Transportation Research Part A 66 (2014) 162–172

Contents lists available at ScienceDirect

Transportation Research Part A

journal homepage: www.elsevier.com/locate/tra

Did California's hand-held cell phone ban reduce accidents?

Nicholas E. Burger [a], Daniel T. Kaffine [b,*], Bob Yu [c]

[a] RAND Corporation, Arlington, VA, USA
[b] Department of Economics, University of Colorado Boulder, 11 Economics Building, Boulder, CO 80309, USA
[c] Division of Mathematics and Computer Science, Colorado School of Mines, USA

ARTICLE INFO

Article history:
Received 5 July 2012
Received in revised form 14 May 2014
Accepted 14 May 2014

Keywords:
Cell phone ban
Traffic safety
Regression discontinuity

ABSTRACT

On July 1st, 2008, California enacted a ban on hand-held cell phone use while driving. Using California Highway Patrol panel accident data for California freeways from January 1st, 2008 to December 31st, 2008, we examine whether this policy reduced the number of accidents on California highways. To control for unobserved time-varying effects that could be correlated with the ban, we use high-frequency data and a regression discontinuity design. We find no evidence that the ban on hand-held cell phone use led to a reduction in traffic accidents.

1. Introduction

It has become conventional wisdom that cell phone use leads to poor driving. Of particular concern is the perception that cell phone use distracts drivers and *causes* them to get into accidents. One often cited study by Redelmeier and Tibshirani (1997) found that using a cell phone increased an individual's accident risk by 4.5 times.

Dramatic numbers such as these have led traffic safety advocates to call for bans on cell phone use while driving. By contrast, based on survey data, economists Hahn and Prieger (2006) find weak evidence for a reduction in accidents due to a ban on cell phone use (hand-held or hands-free) after controlling for selection bias and heterogeneous risk across drivers. Their central estimate is a 1.5% decrease in accidents with standard errors large enough to include a zero effect.[1] This stands in contrast to previous studies (reviewed and critiqued in Hahn and Dudley (2002)) which found evidence that a ban would significantly reduce accidents. In particular, based on Redelmeier and Tibshirani (1997), estimates by Redelmeier and Weinstein (1999) suggest a 2% reduction in accidents from a ban, while Cohen and Graham (2003) calculate a 2–21% reduction in accidents with a central estimate of a 6% reduction.

There is no question that cell phone use has increased significantly in the past two decades. Hahn and Prieger (2006) report that in December 2004, there were 182 million subscribers in the United States. By June 2008, that number had grown to 268 million (a penetration of 86.1%), which is nearly double the number of subscribers reported in Cohen and Graham (2003).[2] In light of this massive growth in cell phone usage and concern about their safety while used when driving, we build upon previous research on the effects of a cell phone ban while moving beyond the epidemiological, survey, and field test designs typically employed in earlier studies.[3]

* Corresponding author. Tel.: +1 303 492 6652.
E-mail address: daniel.kaffine@colorado.edu (D.T. Kaffine).

[1] While not explicitly examining the effects of a ban, Bhargava and Pithania (2013) exploit the increase in call volume as prices change at 9 PM and find no evidence that increased cell phone use leads to an increase in accidents.

[2] From http://www.cellular-news.com/story/33578.php.

[3] See Lissy et al. (2000) and Hahn and Dudley (2002) for further review and critique of these studies.

http://dx.doi.org/10.1016/j.tra.2014.05.008
0965-8564/

On July 1st, 2008, California enacted a ban on hand-held cell phone use while driving (hereafter, "cell phone ban").[4] In this study, we test whether the ban reduced accidents in the state of California. California is an appealing study setting because California has a large number of accident-related fatalities and the highest total vehicle miles traveled (U.S. Department of Transportation, 2012a; U.S. Department of Transportation, 2012b). Another motivation—and one reason our analysis is distinct from other studies—is the availability of high-frequency vehicle accident data around the time the cell phone ban was enacted. Using daily accidents on major freeways and highways in nine of California's traffic districts, we analyze the impact of the ban on accidents. We utilize a variant of regression discontinuity design—similar to Davis (2008) and Auffhammer and Kellogg (2011)—to control for unobserved covariates that can confound traditional regression analysis.

