatic of distortionary costs, including the cost of driving to the lower-tax neighboring state. What makes the variation in MDLA laws especially striking is that part of the social cost of avoiding the local law can be measured in terms of not only the lives of young drivers but also of others involved in the fatal crashes of drunk drivers returning from a night on the town.

In this paper we show empirically that, ceteris paribus, the presence of lower-MLDA border states raises youth driving fatalities in areas that are close to lower-MLDA borders. We use Geographic Information System (GIS) software to match with each U.S. county the closest locality in which an 18, 19, or 20-year-old legally can purchase alcohol and measure the population-weighted average distance from the county to that locality. Then, using data from the Fatal Accident Reporting System (FARS) covering 1977–2002, which contains information on every fatal accident in the United States, we first show that accidents involving only older drivers vary systematically with MLDA changes and with the distance to lower-MLDA borders. This variation suggests a difference-in-difference methodology is necessary to control for spurious fatal accident variation that is correlated with the timing of MLDA increases.

We then estimate such a difference-in-difference model, which identifies how the likelihood that an 18, 19 or 20-year-old driver is involved in a fatal accident relative to older drivers varies with MLDA law changes and distance to lower-MLDA borders. The results indicate that, for counties within 25 miles of a lower-MLDA border, the effect of restricting alcohol by raising the MLDA locally *increases* the likelihood that an 18 or 19-year-old (but not a 20-year-old) driver is involved in a fatal accident (relative to all drivers over 25 years old). In contrast, for counties more than 25 miles from a lower-MLDA border, raising the drinking age within a state has a negative and statistically significant effect on the likelihood that a teenage driver is involved in a fatal accident. Furthermore, although we cannot measure alcohol involvement directly, our estimates of the effect of increasing the minimum legal drinking age and of MLDA evasion are due solely to accidents occurring at night, which is consistent with alcohol use.

We conduct simulations based on our empirical estimates that decompose the total observed difference in teen-involved traffic fatalities between 2002 and each year from 1977 to 1988 attributable to MLDA changes into the part due to *raising* the MLDA and the part due to *equalizing* the MLDA. In the late 1970s and early 1980s, about 23 percent of the total MLDA-related decline in traffic fatalities was due to equalization for 18-year-old accident involvement, and for 19-year-old accidents equalization accounted for about 16 percent of the total MLDA-related decline. These estimates imply previous studies that have ignored MLDA evasion have significantly understated the potential reduction in teenage drunk driving due to completely restricting teenagers' access to alcohol, because local restrictions are partly evaded, often with fatal consequences.

Behind the average national effect lie substantial differential effects across states. For example, the existence of unequal MLDA laws raised 18-year-old involvement in fatal accidents by over 5 percent in Alabama, Delaware, New Jersey, South Dakota, and Tennessee in 1980. In contrast, Arizona, California, the District of Columbia, Idaho, Nevada, Oregon, South Carolina, Utah and Washington did not experience increased fatalities due to 18-year olds evading the minimum legal drinking age in that year. These simulations suggest, despite the fact that the effect of evasion on traffic fatalities is localized to counties within 25 miles of lower-MLDA borders, a significant portion of the national fatality reduction attributable to MLDA changes was due to the equalization of MLDAs across states in the late 1970s and early 1980s.

The rest of this paper is organized as follows: Section 2 reviews the previous literature on cross-border shopping and the effects of the MLDA on traffic fatalities. Section 3 discusses our data, and Section 4 presents estimates from a county-by-year level first-difference model with which we motivate the necessity of using our preferred difference-in-difference approach. In Section 5, we present our difference-in-difference estimator, discuss identification and show the results. Section 6 concludes.

2. Previous literature

There is a large literature concerning the effects on drunk driving of minimum legal drinking age restrictions and other traffic safety policies. Much of the early research found negative effects of both minimum legal drinking ages and beer taxes on traffic fatalities (see Wagenaar and Toomey, 2002 for a review of this literature). However, most of these studies fail to control for state fixed effects, year fixed effects, or state-specific linear time trends, which calls into question whether they identify the causal effect of policy changes. In the first study of MLDA changes and traffic fatalities that uses state and year fixed effects, Cook and Tauchen (1984) find evidence that youth auto fatality rates increased in states that lowered their drinking ages in the 1970s by between 7 and 11 percent. Using a state-level panel from 1977 to 1992, Dee (1999) allows for state-specific linear time trends and concludes that an increase in the MLDA to 21 from under 21 reduced 18–20-year-old traffic fatalities by between 9 and 11 percent. In a study using similar data and methodology, Dee and Evans (2001) find 18–19-year-old teen traffic fatalities fell by about 5 percent when states increased their MLDA to 21.[2] Ruhm (1996), Young and Likens (2000), Young and Bielinska-Kwapisz (2008), Mast et al. (1999), and Ponicki et al. (2007) corroborate the conclusion that increases in the MLDA reduce teen traffic fatalities. Miron and Tetelbaum (2009), however, suggest the effect of MLDA laws on traffic fatalities is all due to reductions from states that increased their MLDA prior to the 1984 Federal Highway Aid Act. Focusing on states that increased their drinking age after 1985, when the increases were due to the Federal Highway Aid Act and thus more

[2] The largest differences between Dee (1999) and Dee and Evans (2001) are the inclusion as an explanatory variable of beer taxes in the former analysis and the inclusion in the latter analysis of the log of the 18–19-year-old population and an indicator for a 65 mile-per-hour maximum speed limit.