

# The Monetary and Non-Monetary Factors Influencing Travel Choices in an Automated, Shared, and Electric Vehicle Future

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# POLICY BRIEF

## Issue

The transportation system is undergoing three revolutions: vehicle automation, electrification, and shared mobility. While these are still nascent trends, studies suggest that they could become ubiquitous in the coming decades. How these revolutionary changes transpire will have significant implications for transportation sustainability. A key factor will be whether autonomous vehicles are deployed as shared cars that serve many travelers such as in ridesourcing or ridehailing fleets, or as privately owned vehicles that could dramatically increase vehicle miles traveled and associated environmental impacts. To anticipate how these revolutions will affect future transportation, and to develop policy to shape that future, it is important to understand the various factors that influence individuals' travel choices. These choices include whether to travel alone or with others, and whether to use a private vehicle or a shared one. Some of these factors are monetary, such as the cost

of fuel, insurance, and a driver, while others are non-monetary, such as the travel time, comfort, and reliability of each transportation option. The significance of these non-monetary factors is poorly understood and often ignored.

Researchers at the University of California, Davis developed a framework for considering the monetary and non-monetary costs of future travel choices and used existing research to develop interim values for several non-monetary travel choice factors.

## Key Research Findings

**A complex combination of monetary and non-monetary factors influences travel decisions.** Non-monetary cost factors could be based on a traveler's value of time, such as time spent searching for parking or for recharging an electric vehicle, or they could be unrelated to time, such as the convenience of keeping items in a personal car. Both monetary and non-monetary factors might be trip-based, such

