Electric Vehicles in Multi-Vehicle Households

Lucas Davis

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Abstract

This paper uses U.S. nationally representative data from the 2017 National Household Travel Survey to present a series of facts about electric vehicles in multi-vehicle households. First, as of the time of the survey, 89% of households with an electric vehicle also had a gasoline or diesel vehicle in addition to the electric vehicle. Second, 60% of households with an electric vehicle also had a gasoline or diesel SUV, truck, or minivan – in most cases with fuel economy below the average for the U.S. vehicle stock. Third, 66% of households with an electric vehicle also had a gasoline or diesel vehicle that was driven more miles per year than the electric vehicle. The paper argues that these patterns have implications for the environmental impact of electric vehicles and underscore the importance of better understanding how multi-vehicle households substitute between vehicles. The paper also points out that within-household substitution between electric and gasoline vehicles will tend to increase the price elasticity of demand for gasoline.

Key Words: gasoline consumption, carbon dioxide emissions, local pollution, vehicle miles traveled, range anxiety, rebound effect, gasoline tax, milege tax, fuel economy standards
JEL Classification: D12; L62; Q41; Q54; Q55

*Haas School of Business at University of California, Berkeley; Energy Institute at Haas; and National Bureau of Economic Research; lwdavis@berkeley.edu. I am thankful to my Berkeley colleagues for many helpful comments and suggestions. I have not received any financial compensation for this project nor do I have any financial relationships that relate to this research. The analysis relies entirely on publicly-available data and all data and code will be posted on my website upon completion of the project.
1 Introduction

Economists have long argued that the best way to address externalities is to price them directly. For reducing carbon dioxide emissions from transportation this would take the form of a carbon tax, or equivalently, a gasoline tax. The advantage of this approach is that it induces efficient choices along all margins, for example, encouraging households to buy more fuel efficient vehicles and to drive them fewer miles per year.

Instead, many countries are implementing subsidies for electric vehicles. Mostly missed in these policy discussions, however, is the potential for multi-vehicle households to substitute between electric and non-electric vehicles. Being encouraged to buy an electric vehicle may change the other vehicles that a household chooses to buy. In addition, households may choose to use their electric and non-electric vehicles differently, for example, preferring non-electric vehicles for long trips.

Within-household substitution only matters to the degree that there are a significant number of such multi-vehicle households. This paper uses U.S. nationally representative data from the 2017 National Household Travel Survey (NHTS) to present a series of facts about electric vehicles in multi-vehicle households. Prior to the latest wave of the NHTS there were few electric vehicles on the road, so these data provide one of the first opportunities to examine electric vehicles at a national level within the broader context of household vehicle portfolios.

1The International Energy Agency “Global EV Outlook 2021” describes fiscal incentives for electric vehicles in the United States, Canada, European Union, India, Japan, and China.
First, as of the time of the survey, 89% of households with an electric vehicle also had a gasoline or diesel vehicle in addition to the electric vehicle. Only 10% of U.S. households with an electric vehicle were single-vehicle households, compared to 37% of all U.S. households. Thus, households with an electric vehicle were almost four times less likely to be single-vehicle households. Households with an electric vehicle had an average of 2.7 vehicles, compared to an average of 2.1 vehicles for all U.S. households.

Second, 60% of households with an electric vehicle also had a “large” gasoline or diesel vehicle, i.e., an SUV, truck, or minivan. Toyota Highlander, Acura MDX, and Honda Odyssey, for example, were frequently observed gasoline-powered vehicle models in households with electric vehicles. These larger vehicles provide differentiation with regard to seating capacity, cargo area, and other characteristics that are valued by the household. However, this also has implications for fuel economy and carbon dioxide emissions as most of these vehicles are less fuel-efficient than the average for the U.S. vehicle stock.