Across various specifications, we find no evidence of a reduction in accidents state-wide due to the ban. One important caveat worth mentioning is that we are unable to separate the effect of compliance from an effect of cell phone use on accidents. In other words, while we find that accidents did not decrease due to the cell phone ban, we are unable to say if the lack of an effect is because cell phone use does not affect accidents, because drivers substituted to other disruptive—but legal—hands-free or text messaging technologies, or because weak compliance failed to reduce cell phone use. Nor can we determine if increased enforcement efforts designed to raise compliance levels would lead to a reduction in accidents.[5] Nonetheless, this study provides evidence that the California policy failed to achieve its objective of reducing traffic accidents.

We proceed by first discussing previous studies on cell phone and accident risk and provide an overview of California's ban. We next discuss the data used in our study, the empirical models used for estimation, and our results.

2. Cell phone use and road safety

There is a long history of concern over the effect of drivers' in-car activities on automotive incidents.[6] Driver actions believed to increase accident risk include using the radio, conversing with passengers, or talking on a mobile phone. Concern about the negative effects of cell phone use while driving has grown in recent years due to fears that cell phone use has increased the number of vehicle accidents and roadway fatalities.

Given the significant increase in cell phone use and subsequent health and safety concerns, it is not surprising that the issue of cell phone use by drivers has received considerable attention by researchers. One set of studies has used driving simulators in laboratory settings to explore the effects of cell phone use while driving. The evidence from driving simulators generally shows that cell phone use adversely affects driving. Strayer and Johnston (2001) demonstrate that drivers talking on a cell phone are more likely to miss traffic cues or respond with delay, and later work shows that these effects are not limited to hand-held cell phone operation (Strayer et al., 2003). Specifically, these studies showed that hands-free cell phone operators were just as likely to create accident risks as hand-held cell phone operators. Strayer et al. (2006) characterize the relative impact of driving while talking on the phone and find that driver impairment is roughly equivalent to driving while intoxicated. While these studies take a scientific approach to controlling environmental conditions, they may be of limited policy relevance if, for example, drivers behave differently in a simulator than on the road;[7] moreover, this type of research provides little information about whether government regulation can effectively mitigate risks.

There have also been various attempts to use observational data to estimate the effect of banning hand-held cell phone use on accident frequency. Estimates by Redelmeier and Weinstein (1999), based on Redelmeier and Tibshirani (1997), suggest a 2% reduction in accidents from a ban, while Cohen and Graham (2003) calculate a between 2% and 21% reduction in accidents with a central estimate of 6%. However, these studies are based on methods (case-crossover) that potentially overestimate the benefits of reducing driver cell phone use due to selection bias. Kolko (2009) also uses survey data on the number of cell phone users by state in a panel data framework and find that cell phone bans reduce the number of accident-related fatalities in adverse weather conditions and during rush hour but have little effect on overall fatalities. In a recent paper, Jacobson et al. (2012) using county-level data from New York and Pennsylvania to estimate the effect of cell phone bans on accident rates. By using county-level data the authors can look at how accident rates changes after bans were implemented in areas with varying traffic density, and they find that rates felt in the post-ban period only in higher-density counties.

Others, such as Hahn and Prieger (2006), find weak evidence for a reduction in accidents due to a cell phone use ban after controlling for selection bias and heterogeneous risk across drivers. In contrast to previous observational research, their central estimate from survey data is a 1.5% decrease in accidents due to a ban with standard errors large enough to include a zero effect. In a related survey study, Hahn and Prieger (2007) find that drivers who use cell phones while driving are more likely to be involved in accidents, even when *not* using a phone, suggesting that omitted variable bias may be driving previous results. If drivers' underlying attitudes towards safety lead to both cell phone use and accidents, then reducing cell phone use may be ineffective. After correcting for this endogeneity, Hahn and Prieger (2007) find no evidence of an increase in accidents due to hand-held or hands-free cell phone use.

[4] It is important to note that hands-free devices were still allowed.

[5] For example, a "click-it-or-ticket" type policy designed to promote public awareness and promise enhanced enforcement.

[6] Frequently, we use the terms "incident" and "accident" interchangeably, while recognizing that some readers may not consider them synonymous.

[7] This could be due to dramatically different incentives across these environments or Hawthorne effects.