

Discussion: "Who Wants Airbags?"

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I would not recommend using the Crashworthiness Data System (CDS) of the National Automotive Sampling System (NASS) for analyzing the fatality-reducing effectiveness of air bags, because a much larger data file—the Fatality Analysis Reporting System (FARS), a census of the nation's traffic fatalities since 1975—is available for that purpose. The relatively small number of fatality cases on CDS and the high sampling error of statistics generated in this type of analysis make it difficult to obtain statistically meaningful, let alone precise estimates of fatality reduction.

The best available estimates of fatality reduction by air bags are still the ones based on analyses of FARS, specifically the estimates in the National Highway Traffic Safety Administration's (NHTSA) *Fifth/Sixth Report to*

Congress—Effectiveness of Occupant Protection Systems and Their Use. Analyses of that type have shown, over the years, a consistent and statistically significant 12 percent overall fatality reduction for air bags.

That said, I think the authors have selected the right statistical methods (including the use of SUDAAN for computing sampling errors) for their data and their analysis goals, and have clearly explained how their analyses work and how the results should be interpreted. ■

Reference

Fifth/Sixth Report to Congress—Effectiveness of Occupant Protection Systems and Their Use, NHTSA Report No. DOT HS 809 442, Washington, DC, 2001, pp. 6–11.

Reply to Discussion of "Who Wants Airbags?"

The Crashworthiness Data System (CDS) is a well-conducted stratified random sample of highways accidents in the United States. All accidents from which there has been a towed vehicle and/or damage to persons or property have a chance of being in the dataset.

The Fatality Analysis Reporting System (FARS) is another high-quality dataset that contains information for all accidents in which there was at least one death caused by the crash.

Analysis conducted using CDS will indeed produce estimates with higher standard errors than analyses conducted with a larger dataset, but the logistic regression procedure accounts for the larger variation in its assessment of statistical significance. The only problem with using a smaller dataset is a possible lack of power; for instance, the inability to distinguish effects as statistically significant. However, the analyses reported using CDS, with more than 22,000 records for front-seat passengers ages 16 or older, demonstrate that the data are large enough to capture many significant effects; seatbelt use, impact speed, direction of collision, etc., are all seen to have the expected effect on the probability of death.

Although the FARS dataset will give more precise results, they are not accurate, as they make conclusions about the wrong population. Do we want to reduce the probability of death overall, or merely the probability of death for occupants who are in collisions in which there is at least one fatality?

If a front-seat occupant wishes to ask the question, "If I get in an accident, am I less likely or more likely to die, if I have an airbag?" the proper way to answer this question is with the CDS dataset. With the FARS dataset, the question one can answer is, "If I get in a highway accident in which there is at least one fatality, am I less likely or more likely to die, if I have an airbag?"

It seems paradoxical that these two questions can have different answers, but they do. The CDS dataset can show us that in low-speed collisions, having an airbag increases the probability of death, and this is especially true for unseatbelted occupants where the main collision is from the side. This fact cannot be seen using the FARS dataset, because the information about low-speed crashes in which there was not a fatality is missing. The increase in risk to occupants in low-speed crashes, due to airbags, cannot be demonstrated.

Therefore, the CDS dataset is the proper tool to assess risk of death in an accident. The distinction is not at all obvious at the outset, and no blame should be attached to those who chose to use FARS for the original analyses. The airbag risk analysis is a great example of the subtleties and challenges of quantitative reasoning, but it is clearly demonstrated that the CDS analyses better reflect the truth about airbags. Not only can we reproduce the results from the analyses with FARS, but there are convincing explanations for the disparate results. This country's commitment to airbags as a safety device needs to be reexamined immediately. ■