Third, 66% of households with an electric vehicle had a gasoline or diesel vehicle that was driven more miles per year than the electric vehicle. This is somewhat surprising. Electric vehicles cost less to drive per mile than gasoline- and diesel-powered vehicles (Rapson and Muehlegger, 2021), so there is a financial incentive for households to use electric vehicles intensively. Still, as the paper discusses, range limitations and other factors tend to work in the opposite direction. The paper also discusses environmental ideology, and how this could potentially lead to some discord between the vehicles households choose to buy and the vehicles they choose to use.
intensively.

Taken together, this evidence suggests that the environmental benefits of electric vehicles may be smaller than previously believed. At least for the early wave of electric vehicle adoption in the United States, most electric vehicles were purchased or leased by multi-vehicle households, often alongside SUVs and other relatively low-MPG vehicles. Electric vehicles also tended to be driven less intensively than these other larger vehicles, implying smaller than expected decreases in gasoline consumption, carbon dioxide emissions, and local pollution.

These patterns underscore the importance of better understanding how multi-vehicle households substitute between vehicles. In recent work, Archsmith et al. (2020) finds evidence that households substitute between vehicle attributes when deciding which vehicle to purchase. For example, a household with one fuel-efficient vehicle may be more likely to purchase a second vehicle that is less fuel-efficient. This within-household substitution likely plays a particularly important role with electric vehicles and can help explain the popularity of electric vehicles among multi-vehicle households.

The findings also provide context for previous research which has shown that electric vehicles tend to be driven less than other vehicles. Davis (2019) uses data from the NHTS to show that electric vehicles are driven 7,000 miles per year on average, compared to 10,200 miles per year for all other vehicles. Burlig et al. (2021) use electric billing data from a major electric utility to measure the change in electricity consumption when a household registers an electric vehicle, concluding that battery
electric vehicles are driven 6,700 miles per year. Within-household substitution may help explain this low driving intensity for electric vehicles.

Finally, the paper complements a growing broader literature on electric vehicles. Previous studies examine, for example, the importance of local factors in determining environmental impacts (Zivin et al., 2014; Holland et al., 2016, 2020), the effectiveness of electric vehicle subsidies (DeShazo et al., 2017; Muehleggger and Rapson, 2020), electric vehicle charging infrastructure (Li et al., 2017; Li, 2019; Springel, forthcoming), and the economics of banning gasoline vehicles (Holland et al., 2021).

The paper proceeds as follows. Section 2 presents evidence about electric vehicles in multi-vehicle households and provides additional details about the NHTS. Section 3 discusses potential explanations for these patterns, and discusses how mixed fuel vehicle portfolios are likely to impact the price elasticity of demand for transportation fuels. Section 4 concludes with a discussion of policy implications.

## 2 Empirical Evidence

### 2.1 Number of Vehicles

**Fact 1:** As of the time of the survey, 89% of U.S. households with an electric vehicle also had a gasoline or diesel vehicle.

Figure 1 describes the number of vehicles per household. The figure reports information both for U.S. households with an electric vehicle and for all U.S. households with at least one vehicle of any type. As discussed in more detail later, these cal-
Calculations are based on the 2017 NHTS and all statistics in the paper are calculated using NHTS sampling weights.

Among U.S. households with an electric vehicle, 90% had two or more vehicles. This is slightly higher than the percentage who also had a gasoline or diesel vehicle (89%) because there are a small number of households with more than one electric vehicle. Only 10% of U.S. households with an electric vehicle are single-vehicle households. In contrast, 37% of all U.S. households are single-vehicle households. U.S. households with an electric vehicle have an average of 2.7 vehicles, compared to an average of 2.1 vehicles for all U.S. households.

In the United States it is relatively common for households to have more vehicles than drivers. This can be examined explicitly in the NHTS as these data provide information both about the number of vehicles, and about the number of drivers in the household. Among households with an electric vehicle, 36% have more vehicles than drivers. For all U.S. households, 24% have more vehicles than drivers. Thus, overall, households with an electric vehicle tend to have multiple vehicles, and in about one-third of cases, more vehicles than drivers. The following section examines these vehicle portfolios in more detail.

