ESTIMATING REVENUE NEUTRAL MILEAGE-BASED FEES FOR URBAN AND RURAL HOUSEHOLDS IN EIGHT WESTERN STATES

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ABSTRACT

This paper focuses on one alternative source of revenue – a mileage-based user fee – as a potential substitute for the current gasoline excise tax. It examines one of many questions that arise when this source of funding is considered – the potential for differential financial effects on urban and rural households. The issue has been characterized as one of "equity", and more specifically whether rural households will pay a disproportionately greater share of the costs if states transition from a fuel-consumption-based to a mileage-based funding system. This paper presents an approach to address this question using existing sources of data and a set of assumptions designed to assess a "revenue-neutral" substitution of mileage-based charges for the current gasoline excise tax. Based on the methods used in this paper, it appears that rural households may, in fact, benefit from introduction of a mileage-based fee because they will pay less than under the current system in all states investigated for this study.

Keywords: Transportation economics, Mileage-based user fees, Equity analysis (finance), rural/urban issues, NHTS, Transferability Statistics, Fuel taxes

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INTRODUCTION

Current limitations associated with reliance on the gas tax require consideration of alternative methods of generating revenue (*1*). The limitations and potential alternative sources of revenue generation have been discussed at length in prior studies (*2*). This paper focuses on one alternative source of revenue – a mileage-based user fee – and one of many questions that arise when this source of funding is considered – the potential for differential financial effects on urban and rural households. The issue has been characterized as one of "equity", and more specifically as whether rural households will pay a disproportionately greater share of the costs if states transition from a fuel-consumption-based to a mileage-based funding system. This paper presents an approach to address this question using existing sources of data and a set of assumptions designed to assess a "revenue-neutral" substitution of mileage-based charges for the current gasoline excise tax. The estimation methods are designed to be reproducible and adaptable to other states or multistate regions interested in assessing urban/rural equity considerations.

SCOPE OF ANALYSIS AND ASSUMPTIONS

The paper is based on research conducted for eight of the 14 states currently members of the Western Road User Charge Consortium (RUC West). The states included in the analysis were:

1. Arizona
2. California
3. Idaho
4. Montana
5. Oregon
6. Texas
7. Utah
8. Washington

This research was designed to help determine both the direction and order of magnitude of charges that households would be likely to bear if a state implements a mileage-based charging system. Households were classified by their location as rural, urban or "mixed". In many areas of the Western US – especially in areas with small and medium-sized population centers, the term "suburban" does not strictly apply. Households with a commute characterized by travel from a less dense location to a denser location fall into this "mixed" category.

The substitution of a mileage-based fee for a fuel-consumption-based tax was predicated on assumptions of "revenue-neutrality" with regard to current gas excise taxes levied by each state. The approach did not rely on any supplemental surveys, interviews or data collection. Rather, it was designed to be readily implementable for any state and updatable as conditions change. Other key assumptions included the following:

1. Census tracts were used as the geographic unit of analysis
2. Only non-commercial vehicles registered at a place of residence were considered
3. Data from publicly-available sources, such as the US Census, were utilized as practical
4. Non-gas-powered vehicles were included in the analysis to assess the mileage-based charges
5. Diesel passenger vehicles would be considered in a separate study of diesel fuel taxes

Literature Review

McMullen et al. (*3*) and Larsen et al. (*4*) review and synthesize the results of a decade of investigation on the urban/rural equity question based on setting flat VMT fees and several variations. McMullen et al. (*3*) estimates the effects of a revenue-neutral mileage-based fee using Oregon Household Activity Survey (OHAS) data and a static estimation technique, concluding that under RUCs, rural areas would generally pay less than under the current excise tax system and that these differences would vary depending on fuel efficiency, as they do in urban areas. That research divided Oregon into eight regions based on the OHAS data. In addition to estimating RUC charges for Oregon (*3*,*5*) other statewide studies have included Nevada (*6*), Texas (*4*), and Iowa (*7*).

Weatherford (*8*) focuses on a nationwide assessment of income and geographic equity of a uniform RUC using information for the 2001 NHTS and assuming a fixed mileage-based fee (0.98 cents per mile). He concludes that burden on rural and low-income households would be less regressive than the current national excise tax but also indicates that a rate set at this level would generally increase the tax burden for residents in the Pacific states. Other issues identified in the literature include the need to develop definitions of geographic areas that can provide detail not typically available in national data sets like the National Highway Travel Survey (NHTS) (*7*) and that provide more nuanced information about distinctions between urban and rural areas that are typically available from the US Census Bureau (*9*).

