

NEWS RELEASE

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Note to Journalists: The research paper is available on Fred Mannering's Web site at https://engineering.purdue.edu/CE/People/view_person?group_id=1920&resource_id=2089 and from Emil Venere, Purdue News Service, at (765) 494-4709, venere@purdue.edu. A publication-quality photograph showing Fred Mannering and his vintage MG sports car is available at <http://news.uns.purdue.edu/images/+2006/mannering-carsafety.jpg>

Study: Airbags, antilock brakes not likely to reduce accidents, injuries

WEST LAFAYETTE, Ind. — Researchers have determined that airbags and antilock braking systems do not reduce the likelihood of accidents or injuries because they may encourage more aggressive driving, thwarting the potential benefits of such safety features.

The behavior responsible for this seeming paradox is called the offset hypothesis, which predicts that consumers adapt to innovations meant to improve safety by becoming less vigilant about safety, said Fred Mannering, a professor of civil engineering at Purdue University.

"When antilock brakes were first introduced, insurance companies noticed that the accident rates for those cars increased," he said. "We decided to see whether the offset hypothesis could explain this phenomenon."

The researchers analyzed motor vehicle data from the state of Washington over a five-year period beginning in 1992.

"We used that time period because that's when airbags started getting introduced very rapidly, and we wanted to track the same drivers over that time frame to see whether the new safety features reduced their accident and injury rate," Mannering said. "Our findings suggest that the offset hypothesis is occurring and that it is sufficient to counter the modest technological benefits of airbags and antilock brakes."

A research paper detailing the study's findings was published earlier this year in the *Journal of Risk and Uncertainty*. The paper was authored by Clifford Winston, a senior fellow at the Brookings Institution; Vikram Maheshri, a doctoral student at the University of California, Berkeley; and Mannering.

The researchers used a series of mathematical equations in "probit models" to calculate accident probabilities based on the motor vehicle data and actual driving records. Using the data, the model enabled researchers to calculate the probabilities of whether drivers in different age and demographic categories would be involved in an accident. The models showed that the safety systems did not affect the probability of having an accident or injury.

The study represents the first attempt to test the offset hypothesis using "disaggregate data," or following the same households over time instead of using more general "aggregate" data from the

population at large.

"By using disaggregate data, we have added to the credibility that our findings actually reflect offsetting behavior," Mannering said. "And the 2005 National Highway Traffic Safety Administration fatality data released last month indicate that fatalities per mile driven in the United States have actually increased, which adds some aggregate validation of our findings."

The researchers tracked 1,307 drivers who had a total of 614 accidents, 16 of which resulted in injury, from 1992 through 1996. Of these drivers, 271 switched from a vehicle without an airbag to a vehicle with an airbag at some point during the same period, and 270 also made the switch to antilock brakes. Because many of the households tracked over the five-year period never purchased cars with the safety features, the study contained an inherent "control group," Mannering said.

"So our sample of drivers has a complete mix of people, with and without safety features, in each of the years we study," he said.

Claims of safety benefits for airbags and antilock brakes assume that motorists drive the same way regardless of whether their cars are equipped with the safety features.

"However, if you drive a car without these safety features and then you get behind the wheel of a newer car, you see the difference immediately," said Mannering, who owns a vintage MG sports car and a newer vehicle equipped with many of the latest safety technologies. "The contrast is dramatic. When I'm driving the MG, I definitely make a special effort not to tailgate or accelerate quickly when roads are slick because I don't have the antilock brakes, traction control and the other advanced safety features of the newer car."

The researchers used Washington state data because Mannering was a researcher at the University of Washington at the time.

"There are no indications that Washington state drivers are unrepresentative of U.S. drivers in general," he said.

Mannering said the offset hypothesis will continue to be an issue in the future with the introduction of even more advanced safety features, such as electronic stability packages designed to prevent rollover accidents.

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Related Web sites:

Fred Mannering:

https://engineering.purdue.edu/CE/People/view_person?group_id=1920&resource_id=2089

Clifford Winston: <http://brookings.edu/scholars/cwinston.htm>

PHOTO CAPTION:

Fred Mannering, a Purdue professor of civil engineering, stands by his 1969 MG sports car and a newer vehicle. Mannering co-authored a recent research paper detailing findings that show modern safety features, such as airbags and antilock braking systems, do not increase the likelihood of reducing accidents or injuries. The reason is because of a phenomenon called the offset hypothesis, which predicts that consumers adapt to innovations meant to improve safety by driving more aggressively and becoming less vigilant about safety. Mannering says the contrast is dramatic when driving older cars lacking safety features and newer vehicles equipped with those features. (Purdue News Service photo/David Umberger)

A publication-quality image is available at <http://news.uns.purdue.edu/images/+2006/mannering-carsafety.jpg>

ABSTRACT

**An Exploration of the Offset Hypothesis Using Disaggregate Data:
The Case of Airbags and Antilock Brakes**

Clifford Winston, Vikram Maheshri, Fred Mannering

The offset hypothesis predicts consumers adapt to innovations that improve safety by becoming less vigilant about safety. Previous tests have used aggregate data that may confound the effect of a safety policy with those consumers who are most affected by it. We test the hypothesis using disaggregate data to analyze the effects of airbags and antilock brakes on automobile safety. We find that safety-conscious drivers are more likely than other drivers to acquire airbags and antilock brakes but that these safety devices do not have a significant effect on collisions or injuries, suggesting drivers trade off enhanced safety for speedier trips.