### 2.2 Vehicle Categories

**Fact 2: As of the time of the survey, 60% of U.S. households with an electric vehicle also had a non-electric SUV, truck, or minivan.**

Table 1 describes the other vehicles in U.S. households with an electric vehicle. As
in Figure 1, 90% of households with an electric vehicle had some other vehicle in addition to their electric vehicle.

The table next explores vehicle categories. Among U.S. households with an electric vehicle, 55% also have a non-electric “car”, i.e. a sedan, hatchback, or station wagon. Honda Civic, Toyota Camry, and Honda Accord are all frequently observed vehicle models in households with an electric vehicle. The second most common category of other vehicle is the SUV; 42% of U.S. households with an electric vehicle also have a non-electric SUV. Porsche Cayenne, Toyota Highlander, Acura MDX, and Ford Explorer all appear frequently among the other vehicles in these households. Many households with an electric vehicle also have non-electric trucks (13%) and minivans (12%). Typical trucks for households with an electric vehicle include the Ford F-Series and the Toyota Tacoma, while typical minivans include the Honda Odyssey, Toyota Sienna, and Dodge Caravan.

Overall, 60% of households with an electric vehicle have a large non-electric vehicle, i.e. an SUV, a truck, or a minivan. These larger vehicles provide differentiation with regard to exterior and interior dimensions, seating capacity, cargo area, and other factors. However, this also has implications for fuel economy and gasoline consumption. These larger vehicles in households with an electric vehicle have an average fuel economy of 18.8 miles-per-gallon. As a point of comparison, the average fuel economy in the entire U.S. vehicle stock is 21.5 miles-per-gallon. See Appendix Table 1. Thus, the large non-electric vehicles in households with an electric vehicle are less fuel efficient than the average for the U.S. vehicle stock.
2.3 Miles Driven Per Year

**Fact 3: As of the time of the survey, 66% of U.S. households with an electric vehicle had a non-electric vehicle that was driven more.**

Table 2 reports information about miles driven per year. NHTS respondents fill out an “Odometer Mileage Record Form” which requires them to write down the current odometer reading for all vehicles in the household. To calculate the average annual miles traveled for each vehicle, these odometer readings were divided by vehicle age.

As of the time of the survey, two-thirds (66%) of households with an electric vehicle had a non-electric vehicle that was driven more miles per year than their electric vehicle. This and the other percentages in the table are unconditional averages, so this is two-thirds of all U.S. households with an electric vehicle, not two-thirds of all multi-vehicle households with an electric vehicle. All the percentages in Table 2 would be higher if single-vehicle households were excluded when making these calculations.

SUVs and minivans used particularly intensively. To see this, it is helpful to compare Tables 1 and 2. For example, 42% of households with an electric vehicle have an SUV, and 33% of households with an electric vehicle have an SUV that is driven more than their electric vehicle. Thus among households with both an electric vehicle and an SUV, 79% drive the SUV more. The ratio is similar for minivans (75%), and lower for cars (60%) and trucks (53%). Overall, 46% of U.S. households with an electric vehicle have a non-electric large vehicle (i.e. an SUV, truck, or minivan) that they
drive more miles per year than their electric vehicle.

2.4 Additional Details About Data

These facts are derived from the 2017 *National Household Travel Survey* (NHTS). The NHTS is a nationally-representative survey conducted every four to eight years by the U.S. Department of Transportation. The 2017 NHTS is the latest available wave of the NHTS, and data from the following wave of the NHTS will not be available for several more years.

The sample of households interviewed for the NHTS is selected using stratified sampling. Accordingly, all analyses throughout the paper use NHTS sampling weights. A nice feature of the NHTS is the large sample size – 129,696 households in the 2017 survey. This large sample size makes it possible to provide descriptive information about households with electric vehicles even though electric vehicles made up less than 1% of the U.S. vehicle stock at the time these interviews were conducted.