A combination of demographics, geographic characteristics and vehicle fuel consumption attributes are necessary to consider when assessing the impacts of a RUC relative to the current gas excise tax. The urban/rural definition of the geographic region as well as the relative size of the region is also important. Moreover, it is also clear that, to date, there has been no methodology that distinguishes between revenue-neutral RUC rates for urban and rural areas and has been applied consistently across multiple states. This study was designed to address each of these issues and to provide practitioners with a uniform, implementable approach to estimating revenue-neutral RUC rates without having to resort to specialized surveys or complex econometric methods.

APPROACH

The approach to estimation of revenue-neutral mileage-based user fees required several steps (see FIGURE 1). Three basic types of information were required: a systematic urban/rural categorization system that could be applied to diverse states; the number of vehicle miles of travel associated with households in a census tract; and the mix of fuel types and efficiencies in each census tract. These three types of information were combined with gas tax rates for each of the states to estimate the gas taxes paid per household associated with the current fleet of gas-burning vehicles.

Our objective was to estimate a mileage-based fee that would be equal to the portion of total gas tax revenues currently paid by households in each state. These “revenue-neutral” mileage-based fees were based on current estimated household gas excise tax payments, not total statewide revenue from all gas-related sources (e.g., sales or other taxes and fees, or excise taxes paid by commercial, agricultural or recreational vehicles.) We estimated total gas-tax-based revenues using household VMT by census tract and the average fuel efficiency of gas-powered and flex-fueled non-commercial vehicle types registered in each census tract. We then computed the equivalent total revenue from mileage-based fees by including mileage for non-gas-powered vehicles and flex-fueled vehicles when computing a mileage-based fee.

IDENTIFYING URBAN, RURAL AND MIXED HOUSEHOLDS

While there are many possible approaches to identifying urban and rural areas, the one judged most suitable for this study was developed by the US Department of Agriculture’s (USDA) Economic Research Service (ERS). The ERS used census tract-level household data from the 2006-2010 American Community Survey (ASC) to identify ten different types of commuting patterns within and between urbanized areas and less dense areas (TABLE 1).

Each census tract in the eight-state region has a Rural-Urban Commuting Area (RUCA) code assigned by ERS based on commuting patterns reported in the ACS. Various combinations of these codes were evaluated for use in urban/rural classification. TABLE 2 shows the combination of RUCA codes that best captured urban and rural census tract commuting patterns for this study. A “mixed” classification was defined based on three RUCA codes that indicated primary flows to large urban areas (UAs) or strong flows to a large urban cluster (UC). We use the term “mixed” because some of these tracts have densities of less the 25 people per square mile on average in the western states. Mixed tracts are characterized by primary commuting flows to urbanized areas, and contain less-dense suburbs, outer suburbs and even stretch out from population centers to include land with more rural settlement and land use patterns. Socioeconomic and travel characteristics for these areas are different than rural areas. Small towns that are dense enough to classify as urban areas under the Census definition are often included in the “urban” category, not the “mixed” category for this study. The spatial patterns that emerged for the eight states are shown in FIGURE 2.

This method of classification picked up subtleties in commuting patterns between census tracts identified as smaller urban clusters and nearby rural census tracts. Urban census tracts included those in a metropolitan or micropolitan core with primary commuting flows between place of residence and work within the core area. Mixed census tracts consist of those in non-core metropolitan areas with primary flows to the metropolitan core, and census tracts with high levels of commuting between those located in non-core micropolitan areas and the micropolitan core. Rural census tracts are those census tracts with commuting flows within or between small urban clusters (populations under 10,000) and rural areas. While some urban census tract classifications may seem unusual considering their location in less populated counties, they generally have small urban clusters with most commuting internal to the census tract.

ESTIMATING VMT BY FUEL TYPE FOR CENSUS TRACTS

VMT by fuel type was approximated by estimating VMT by census tract and then using vehicle registration data to estimate the mix of fuel types at the census-tract level. Estimates of VMT are totals for households located in each census tract (not VMT for all vehicles passing through each census tract, regardless of where they are registered). Motor vehicle registrations from each state were matched with vehicle characteristics attributed using vehicle identification numbers (VINs) from registration data. Vehicle location was determined by matching registration data to census tract boundaries. Vehicle registration data was filtered to exclude commercial vehicles, farm vehicles, and other vehicles not registered to residential users (e.g., golf carts).

