Give me 3': Do minimum distance passing laws reduce bicyclist fatalities?

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ABSTRACT

Safely integrating bicyclists onto roadways in the United States has become an important issue as the number of cyclists has steadily increased in recent decades. These concerns have led many city and state legislatures to pass laws requiring drivers to provide a minimum amount of distance between their vehicle and cyclists when passing them on roadways. Many believe these laws are ineffective in reducing the number of bicyclist fatalities because they are difficult for police to enforce, contain loopholes, and the minimum distance required is inadequate. This paper tests this claim empirically using data on 18,534 bicyclist fatalities from the Fatality Analysis Reporting System and a differences-in-differences approach, in a negative binomial model, to identify the effect of minimum distance passing laws on bicyclist fatalities. The analysis fails to find a significant effect of enacting a minimum distance passing law on the number of cyclist fatalities after controlling for differences in weather, demographics, bicycling commuter rates, state level traffic, and time variation.

1. Introduction

Policy makers have long sought to reduce the external pollution and congestion costs created by automobiles. Estimates have put air pollution costs at $0.03 per mile and congestion costs at $0.065 per mile (Small and Kazimi, 1995; Fischer et al., 2007). While many policies aim to make vehicles more fuel efficient or divert traffic to off-peak times, reductions in these costs could also occur by promoting alternative modes of transportation. Persuading a portion of the US population to switch from automobiles to bicycles could drastically decrease these external costs.

Though bicycling exhibited the largest percentage increase in modal split share of all commuting modes between 2000 and 2012, the number of bicyclists in the US is still modest (McKenzie, 2014). To alleviate pollution and congestion through increases in bicyclist numbers, policy makers must make bicycling an appealing substitute for automobiles. While bicycles and vehicles differ along many dimensions, it appears that many marginal bicycle users are deterred by the dangers of bicycling. When asked what factors prevent them from bicycling, individuals consistently report safety concerns are a major deterrent (Goldsmith, 1992). Bicyclists are some of the most vulnerable users of roadways, and, as their numbers have increased, safely integrating them onto roadways has become a major concern. Recognizing this, many states are seeking to make bicyclists safer to encourage more bicycle use.

One solution used in recent years by state legislatures to improve bicyclist safety is minimum distance passing laws (MDPLs). To date, 26

states and several cities have passed laws that require motorists to leave a minimum amount of distance between their vehicle and bicyclists when overtaking them on roadways (NCSL, 2015). The first of these laws was passed in Wisconsin in 1974, but 24 of these 26 states have enacted MDPLs since April 2000. Generally, the laws stipulate drivers may not come within 3 feet of bicyclists while passing.

Many welcome these laws as much needed passing guidelines, but others, including some bicycle advocacy groups, question their effectiveness (Brown et al., 2013). Skeptics argue that vague language, loopholes, inadequate minimum distance, and the difficulty police officers have enforcing such laws means they have little or no impact on cyclist safety.

The actual effect of MDPLs on bicyclist safety has remained ambiguous in the absence of substantive evidence. This paper uses data on 18,534 bicyclist fatalities to empirically test the impact of MDPLs on this aspect of bicyclist safety. The identification strategy utilizes a differences-in-differences approach which compares fatalities in states with MDPLs to those without MDPLs and the variation in timing of state level MDPL enactment to examine their effect while controlling for other factors.

The results, which are insensitive to numerous robustness and endogeneity checks, fail to find a statistically significant effect of MDPLs on bicyclist fatalities. Further, MDPLs do not appear to have an economically significant effect on bicyclist fatalities either as the estimates within the 95% confidence interval predict, at best, a reduction of 1 bicyclist fatality per state every 20.41 months after MDPL enactment.

These results suggest that current MDPLs are ineffective in reducing bicyclist fatalities.

The remainder of this paper is organized as follows. The next section introduces where this paper fits in the related literature. Section 3 provides an in depth background on MDPLs. Section 4.1 describes the data, section 4.2 the empirical methods and identification assumptions, section 5.1 the main results, and section 5.2 provides robustness checks. Section 5.3 discusses limitations of the empirical work, and section 6 concludes with a brief overview of the policy implications.

2. Literature review

One branch of existing literature on MDPLs has focused on driver compliance with these laws. Though this research doesn't-test the impact of MDPLs on bicyclist safety, it provides important information about why these laws may or may not be effective.

Love et al. (2012) observed vehicles passing five bicyclists over 10.8 h of riding in Baltimore, Maryland approximately one year after a MDPL took effect. The results suggest MDPLs may not be effective as a sizable portion of Baltimore's population does not abide by the MDPL with 89 of the 586 recorded passes occurring within 3 feet or less of cyclists (Love et al., 2012). A second study of a MDPL in Queensland Australia also found a sizable portion of the population did not comply with the new law (Schramm et al., 2016).

In addition, there has been some preliminary analysis of the effect of the Queensland MDPL on bicyclist safety. This work looks at bicyclist fatalities before and after the passage of the law in Queensland, but due to the short time frame of the study, small number of bicyclist fatalities (33 in total), and the lack of a control group, the authors cannot infer the effect of MDPLs (Schramm et al., 2016).

