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Factors contributing to hit-and-run crashes in China

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ABSTRACT

Hit-and-run accidents, or those where the perpetrator leaves the crash scene without reporting the event, are a serious concern because they can delay the rescue of victims, thereby increasing the fatality rate and severity of injuries. However, only a few studies exist on the factors that influence hit-and-run behavior, particularly in developing countries. Using data collected from Guangdong Province in China, this study applies a logistic regression model to analyze factors associated with hit-and-run behavior in five categories: crash attributes and human, vehicle, road, and environmental factors. This study finds that the probability of hit-and-run behavior increases with accidents that involve pedestrians, occur in dark driving conditions, and are caused by drivers who are male, middle-aged, and without a valid driver's license, extensive driving experience, or automobile insurance. Therefore, we recommend closer supervision and better public education for different groups of people about traffic laws and regulations.

1. Introduction

Traffic accidents have long been a serious threat to human life and property around the world. Approximately 1.3 million people die each year on the road, and between 20 and 50 million people sustain non-fatal injuries in automobile crashes (World Health Organization, 2009). Among the different types of vehicle crashes, the hit-and-run crash is the most dangerous. While the legal definition of hit-and-run varies from country to country, the hit and run is generally considered a crime in most jurisdictions because it is usually required in statutes that the driver of a vehicle who is involved in a collision with another vehicle, object or human being must stop immediately to provide his or her name, license number and other information required by law to the injured party, a witness or law enforcement officers (Fisher, 1961). Article 70 of Chapter V, Disposition of Traffic Accidents, in the Law of the People's Republic of China on Road Traffic Safety requires that, when a road traffic accident occurs, the driver should immediately stop the vehicle and keep the scene intact; and if the accident causes casualties, the driver should immediately rescue the injured persons and speedily report to the traffic police officer on point duty or to the traffic control department of the public security organization. Otherwise, the case will be considered as hit and run. If the victims die, the offender may be subject to death penalty.

Hit-and-run behavior inevitably delays the notification of authorities and hinders rescue responses, thereby increasing the severity of injuries and fatality rates of victims. In the United States, hit-and-run crashes accounted for 18.1% of

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approximately 48,000 pedestrian fatalities between 1998 and 2007, with wide variation by state, which ranged from 6.6% in Mississippi to 29.8% in the District of Columbia (MacLeod, Griswold, Arnold, & Ragland, 2012). With their severe consequences, hit-and-run crashes have attracted significant public attention. More effective measures should be taken to prevent hit-and-run behavior. However, only a few studies have focused on factors associated with this behavior, and even fewer have focused on the determinants of hit-and-run behavior in developing countries.

Most previous studies have examined hit-and-run crashes in developed countries, although developing countries have higher traffic fatality rates than developed countries (19.5 and 10.3 per 100,000 population, respectively), and developing countries account for 90% of road fatalities with only 48% of registered vehicles in the world. Thus, our study aims to shed light on the determinants of the hit-and-run behavior in developing countries with considerably different social and cultural environments.

The main objective of this study is to identify the factors that influence the decisions of drivers to flee after traffic accidents in China. This paper contributes to the literature in the following aspects. First, our study examines a highly comprehensive set of factors. The detailed data extracted from Guangdong Provincial Security Department covers 30,878 traffic crashes involving 40,373 drivers from 2006 to 2010. A total of 77 variables in 23 categories are examined in this study, and several socioeconomic factors that affect hit-and-run decisions are identified for the first time.

This paper is organized as follows. Section 2 discusses the empirical literature and summarizes the factors that may induce hit-and-run behavior. Section 3 describes the methodology, data, and variables. Section 4 presents the empirical results and discussion. Section 5 concludes the study, as well as indicates its policy implication and research limitation.

2. Literature review

To develop appropriate driver interventions and prevent hit-and-run behavior, two research questions have to be answered: (1) what factors affect the possibility of identifying perpetrators and (2) what factors make the perpetrators of hit-and-run crashes more likely to flee after crashes.[1] Concerning the methods of identifying the involved vehicles and drivers to help apprehend the perpetrators, existing studies find that the color of retrieved paint fragments from crash scenes or from the clothing of victims can be used to identify perpetrators (Baucom, 2006; Karger, Teige, Fuchs, & Brinkmann, 2001; Locke, Cousins, Russell, Jenkins, & Wilkinson, 1987; Locke, Sanger, & Roopnarine, 1982; Locke, Wilkinson, & Hanford, 1988; Taylor, Cousins, Holding, Locke, & Wilkinson, 1989). Other researchers have developed methods based on forensic science to identify the types of vehicles involved in crashes according to the injuries of victims (Karger et al., 2001; Teresinski & Madro, 2001).

As regards the second research question, a study conducted in Singapore by Tay, Rifaat, and Chin (2008) has proposed a cost-benefit analysis framework and argued that the hit-and-run decisions of drivers depend mainly on the likelihood of apprehension, expected benefits of running away, and expected costs of being arrested. Any factor that affects the probability of escaping detection and the driver perception of subsequent economic and legal consequences of the accident significantly contribute to the occurrence of hit-and-run behavior. From an empirical perspective, a logistic regression model has been used as the main analytical method, using "hit-and-run" or "non-hit-and-run" crashes and "perpetrator caught" or "perpetrator not caught" as binary or dichotomous variables, to examine the risk factors related to the hit-and-run crash and the characteristics of the drivers involved (Aidoo, Amoh-Gyimah, & Ackaah, 2013; MacLeod et al., 2012; Solnick & Hemenway, 1995; Tay, Barua, & Kattan, 2009; Tay, Kattan, & Sun, 2010; Tay et al., 2008). These studies find that crash attributes as well as human, vehicle, road, and environmental factors have a significant effect on the hit-and-run decision.

2.1. Crash attributes

The features of the crash itself affect hit-and-run behavior. Drivers are more likely to leave the scene when the collision is with a pedestrian rather than with another vehicle (Tay et al., 2008, 2009). Compared with single-vehicle crashes, crashes that involve two or more vehicles are associated with a significantly higher probability of being hit-and-run cases in fatal crashes (Tay et al., 2008, 2009). Collision type also affects the possibility of hit-and-run behavior in fatal crashes. Compared with head-on and other types of collision, single-vehicle, rear end, angle, and sideswipe collisions are more likely to induce hit-and-run behavior in a fatal crash (Tay et al., 2009).

2.2. Human factors

The characteristics of the victims and perpetrators have a significant effect on hit-and-run behavior and whether the offender will be identified afterwards. Research indicates that when the victim is female, the perpetrator is less likely to flee. However, the association of hit-and-run behavior with victim gender depends entirely on the circumstances of the crash (Solnick & Hemenway, 1995). Although the effect of the victim gender is not obvious, most studies show strong indications

[1] Solnick and Hemenway (1994, 1995) report that in approximately half of the US pedestrian fatality hit-and-run cases, the driver is never apprehended or identified.