Estimates of VMT by fuel type were important for two reasons. First, estimates of VMT by gas-powered vehicles were necessary to determine the current level of gas tax being paid. This was accomplished by estimating average fuel efficiency for gas-powered vehicles for each census tract. VMT estimates were based on parameters developed by the Bureau of Transportation Statistics’ (BTS) Transferability Statistics report from the National Highway Transportation Survey (NHTS) (*10*). Second, a revenue-neutral mileage-based charge would then need to reallocate gas tax revenues paid by gas-powered vehicles to the total VMT estimated for both gas and non-gas-powered vehicles.

The data needed to estimate VMT includes independent variables available at the census tract level. These include the following:

- Average Household Income
- Average Number of Household Vehicles
- Average Number of Household Members
- Average Number of Workers
- Percent of Households who are Homeowners
- Percent of Households with Children
- Percent of Single Member Households
- Percent of Multiple Member Households, No Members Over 65
- Percent of Multiple Member Households, at least One Member Over 65

BTS parameters are estimated based on states aggregated by Census Divisions, and by urban, suburban and rural areas within these divisions. Using the Urbanicity Index, developed as part of the BTS Transferability Statistics report and based on census tract location and population density, census tracts were designated as urban, suburban and rural for purposes of VMT estimation.

Washington and Oregon both developed estimates for DVMT in support of their on-going road usage charge programs (*11, 3).* These reports were used to compare estimates developed from the BTS model. The Washington study estimates were within 10 percent for most counties. The Oregon Household Activity Survey (OHAS) closely matched the BTS results for urban households but estimated higher DVMT in rural areas than the BTS model. BTS-derived estimates also compared favorably to several California estimates of household DVMT.

These DVMT estimates were for all households in each census tract. Therefore, they included vehicle miles traveled by both gas and non-gas-powered vehicles. The next step in the study was to estimate the distribution of vehicles by fuel type in each census tract and use this information to estimate aggregate VMT by fuel type.

PROCESSING AND IDENTIFYING FUEL TYPE FROM VEHICLE REGISTRATION INFORMATION

As shown in TABLE 3, over 72 million vehicle registration records were received and processed. These records contained VINs and sufficient information to assign the record to a census tract. There were several reasons why vehicle records were removed from the analysis. The primary reason was that registration databases typically contain information for motorcycles, heavy trucks, trailers, motor homes and other vehicle types excluded from this analysis. Also, under the heading of Location Rebalance, vehicles registered outside the targeted states, in census tracts showing no population, or in unrecognizable locations were eliminated.

VINs for the remaining registration information were decoded using the National Highway Safety Administration's (NHTSA) Product Information Catalog and Vehicle Listing (vPIC) database and the Application Programming Interface (API) provided by NHTSA (*12*). The results from vPIC API decoding were used to match EPA fuel economy data to each VIN record (*13).* Losses due to inability to match fuel type and fuel economy are noted in TABLE 3.

Once the VINs were decoded, estimating the distribution of fuel types by state and census tract was relatively straightforward. TABLE 4 shows these distributions for each of the eight states and the percentage of all decoded VINs that these estimates represent. There are important differences between states that can be observed from these data.

While the total number of diesel-fueled vehicles is largest in Texas, the states of Utah, Oregon and Montana have a higher percentage of registrations when compared to Texas. California has the highest total number of hybrid vehicle registrations, though in terms of the percent of total registrations by state, Oregon and Washington have a higher percentage of registrations. Diesel vehicles are not included in this research and hybrids are treated as gas-powered vehicles but tend to have higher average efficiency.

Electric vehicles are primarily registered in California. This state has over 69 percent of registered electric vehicles in the eight states studied. Most of the flex/bio-fuel and "other fossil"-fueled vehicles are registered in Texas. Flex-fuel vehicle registrations in Texas are particularly high. These distributions of non-gas-powered vehicles influence the effect of a mileage-based fee since they currently often pay less in gas taxes (or in some cases, no gas taxes).

Estimated VMT for gasoline, hybrid and flex/biofuel vehicles is shown in TABLE 5 aggregated for the urban, mixed and rural census tracts in each state, as is the percentage of VMT attributed to gas-powered vehicles in each state. A similar estimate for non-gas-powered vehicles is shown in TABLE 6. For both tables, some assumptions were necessary. Although gas-powered vehicles can use up to 15 percent ethanol, and most gasoline sold in the US has up to 10 percent ethanol, most states tax gasoline with these levels of ethanol at the same rate as pure gasoline. Consequently, the gas-powered vehicle category includes vehicles fueled with up to 10 percent ethanol.