As mentioned in the introduction, this latest wave of the NHTS provides a unique opportunity to better understand electric vehicles. Prior to the 2017 NHTS, the most recent NHTS was conducted back in 2009, when there were virtually no electric vehicles on the road. Although there are other smaller datasets, for example, collected on California drivers, this 2017 NHTS represents the first opportunity for a national-level study of electric vehicles in multi-vehicle households. The NHTS includes information about each vehicle’s make, model, and vintage, as well as a measure of the vehicle’s miles-per-gallon. This information about fuel economy comes from the
FuelEconomy.gov database, which has the miles-per-gallion of all makes and models of vehicles sold in the United States since 1984. This measure of miles-per-gallon is calculated to reflect real-world driving conditions.

A notable limitation of the NHTS is the low response rate. The 2017 NHTS has a lower response rate than previous waves, only 15.6% according to the survey documentation. Thus, in order to generate the sample size of 129,696, the National Highway Traffic Safety Administration had to contact more than 900,000 households. The NHTS sampling weights attempt to correct for non-response by balancing observable household characteristics, but it is impossible to rule out concerns about non-response bias.

The 2017 NHTS includes over 1,000 households with an electric vehicle. This includes both all-electric vehicles and plug-in hybrids, and, using NHTS sampling weights, implies a total of 780,000 electric vehicles in the United States. This is similar to aggregate sales of electric vehicles in the United States 2011-2017 (740,000) according to the U.S. Department of Energy, Alternative Fuels Data Center. Thus, at a minimum, the NHTS seems to provide a reasonable description of the overall number of electric vehicles in the United States.

The 2017 NHTS is already several years old. Traditional vehicle markets evolve relatively slowly, so using recent data is not so imperative, but the electric vehicle market is changing rapidly. Since this survey was conducted, dozens of new electric vehicle models have been introduced and policymakers and automakers have made aggressive pledges to sharply increase the market share of electric vehicles. An im-
3 Discussion

This section discusses explanations and implications. Section 3.1 presents a possible explanation for why multi-vehicle households are particularly likely to have electric vehicles. Section 3.2 discusses explanations for the evidence on miles driven per year. Finally, Section 3.3 discusses the implications of multi-vehicle households for the price elasticity of demand for transportation fuels.

3.1 Why Multi-Vehicle Households?

Multi-vehicle households can substitute attributes across vehicles, potentially making electric vehicles more attractive. Archsmith et al. (2020) describes a model in which multi-vehicle households derive utility from the characteristics of each individual vehicle, as well as from the combination of attributes in the vehicle portfolio. This modeling of within-household substitution is a considerable departure from previous economic analyses which assume that households choose only a single vehicle or, alternatively, that vehicle choices in a household are independent (Bento et al., 2005; Goulder et al., 2012; Jacobsen, 2013).\(^2\)

\(^2\)This type of attribute substitution has not typically been a feature of discrete choice models of energy-using durable goods. At least since Hausman (1979) and Dubin and McFadden (1984), economists have been modeling energy-using durable goods as having both an extensive and intensive margin but there is typically only a single durable good selected for each household so attribute substitution is not a primary feature.
This framework is compelling because it allows vehicles to be substitutes. For example, a household might want one vehicle for commuting which is inexpensive to operate, as well as a larger vehicle for family vacations and other trips that require carrying more passengers or cargo. Or, whereas a single-vehicle household might find a pickup truck to be less useful for general purpose use, a multi-vehicle household might want a pickup or other more specialized vehicle as part of a broader portfolio, knowing that other household vehicles can be used for more general-purpose trips. This differentiation increases household utility, making it more likely that a household has an appropriate vehicle for any necessary trip and purpose. Indeed, the evidence presented previously that about one-quarter of U.S. households have more vehicles than drivers points to the utility derived from vehicle differentiation.

Electric vehicles make sense in such a context. There is some debate about the degree to which households should be concerned about range anxiety. But, at the very least, it seems clear that many households perceive range limitations to be a challenge with electric vehicles. However, the ability to substitute between vehicles makes range limitations less of a challenge for multi-vehicle households. Similar to the examples above, a household can use the electric vehicle for short trips, while using the non-electric vehicle for longer trips for which range is an issue. Thus, the high prevalence of electric vehicles in multi-vehicle households likely reflects, at least in part, the ability of these households to substitute attributes across vehicles.