Another literature examines cyclist safety perceptions finding that many individuals believe bicycling is too dangerous. It has been shown that the perceived danger associated with bicycling plays a large role in deterring new riders (Fernández-Heredia et al., 2014). Thus, an increase in cycling after a MDPL is enacted is expected if it makes cyclists safer, or makes them *feel* safer. There is some evidence that providing an additional buffer between cars and cyclists increases the number of cyclists. Habib et al. (2014) find that the factor with the largest positive effect on bicycle use in Toronto is providing on-street and protected bike lanes.

This paper also adds to the literature on the impact of legislation on road safety. In this literature, MDPLs are particularly related to distracted driving laws (texting and handheld phone bans while driving) as both are subject to enforcement and loophole concerns. The effectiveness of distracted driving laws has been questioned as they can be difficult to enforce and many contain loopholes that could render them useless. The literature has not reached a consensus on the impact of distracted driving laws on crashes or fatal crashes, with results ranging from no effect to significant decreases.

Recent contributions have found that texting and driving bans decrease single vehicle single occupant fatalities if the laws are sufficiently strict (Abouk and Adams, 2013). It has also been shown that this reduction may diminish quickly over time, implying drivers may simply be reacting to the announcement of the ban (Abouk and Adams, 2013). Other researchers argue that distracted driving laws have zero effect because of enforcement issues, low compliance rates, and driver heterogeneity (Burger et al., 2014; Prieger and Hahn, 2005).

This strictness requirement and persistence issue are of particular concern when examining MDPLs. There are only slight variations in the strictness of MDPLs, so it is possible that most may be too weak to significantly reduce fatalities. It is also possible that the effect of passing laws could diminish quickly after passage due to lack of enforcement, or it may take months for the law to become effective if officers must learn how to enforce it.

Broadly, this work connects existing research on MDPLs and bicyclist safety to literature on the quantitative analysis of road safety policies. This is done by performing a nation-wide analysis of state MDPLs using econometric methodology.

3. Policy context

Motor vehicles and bicycles routinely travel at differential speeds which frequently leads to overtaking maneuvers when drivers and bicyclists meet. These interactions become more dangerous as the distance between bicyclists and vehicles decreases not only because the margin of error for direct collisions decreases, but also because automobiles may generate enough air displacement to affect a cyclists balance at close proximity (Kahn and Bacchus, 1995). MDPLs are intended to increase the distance between vehicles and cyclists to lower the probability of a collision.[1]

Prior to the passage of Wisconsin's MDPL in 1974, no well established rules outlining how to pass bicyclists on roadways existed. Formalizing bicyclist passing requirements caught on slowly, as can be seen in Fig. 1. However, in the past 16 years, policy makers, motivated by a desire to improve safety and increase the number of bicyclists, have passed MDPLs in 24 more states. Although MDPLs are enacted with good intentions there are several common critiques including: insufficient distance required, loopholes in the legislation, and lack of enforcement.

MDPLs usually require motorists to provide 3 feet of space between their vehicle and cyclists when passing on roadways. Bicycle advocacy groups argue this is not enough space.[2] Some believe setting the minimum distance at 3 feet actually makes cyclists worse off (Brown et al., 2013). They argue the law effectively sets a benchmark that leads drivers who previously gave bicyclists a wider berth to adjust their behavior to provide only the minimum required distance.

Loopholes in the legislation allowing motorists to drive closer than the minimum distance specified if they slow to a safe speed may also undercut the effect of MDPLs. For example, California's law allows for passing with less than 3 feet if the driver slows to a "reasonable and prudent" speed (CA State Legislature, 2013). This wording leaves the determination of reasonable and prudent speeds entirely up to the vehicle's driver, who likely has a different interpretation of reasonable and prudent than the bicyclist being passed. This wording also undermines police officers' ability to effectively enforce the law.

Another enforcement problem also exists. If police officers are trained in bicyclist traffic laws at all, it is often only secondary training provided by local bicycle advocacy groups.[3] This means many officers are inexperienced in handling bicyclists, and often do not monitor bicycling areas. If the laws are not being enforced, they are likely not an effective deterrent (Schramm et al., 2016).

4. Empirical analysis

4.1. Data

A unique panel data set was created for the empirical estimation of this paper. Information about traffic fatalities (driver, bicyclist, pedestrian, etc.) was provided by the Fatal Accident Reporting System (FARS) of the National Highway Traffic Safety Administration (NHTSA) for the years 1990–2014.

Although data on all crashes (fatal or not) that occurred while a

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[1] MDPLs are one of many possible safety measures policy makers can enact. These include protected bike lanes, bicycle helmet laws, and strict liability laws that find drivers at fault in all automobile-bicycle collisions.

[2] Advocacy groups prefer MDPLs like South Dakota's which requires 4 feet of space (NCSL, 2015).

[3] According to records provided by the League of American Bicyclists, new officers were trained in bicycling enforcement as part of the police academy curriculum in only 23 states in 2014. In the same year, officers in 31 states were provided with secondary bicycling enforcement training by bicycle advocacy groups.