For flex/biofueled vehicles, motorists have a choice of using either standard-formulated gasoline or an alternative fuel, such as biofuels purchased from non-retail distribution or otherwise untaxed or differentially-taxed fuels. Since the choice, especially in rural areas, may be highly dependent on local availability, the assumption made for this study was that 50 percent of the fuel used by flex/biofueled vehicles was gasoline and 50 percent was an alternative non-taxed fuel. This assumption is reflected in TABLES 5 and 6. It is noteworthy that in many of the more rural states such as Montana and Idaho, there are relatively high concentrations of VMT in the urban areas for non-gas-powered vehicles.

ESTIMATED EFFECTS OF MILEAGE-BASED FEES ON RURAL HOUSEHOLDS

Effects of a change from a per-gallon tax to a mileage-based fee depend on two key factors: the number of miles driven, and fuel efficiency of the vehicles involved. In this regard, the differences between households located in rural, urban and mixed census tracts are important to understand, as they directly affect how much households are likely to pay under a revenue-neutral mileage-based fee.

As shown in TABLE 7, fuel efficiency is consistently higher in urban census tracts compared to rural census tracts. Vehicles registered in mixed census tracts are generally less fuel-efficient than those in urban areas, but, like vehicles registered in urban census tracts, are typically more fuel-efficient on average than those in rural areas. Based on registration data, vehicles in rural areas also tend to be older than those in urban areas (by an average of 1.3 years).

The estimates of DVMT by census tract also provided important information on average distances traveled by households in urban, mixed and rural census tracts. TABLE 8 shows estimates for DVMT by state. Although rural households travel between 38.6 and 52.6 miles per day, these totals are not a lot greater than urban households. In some states, such as Texas and Washington, urban households travel more on average than rural households. In all states, households in mixed census tracts travel longer distances on average than those in either urban or rural census tracts.

Total gas tax revenues from households was computed using the annualized VMT estimates for gas-powered vehicles at the census-tract level, estimated average fuel efficiency based on the composition of vehicles in each census tract, and the state gas taxes per gallon as of 2016. The estimated revenues based on this computation were then used as the base levels to estimate the revenue-neutral mileage-based fee for all drivers that would result in no net gain or loss in revenues. Since each state's per-gallon gas tax is different, the results of these computations are different for each state. TABLE 9 shows the estimated mileage-based fees that would need to be charged by each state to produce the same amount of revenue as the current gas tax.

The average cost per household in each census tract was then computed using the mileage-based fees shown in TABLE 9 and census tract VMT estimates. Results were tabulated by the urban, mixed or rural classification of each census tract. TABLE 10 shows the reduction in average costs per census tract for each of the states studied. Since these are *reductions*, negative values represent *increases* in the cost of a mileage-based fee per household compared to the current gas tax and positive values represent *savings*.

Based on these estimates, households in rural areas would save, on average, between 2 percent and 6 percent of what they currently pay in gasoline taxes. Urban households would pay between 0.3 percent and 1.4 percent more than they currently pay in gasoline taxes.

These effects are not uniform for all census tracts. There is a wide variation among the census tracts in the number of miles driven, the fuel efficiency of the current mix of vehicles in each census tract, and the types of vehicles driven. FIGURE 3 shows the distribution of costs for a mileage-based fee at the census tract level.

As FIGURE 3 shows, there are likely to be some rural census tracts where mileage-based fees will increase how much the average household will pay. Likewise, there appear to be many urban census tracts where the average payment per household under a mileage-based fee will decline compared to the current gas tax. What is evident is that neither the additional costs nor the potential savings will be large relative to the current levels of gasoline taxes paid by the average household.

CONCLUSION

One of the chief concerns expressed about instituting a mileage-based fee is that rural households would be disproportionately affected by a switch to this type of fee structure. Based on this concern, a systematic assessment across multiple Western states with varying degrees of urbanization and rural settlement was conducted. The results consistently show that, on average, census tracts that can be characterized as rural under the USDA's RUCA codes are more likely to have their driving costs reduced than increased under a mileage-based fee. The converse is true for urban areas. While this conclusion is based on data for Western states, the approach used in this study could be applied to states in other regions of the US. To the extent that household VMT, fuel type profiles and household characteristics are similar, these results would be expected to mirror those for the Western US.

In the absence of individual household travel information, census tract level household data was used in combination with parameters from the BTS NHTS Transferability Statistics. Each of these sources is subject to statistical errors and the generalizations that are characteristic of national surveys. However, the methods and approach used in this study appear to provide consistent results across states and provide readily explainable and reasonable results. The study also demonstrates the importance of maintaining adequate, accessible vehicle registration data, and the need for developing protocols for accessing this information on an on-going basis for support of future studies focused on assessing the potential financial impacts of mileage-based fees.