Adopting an electric vehicle may also have a causal impact on the subsequent vehicles acquired by the household. In the model described by Archsmith et al. (2020), households make vehicle purchase decisions taking into account how that additional
vehicle will change the overall portfolio. Viewed through this framework, if the household already has an electric car, it may want to diversify when acquiring its next vehicle with a non-electric larger vehicle. Until the Tesla Model X began deliveries in September 2015, most of the available electric vehicles were cars, not SUVs, trucks, or minivans, so this is a relevant example. Archsmith et al. (2020) discuss how substitution patterns like this can erode the environmental benefits of programs like “Cash-for-Clunkers”, but the same can be said of subsidies aimed at electric vehicles.

3.2 Why Fewer Miles?

Why do two-thirds of households with an electric vehicle have a non-electric vehicle that is driven more miles per year? As mentioned before, this behavior is surprising. Electric vehicles tend to cost considerably less to drive per mile, so there is a financial incentive for households to use electric vehicles for as many of the household miles as possible.

One possible explanation for this apparent failure to cost-minimize is that households are myopic or in some other way fail to understand vehicle operating costs. Although policymakers have often claimed that households are myopic in making these decisions, at least for gasoline vehicles the empirical evidence indicates that households are not particularly myopic and understand vehicle operating costs reasonably accurately (Busse et al., 2013; Allcott and Wozny, 2014; Sallee et al., 2016). It could be that expenditures on electricity are less salient than expenditures on gasoline. With a gasoline vehicle, a driver pays specifically for the fuel used for this vehicle, so
gasoline expenditures are salient and observable. In contrast, with electricity a driver typically only knows total monthly electricity consumption, and thus may not have as good of information about electricity expenditures for electric vehicle charging. Still, it is relatively straightforward to calculate the approximate price per mile for electric vehicles.

Perhaps a more likely explanation is range limitations. It makes sense for multi-vehicle households to deploy a non-electric vehicle for family vacations and other long trips where range limitations are a real issue. But even for some shorter trips not obviously beyond the range of the vehicle, the household may want to drive the non-electric vehicle because of the option value of being able to extend the trip if plans change. It is worth noting also that the earlier electric vehicles tended to have less range than many of the electric vehicles that are currently available. The first generation Nissan Leaf, for example, had a range of less than 80 miles, making it impractical for medium-length trips. In contrast, the current Nissan Leaf has a 150+ mile range, almost twice the range as the original version.

Environmental ideology may also be part of the explanation. Examining a previous generation of green vehicles, Kahn (2007) finds that environmentalists are more likely to purchase hybrid vehicles, and Sexton and Sexton (2014) finds that households in green communities are willing-to-pay more for the Toyota Prius, a vehicle that was much more conspicuously green than other hybrid vehicles. If households are buying electric vehicles, in part, because of environmental ideology then these purchases may be more about the “green status” that comes with ownership than about the actual utility that would come from using these vehicles intensively. This can be
viewed as another form of the attribute substitution discussed in the previous section, with a household buying one vehicle for green status and another vehicle for driving intensively.

### 3.3 Implications for Price Elasticities

A large literature in economics studies how gasoline consumption responds to changes in the price of gasoline. More recently, studies have discussed how electric vehicle charging behavior might respond to the price of electricity. Almost completely ignored in these literatures, however, is the potential for multi-vehicle households to substitute between vehicles. It has been relatively uncommon for households to have vehicle fleets fueled by multiple energy sources but this is changing rapidly with the growth of electric vehicles.

Within-household substitution will tend to increase the price elasticity of demand for both energy sources. When gasoline prices go up, a household with an all-gasoline vehicle fleet can choose to drive less, or to switch to alternative modes of transportation. However, a household that also has an electric vehicle has an additional margin of adjustment. When the price of gasoline goes up, the household with a mixed fleet can drive the gasoline vehicle less, and drive the electric vehicle more.

