



The antecedents of mandatory motorcycle helmet legislation enhancing behavior



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ABSTRACT

The effectiveness of safety legislation may be improved or negated as a result of behavioral responses. Recent empirical research suggests that the efficacy of mandatory motorcycle helmet laws is enhanced by the behavior of motorcyclists. This study uses a nationally representative survey of approximately 500 US motorcyclists to investigate the precursors of helmet law enhancing behavior. Favorable opinions regarding helmet safety result in a 10–20 percentage point increase in helmet use depending on beliefs regarding death and injury risks or vision obstruction. Motorcyclists living in states with mandatory helmet laws are more likely to choose higher visibility helmet colors and are 10.7 percentage points more likely to take out-of-state motorcycling trips. Each of the aforementioned factors is expected to contribute to the enhancing behavior documented in state-level panel analyses using motorcycle registrations as an imperfect measure of risk exposure.

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1. Introduction

Dating back to the seminal work of Peltzman (1975) traditional economic theory suggests that individuals will adjust their behavior in a risk compensating manner in response to mandatory safety legislation. This risk compensation will, in turn, partially offset the intended safety improvements of the legislation. Blomquist (1986) extends the work of Peltzman to a utility theoretic framework of driver safety optimization, and Evans (1985) develops a simple comprehensive model of behavioral feedback in safety legislation that incorporates Peltzman's theory of offsetting behavior and more restrictive theories such as Wilde's (1982) theory of risk homeostasis.¹ Evans's (1985) model also allows for enhancing behavior whereby the efficacy of safety legislation can be improved if individuals reduce their risk taking in the presence of safety mandates. Evans (1985) hypothesizes that the act of buckling a seatbelt or fastening a motorcycle helmet may serve as a salient reminder to motorists of the inherent dangers of driving, but also notes that empirical evidence supporting the presence of enhancing behavior is scant and often statistically insignificant.

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¹ Peltzman's hypothesis suggests that the safety efficacy of mandates will be partially to fully offset by increased risk taking among individuals affected by the laws, while Wilde's theory suggests that individuals have a firm target level of risk and any safety mandates will be fully offset as individuals increase their risk taking activities to retain their ideal risk.

A notable exception is the empirical analysis of [Houston and Richardson \(2007\)](#) who find that mandatory seatbelt laws significantly reduce non-motorists fatality risks. [Dee \(2009\)](#) finds evidence consistent with enhancing behavior related to mandatory motorcycle helmet laws by noting that estimates of the technological efficacy of motorcycle helmets are not large enough to fully explain the reduction in fatalities observed in states with mandatory helmet laws.² Numerous state-level panel analyses have estimated similar effects of helmet laws ranging from 11% to 33% reduction in motorcycle fatalities. These estimates are robust to controls for other primary motorcycle legislation (e.g. motorcycle licensing and daytime headlight laws) and secondary legislation and enforcement regarding alcohol consumption, speed limits, seatbelt laws, and texting bans (see, for example, [Dee \(2009\)](#), [Lee \(2015\)](#), [Graham and Lee \(1986\)](#), [Houston and Richardson \(2007, 2008\)](#), [Sass and Zimmerman \(2000\)](#), and [Dickert-Conlin et al. \(2011\)](#)).³ In a similar empirical analysis of US state motorcycle helmet laws [Lee \(2015\)](#) finds direct empirical evidence for enhancing behavior in the form of reduced motorcycle crashes following helmet law adoption. Specifically, state fixed effects models suggest that motorcycle crashes decline by 18.4–31.9% following helmet law adoption, and the effect is not driven by non-classical measurement error in the number of state reported crashes or omitted variable bias ([Lee, 2015](#)). In follow-up analysis using individual-level crash data, [Lee \(2018\)](#) provides additional evidence that motorcyclists' enhancing behavior is partially attributable to reduced risk taking among motorcyclists complying with mandatory helmet laws. Specifically, motorcyclists forced to wear helmets in order to comply with helmet laws are less likely to receive traffic citations for reckless driving, have a lower average travel speed, and exhibit less vehicle damage when involved in crashes. [Dee \(2009\)](#) suggests that mandatory helmet laws may reduce the popularity of motorcycling thereby enhancing their effectiveness and [Lee \(2015\)](#) provides three possible sources for the observed enhancing behavior associated with helmet laws:

