UC Office of the President
Policy Briefs

Title
Partially Automated Vehicles Are Increasing Vehicle Miles Traveled

Authors
Hardman, Scott
Chakraborty, Debapriya
Kohn, Eben

POLICY BRIEF

Institute of
Transportation
Studies

UNIVERSITY
OF
CALIFORNIA

Partially Automated Vehicles Are Increasing Vehicle Miles Traveled

Scott Hardman, Debapriya Chakraborty, and Eben Kohn
Plug-in Hybrid & Electric Vehicle Research Center, Institute of Transportation Studies,
University of California, Davis

May 2021

Issue

Research is beginning to show that vehicle automation will encourage more driving because it substantially reduces driver workload, making driving more relaxing and less stressful. This will have environmental sustainability implications, given that vehicle electrification alone will not be sufficient to meet state and federal greenhouse gas reduction targets without reductions in vehicle miles traveled (VMT).

Research on the effects of vehicle automation has been somewhat speculative because fully automated vehicles are not yet commercially available. But many automakers are already incorporating automated features such as adaptive cruise control and lane keeping assist into their vehicles. These features assist in driving tasks and reduce the "cost" of driving in much the same way fully automated vehicles promise to do. Researchers at UC Davis surveyed owners of partially automated electric vehicles in California to understand the impact of partial automation on VMT. The survey asked respondents about their use of partial automation systems including BMW Driving Assistant, Ford Co-pilot360, Honda Sensing, Nissan ProPilot Assist, Tesla Autopilot, and Toyota Safety Sense. The results of this study show that partial automation has the potential to cause large increases in VMT.

Key Research Findings

Drivers with partial automation drive on average 4,888 miles per year more than comparable car owners who do not have partial automation. This result is from a subsample of only Tesla users, with and without Autopilot. The econometric analysis was limited to just these users to simplify the complicated method of determining causal differences in VMT.

Partial automation makes some drivers more willing to drive in traffic congestion. Among Tesla Autopilot users, 40% reported that if they could not use automation, they would seek to avoid congestion. Among users of other systems, 27% reported the same. This finding indicates that automation increases drivers' willingness to travel in congested traffic, and suggests that vehicle automation may reduce drivers' objections to congestion, actually making it worse.

Respondents report more long-distance travel due to vehicle automation. For Tesla Autopilot users, 36% of respondents reported more long-distance travel due to automation. For users of other systems, 21% reported this increase (Figure 1). This increase could be due to the partial automation system alleviating some of the fatigue associated with long-distance travel.

Increases in long-distance travel are correlated with using automation in a greater variety of conditions, being younger, and having an outdoor lifestyle. Those
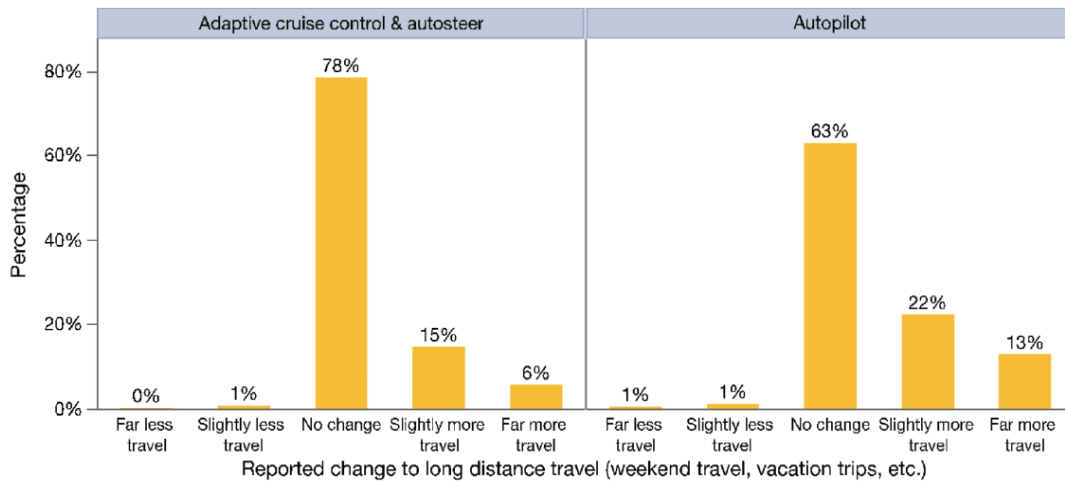
Figure 1. Percentage of respondents who reported changes to their long-distance travel as a result of vehicle automation for those with Tesla Autopilot (right) and other partial automation systems (left)

who use automation in inclement weather and at night likely have more confidence in the system and are more comfortable using it. As a result, these drivers may perceive the system as taking over more of their driving load. As automation systems become more prevalent and as more consumers feel comfortable using them, the impact of partial automation on VMT could be even greater.

Tesla Autopilot is used more frequently and in a greater variety of weather, traffic, and road conditions than other automation systems. This finding may be due to functional differences in Autopilot compared to other systems, differences in owners of Tesla vehicles compared to other brands, or a combination of both. Users of all automation systems are most likely to use it on freeways, in clear weather and at night, and on empty roads or on roads with fast moving traffic.

Policy Considerations

Evidence from partially automated vehicle owners confirms that vehicle automation will increase VMT, particularly by facilitating long-distance travel, and may also cause an increase in congestion. Governments looking to reduce

VMT in the face of increasing automation will need to consider policies to counter this reduction in the "cost" of driving. One such policy is a mileage-based fee.

Because automated vehicle technology improves traffic efficiency, some automakers, policymakers, and researchers have suggested that it should be eligible for "off-cycle credits" to meet emissions and fuel economy standards. The findings from this UC Davis study suggest otherwise: automated vehicles could increase emissions and energy consumption by stimulating extra driving, counteracting efficiency gains.

Further Reading and More Information

This policy brief is drawn from the report "A Quantitative Investigation into the Impact of Partially Automated Vehicles on Vehicle Miles Traveled in California" prepared by Scott Hardman, Debapriya Chakraborty, and Eben Kohn with the University of California, Davis. The report can be found at www.ucits.org/research-project/2020-10.

For more information about findings presented in this brief, please contact Scott Hardman at shardman@ucdavis.edu.