DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

Understanding the Distributional Impacts of Vehicle Policy: Who buys new and used alternative vehicles?

Identify the number of Electric Vehicles (EVs) in California, who is buying them, and how are they used.

Planning, Policy, & Programming

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Project Title:
Understanding the Distributional Impacts of Vehicle Policy: Who buys new and used alternative vehicles?

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WHAT IS THE NEED?

Consumer adoption of alternative vehicle technology is often viewed by policymakers as an important step to addressing environmental impacts of the transportation sector, reducing U.S. reliance on foreign energy sources and shifting the transportation sector towards a more sustainable equilibrium.

As such, federal, state and local governments offer a wide variety of incentives to encourage the purchase of new, alternative fuel technology. But the efficacy of these policies depends crucially on who adopts new vehicles. If households adopting new vehicles would otherwise purchase low-fuel economy vehicles, the immediate contribution of a new alternative vehicle may be substantial, whereas if the alternative fuel vehicles would replace high-fuel economy vehicles, the effect of a policy may be more modest.

WHAT WAS OUR GOAL?

The Experian data include precise location of buyers and sellers, the purchase price for roughly half of the transactions, demographic information for buyers and sellers (gender, age, income bracket and ethnicity), as well as information about the car itself. When considering how this may affect access of lower-income groups to EVs in the secondary market, one must consider how close these groups live to the high income groups.

Geographic distance imposes increasing transportation and search costs, and presents a potential barrier to resorting of these durable assets.

WHAT DID WE DO?

Using a unique and rich dataset of electric vehicle (EV) purchases from 2011-2016, we examined the proliferation of EVs in California, during a period of time in which the market has matured to include new technologies, a robust secondary market, and a suite of policies that promote switching away from gasoline-powered cars.

Understanding who buys EVs, how much they are being driven, and to what extent policies are benefiting low-income households is central to the sustainability of alternative vehicle policies.

barriers to access was the focus of this study. Different demographic groups have varying degrees of access to alternative vehicles due to correlations in income (and ability to pay) and geographic determinants of finding and completing purchases. Our data allowed us to examine the role of these barriers in the used EV market. Further, we studied how these barriers vary by demographic group.

WHAT WAS THE OUTCOME?

The average distances traveled for new ICEs differ significantly by ethnicity. African Americans and Asians travel more than three miles more than non-Hispanic whites. However, when we look at distance traveled to purchase new PHEVs and BEVs, there is not a statistically significant difference beyond what is observed for ICEs. There appear to be small differences in distance traveled by income for Hispanics buying BEVs (wealthier buyers travel farther) and other ethnicities for PHEVs (less wealthy buyers travel farther). But, on net, these differences are small in absolute magnitude. This suggests that local availability does not explain the gap in adoption for new PEVs.

The patterns of distance traveled to buy used PHEVs and BEVs are somewhat different than to buy new ones. On average, people tend to travel 10.2 miles to buy used cars, which is 1.6 miles farther than they travel to buy new cars. People travel farther still to buy used PHEVs (3.8 miles farther) and BEVs (9.6 miles farther). Relative to this baseline, Asians and Hispanics travel even farther (3.5 and 2.0 miles respectively) for use PHEVs, but Hispanics and other ethnicities travel less distance for used BEVs (2.8 and 9.5 miles respectively). There are mostly no differences in distance traveled as a function of income across ethnicities, but Hispanics travel somewhat farther for PHEVs and BEVs as their incomes increase, and other ethnicities travel somewhat farther for BEVs as incomes increase. Interestingly, there are no measurable differences in distance traveled by African American used PHEV and BEV buyers relative to non-Hispanic whites.

The results of our work suggest that price discrimination and market access are not limiting adoption amongst these groups. In the new PEV market in particular, there is little evidence of minority ethnic groups paying higher prices or traveling longer distances to buy their alternative fuel cars. In the used car market, the results are more mixed. Low-income non-whites tend to pay more relative to baseline for used PHEVs and BEVs than in the new car market. While it's possible that these effects are compositional, it's also possible that there are more obstacles to market access in the used PEV market.

WHAT IS THE BENEFIT?

The question of who ultimately benefits from access to this important durable good is revealed in the long run through activity in the secondary market, and this is nearly uncharted territory in academic research. The costs of transporting cars from high- to low-income areas and the costs of

searching for one's desired EV model will combine to determine how effectively the EV technology distributes over time and space.

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