To some degree we should expect to see this same pattern for electricity. When electricity prices go up, a household with a mixed fleet can drive the electric vehicle

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3 See, e.g., Hughes et al. (2008); Li et al. (2014); Levin et al. (2017).
4 See, e.g., Zivin et al. (2014); Fang et al. (2018).
less, and drive the gasoline-powered vehicle more. The price per mile is lower for electric vehicles, however, so driving choices will tend to be less responsive overall to electricity prices.

Within-household substitution will also tend to increase cross-price elasticities. When gasoline prices go up, households with mixed fleets will consume more electricity. Similarly, when electricity prices go up, households with mixed fleets will consume more gasoline. Again, the overall price per mile tends to be higher for gasoline so the former effect is likely to be larger in magnitude than the latter. And, of course, the impact of these behaviors on aggregate own- and cross-price elasticities depends on how many households have mixed vehicle fleets.

4 Conclusion and Policy Implications

Thus the evidence shows that, at least for this early wave of electric vehicle adoption in the United States, electric vehicles tend to be found in multi-vehicle households. These households tend to also have at least one large gasoline vehicle like an SUV, and they tend to have at least one non-electric vehicle that is driven more miles per year than their electric vehicle.

This evidence suggests that the environmental benefits of electric vehicles may be smaller than previously believed. Multi-vehicle households are able to choose larger and less fuel-efficient vehicles to complement their electric vehicles. Moreover, within-household substitution may lead to electric vehicles being driven less intensively than non-electric vehicles.
This same dynamic may also tend to reduce the effectiveness of electric vehicle subsidies over time. Inducing a multi-vehicle household to adopt its first electric vehicle may be relatively easy as the household can substitute across vehicle attributes and continue, for example, to also drive a larger gasoline-powered vehicle with additional passenger and cargo capacity. However, adopting the second electric vehicle may tend to be more difficult because it reduces the ability of the household to differentiate.

It will be important to re-examine these patterns with newer data once available. At the time this survey was conducted, most electric vehicle models were smaller cars with limited passenger and cargo capacity. However, manufacturers have now introduced a broader range of electric vehicles including SUVs and trucks. This richer set of available electric vehicles gives households more flexibility and ability to differentiate. In the language of Holland et al. (2021), electric- and non-electric vehicles are becoming closer substitutes.

The U.S. vehicle stock has added 2.1 million electric vehicles since 2010, counting both plug-in hybrids and all-electric models. Although this is still less than one percent of all U.S. registered vehicles, many policymakers and automakers envision this ramping up dramatically over the next decade. General Motors, Fiat Chrysler, and Ford have pledged that 40%+ of their new vehicles will be electric by 2030 if Congress agrees to finance vehicle charging stations and tax credits.\(^5\)

On the one hand, this enthusiasm makes sense. The U.S. electric grid has become

dramatically greener over the last decade, creating an opportunity to decarbonize transportation through electric vehicles. On the other hand, decarbonization will occur only to the degree that electric vehicles actually lead to sharp reductions in gasoline- and diesel consumption. It isn’t the production or even the sale of electric vehicles that makes them green, it is their ability to offset driving in traditional vehicles.

Thus it is more important than ever to understand how households choose vehicles as well as how they decide which vehicles to drive. This paper argues that multi-vehicle households are particularly important because they have so many options with regard to how to combine vehicles with varying attributes, as well as so much scope for substituting across vehicles when making trips. Policymakers need better information about these behaviors if they are to craft effective subsidies and other policies aimed at reducing carbon dioxide emissions from transportation.
References