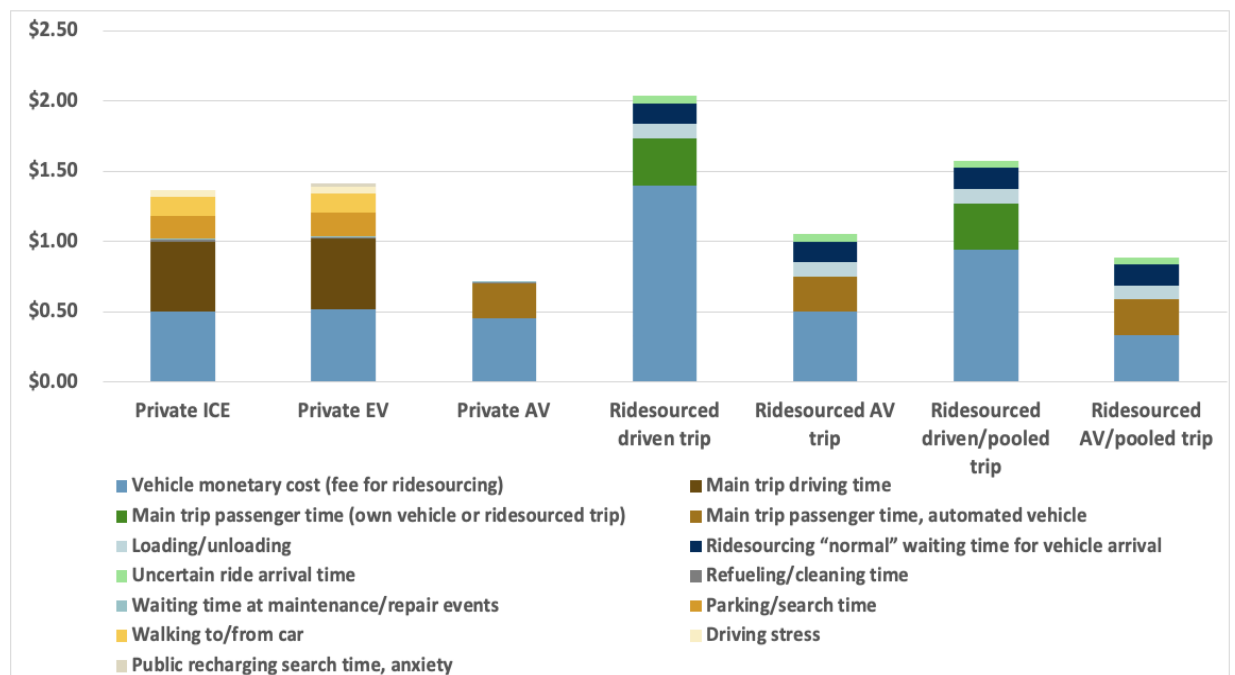


Figure 1. Generalized costs-per-mile of a range of factors for various trip and vehicle types, including conventional internal combustion engine (ICE) vehicles, electric vehicles (EVs), and automated vehicles (AVs)

as the cost of fuel or time spent waiting to be picked up, or might be unrelated to a specific trip, such as annual insurance fees or a feeling of pride in car ownership.

**Non-monetary factors play an important role in travel decisions.** Ridesourcing has grown dramatically in recent years despite being much more expensive than private vehicle travel, indicating that travelers value convenience, time savings, and other non-monetary benefits. The analysis suggested that ridesourcing is particularly attractive to travelers with a high value of time, i.e., those earning higher wages.

**Privately owned, fully automated vehicles are expected to have lower generalized costs than both private, non-automated vehicles and any type of ridesourced vehicles in the future (Figure 1).** Automation will reduce or eliminate many of the non-monetary costs associated with private vehicle use. Owners of automated private vehicles would eliminate time spent driving (allowing them to do other activities while traveling), searching for parking, and walking to and from the vehicle. They also may experience less driving stress.

**Automation will also lower the monetary costs of ridesourcing by eliminating driver costs.** The cost of a driver in a ridesourced vehicle is estimated to be far greater per mile than other vehicle costs such as maintenance and fuel. Even with these savings, ridesourcing costs may still be higher than the costs of privately owned, driverless cars.

**Pooled ridesourcing will lose most of its cost advantage when vehicles are automated.** The main advantage of pooling is lower monetary costs per trip, with disadvantages of longer trip times and sharing rides with others. Reducing the overall monetary cost of ridesourcing through automation will reduce the relative advantage of pooling without addressing its disadvantages.

**Electric vehicles may affect the overall cost of travel options, but not by much.** Electric vehicles will likely remain more expensive to purchase in the near future while offering energy and maintenance cost savings. But any changes in the cost of travel options due to vehicle electrification are

small on a per-mile basis compared to the changes in cost brought about by ridesourcing or automation. However, the energy cost advantage of electric vehicles will likely motivate ridesourcing companies to convert their high-mileage fleets to electric vehicles eventually.

## Policy Implications

Monetary and non-monetary costs must both be considered when developing policies to promote efficient transportation systems. These findings suggest that subsidies to promote pooled ridesourcing may need to be significant given its non-monetary disadvantages. Similarly, promoting ridesourcing over privately owned automated vehicles may need to overcome the inherent advantages of ownership. More research is needed on non-monetary factors to better understand how travelers will make near-term and long-term choices, and how policies should be structured to influence these choices.

## More Information

This policy brief is drawn from “Estimating the Costs of New Mobility Travel Options: Monetary and Non-Monetary Factors,” a report from the National Center for Sustainable Transportation, authored by Lewis Fulton, Junia Compostella, and Alimurtaza Kothawala of the University of California, Davis. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/estimating-hedonic-costs-new-mobility-travel-options>.

This brief is also drawn from the report “Generalized Costs of Travel by Solo and Pooled Ridesourcing vs. Privately Owned Vehicles, and Policy Implications,” authored by Lewis Fulton, Austin Brown, and Junia Compostella of UC Davis. The report can be found here: <https://www.ucits.org/research-project/present-and-future-costs-of-shared-mobility-and-automated-vehicle-services-and-implications-for-consumer-adoption-under-varying-policy-scenarios/>.

For more information about the findings presented in this brief, please contact Lewis Fulton at [lmfulton@ucdavis.edu](mailto:lmfulton@ucdavis.edu).

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