1. Motorcyclists forced to comply with mandatory helmet laws may have unfavorable perceptions of the safety benefits of helmet use.
2. Helmet use can nudge motorcyclists to improve riding safety along other dimensions such as alcohol consumption, travel speed and rider conspicuity.
3. Mandatory helmet laws may reduce motorcycle utilization along an intensive margin (vehicle miles traveled) which is imperfectly approximated by state-level data on motorcycle registrations.

This study employs a nationally representative survey of roughly 500 US motorcyclists in order to determine the role of each of the aforementioned hypotheses as determinants of motorcycle helmet legislation enhancing behavior. The survey asks respondents to report motorcycle use, helmet use, and the perceived safety efficacy of helmets.⁴ The theory of reasoned action suggests that individuals' attitudes toward safety equipment and norms such as those established by mandatory helmet laws are the two key determinants of behavior ([Ajzen and Fishbein, 1970](#)). Furthermore, [Slovic and Fischhoff \(1982\)](#) and [Slovic et al. \(1980\)](#) clarify that behavioral adaptations in response to safety legislation arise out of responses to risk perceptions rather than actuarial risks. The current study progresses on this basis by first testing the impacts of helmet efficacy opinions and mandatory helmet laws on motorcyclists' helmet use. Next, when evaluating the impact of mandatory helmet laws on additional motorcycling behavior, the empirical analysis compares the behaviors of motorcyclists in mandatory helmet law states to those in states without helmet laws who share similar propensity for helmet use (if a helmet law were enacted) based on demographic characteristics and attitudes toward helmet efficacy.

Survey results suggest that each of the aforementioned enumerated factors plays a role in helmet law enhancing behavior. Specifically propensity score matching estimators find 13.6–19.8 percentage point increases in helmet utilization among motorcyclists with favorable opinions regarding helmet death and injury prevention. Conversely, negative opinions that helmets increase the risk of neck injury or obstruct vision are widely held among motorcyclists and are associated with 9.9–16.2 percentage point reductions in helmet utilization.⁵ All of the aforementioned differences in utilization are statistically significant at the 10% level or less. As such, motorcyclists with unfavorable views of helmet safety are likely to change their behavior when forced to comply with mandatory helmet legislation.

Helmet laws do not appear to have a significant impact on alcohol consumption, but there is some evidence of motorcyclists in mandatory helmet law states shifting away from black helmets and adopting more conspicuous helmet colors (e.g. red, orange and white helmets). The survey does not find a significant difference in vehicle miles traveled when comparing motorcyclists in helmet law states to those in states without helmet laws, but there is statistically significant evidence that motorcyclists in states with mandatory helmet laws are 10.7 percentage points more likely to take out-of-state motorcycling trips and increase the average number of such trips by 0.3 annually. These results are consistent with changes in motorcycle utilization along alternative margins to vehicle miles traveled that can help explain helmet law enhancing behavior.

² [Dee \(2009\)](#) estimates helmet technological efficacy from individual-level matched cohort crash analysis (identification based on heterogeneous crash outcomes of helmeted drivers and non-helmeted passengers and vice versa) of roughly 34% reduced fatality risk. In the absence of behavioral motorcycle responses, fatalities are only expected to decrease by 8–20% following adoption of mandatory helmet laws, because some individuals choose to wear helmets even without a regulatory requirement. State-level panel data analysis suggests that fatalities actually decrease by 27–32% following adoption of helmet laws.

³ This finding of robustness to controls for potentially confounding safety legislation is not surprising, because the next section highlights that the majority of variation in state-level mandatory helmet laws is driven by plausibly exogenous changes in federal rules for highway funding.

⁴ The full text of the survey is available to readers in the online Survey Appendix A.

⁵ Roughly 63% of non-helmeted survey respondents believe that motorcycle helmets increase risk of neck injury and/or obstruct vision.

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