Figure 1: Number of Vehicles in the Household

Note: This figure was constructed using data from the 2017 National Household Travel Survey (NHTS). Electric vehicles include both all-electric and plug-in hybrids. All percentages were calculated using NHTS sampling weights. Calculations for “All U.S. Households” exclude a small number of households (<5%) that have zero vehicles. All four differences are statistically significant at the 1% level.
<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Another vehicle of any type</td>
<td>90%</td>
</tr>
<tr>
<td>A non-electric vehicle of any type</td>
<td>89%</td>
</tr>
<tr>
<td>A non-electric car (e.g. Honda Civic, Toyota Camry)</td>
<td>55%</td>
</tr>
<tr>
<td>A non-electric SUV (e.g. Porsche Cayenne, Toyota Highlander)</td>
<td>42%</td>
</tr>
<tr>
<td>A non-electric truck (e.g. Ford F-Series, Toyota Tacoma)</td>
<td>13%</td>
</tr>
<tr>
<td>A non-electric minivan (e.g. Honda Odyssey, Toyota Sienna)</td>
<td>12%</td>
</tr>
<tr>
<td>A non-electric SUV, truck, or minivan</td>
<td>60%</td>
</tr>
</tbody>
</table>

Note: This table was constructed using data from the 2017 National Household Travel Survey (NHTS). All percentages were calculated using NHTS sampling weights.
## Table 2: Miles Driven Per Year

Among U.S. households with an electric vehicle, what percentage have?

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A non-electric vehicle that is driven more than the EV</td>
<td>66%</td>
</tr>
<tr>
<td>A non-electric car that is driven more than the EV</td>
<td>33%</td>
</tr>
<tr>
<td>A non-electric SUV that is driven more than the EV</td>
<td>33%</td>
</tr>
<tr>
<td>A non-electric truck that is driven more than the EV</td>
<td>7%</td>
</tr>
<tr>
<td>A non-electric minivan that is driven more than the EV</td>
<td>9%</td>
</tr>
<tr>
<td>A non-electric SUV, truck or minivan that is driven more than the EV</td>
<td>46%</td>
</tr>
</tbody>
</table>

Note: This table was constructed using data from the 2017 National Household Travel Survey (NHTS) to assess whether U.S. households with an electric vehicle have non-electric vehicles that are driven more miles per year. As of the time of the survey, for example, 66% of households with an electric vehicle had a non-electric vehicle that was driven more miles per year than their electric vehicle. Vehicle driving intensity is measured using annual VMT calculated with odometer readings. All percentages were calculated using NHTS sampling weights.
## Appendix Table 1: Comparison to the U.S. Vehicle Fleet

<table>
<thead>
<tr>
<th></th>
<th>Other Vehicles in Households with an EV</th>
<th>Entire U.S. Vehicle Fleet</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

### Vehicle Characteristics:

- **Average Miles-Per-Gallon**
  - 22.1
  - 21.5
  - .07

- **Average Miles-Per-Gallon**
  - (SUVs, Trucks, and Minivans)
  - 18.8
  - 18.2
  - .04

- **Average Vehicle Age (Years)**
  - 8.8
  - 9.7
  - .01

### Vehicle Miles Traveled:

- **Average Total Vehicle Mileage (1000s)**
  - 82.7
  - 92.9
  - .01

- **Average Annual Mileage (1000s)**
  - 9.4
  - 10.5
  - .00

### Fuel Type:

- **Gasoline**
  - 90%
  - 96%
  - .00

- **Diesel**
  - 4%
  - 2%
  - .12

- **Conventional Hybrid**
  - 6%
  - 2%
  - .00

### Vehicle Categories:

- **Car**
  - 51%
  - 52%
  - .70

- **SUV**
  - 33%
  - 25%
  - .00

- **Truck**
  - 9%
  - 17%
  - .00

- **Minivan**
  - 8%
  - 6%
  - .33

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Note: This table was constructed using data from the 2017 National Household Travel Survey (NHTS). The table reports vehicle characteristics for other vehicles in U.S. households with an electric vehicle (column 1), and for the entire U.S. non-electric vehicle fleet (column 2). The final column reports p-values from tests that the statistics in the two samples are equal. All statistics are calculated using NHTS sampling weights.