This study required the cooperation of motor vehicle registry departments in each state, which may not always be straightforward to arrange due to concerns about personally identifiable information. However, experience with multiple states in this study illustrates that sufficiently anonymized information can be released so that the basic vehicle identification and geolocation data needed to resolve information at a census tract level can be obtained.

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TABLE 1 Rural-Urban Commuting Area (RUCA) Codes Developed by USDA.

Code	Description
1	Metropolitan area core: primary flow within an urbanized area (UA)
2	Metropolitan area high commuting: primary flow 30% or more to a UA
3	Metropolitan area low commuting: primary flow 10% to 30% to a UA
4	Micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC)
5	Micropolitan high commuting: primary flow 30% or more to a large UC
6	Micropolitan low commuting: primary flow 10% to 30% to a large UC
7	Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC)
8	Small town high commuting: primary flow 30% or more to a small UC
9	Small town low commuting: primary flow 10% to 30% to a small UC
10	Rural areas: primary flow to a tract outside a UA or UC

TABLE 2 Aggregated RUCA Codes Defining Urban-Mixed-Rural Census Tracts.

UMR Classification	RUCA Codes Included	Count of Census Tracts	Total Land Area (sq.mi.)	Total Population
Urban	1, 4	12203	83,595	56,628,426
Mixed	2, 3, 5	1122	187,366	4,776,604
Rural	6, 7, 8, 9, 10	926	574,841	3,146,635

1 **TABLE 3 Registration Record Disposition.**

State	Registration Records Received	Removed from Analysis because: Non-Standard Passenger Vehicle	No Fuel Type ID	No Fuel Economy ID	Location Rebalance	Final Vehicle Count by State	Usable Vehicle Records
Arizona	5,917,640	8%	1%	10%	2%	4,618,996	78.1%
California	27,559,122	17%	3%	0%	1%	21,588,525	78.3%
Idaho	2,746,499	13%	0%	3%	4%	2,194,713	79.9%
Montana	700,000	10%	1%	8%	5%	528,872	75.6%
Oregon	3,782,748	0%	0%	33%	0%	2,524,951	66.7%
Texas	24,203,117	15%	0%	6%	4%	18,047,380	74.6%
Utah	2,330,852	6%	1%	7%	1%	1,979,521	84.9%
Washington	5,130,387	1%	0%	15%	0%	4,315,254	84.1%
Total	72,370,365	13%	1%	6%	2%	55,798,212	77.1%

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TABLE 4 Vehicles by Fuel Type.

State	Gas Vehicles	Electric/ Hydrogen	Hybrid	Flex fuel/ Biofuel	Other Fossil	Diesel	Total
Arizona	4,135,600	3,233	84,880	339,843	675	54,765	4,618,996
(percent of total)	*89.5%*	*0.1%*	*1.8%*	*7.4%*	*0.0%*	*1.2%*	*100.0%*
California	20,563,578	83,213	433,851	267,871	16,508	223,504	21,588,525
(percent of total)	*95.3%*	*0.4%*	*2.0%*	*1.2%*	*0.1%*	*1.0%*	*100.0%*
Idaho	2,020,931	290	18,014	106,149	197	49,132	2,194,713
(percent of total)	*92.1%*	*0.0%*	*0.8%*	*4.8%*	*0.0%*	*2.2%*	*100.0%*
Montana	420,969	2	6,378	28,813	83	72,627	528,872
(percent of total)	*79.6%*	*0.0%*	*1.2%*	*5.5%*	*0.0%*	*13.7%*	*100.0%*
Oregon	2,210,772	14	62,342	112,388	160	139,275	2,524,951
(percent of total)	*87.6%*	*0.0%*	*2.5%*	*4.5%*	*0.0%*	*5.5%*	*100.0%*
Texas	14,594,896	27,018	38,190	2,370,422	455,099	561,590	18,047,215
(percent of total)	*80.9%*	*0.2%*	*0.2%*	*13.1%*	*2.5%*	*3.1%*	*100.0%*
Utah	1,683,707	1,506	32,797	144,812	2,758	113,941	1,979,521
(percent of total)	*85.1%*	*0.1%*	*1.7%*	*7.3%*	*0.1%*	*5.8%*	*100.0%*
Washington	3,983,716	5,084	94,684	140,127	167	91,476	4,315,254
(percent of total)	*92.3%*	*0.1%*	*2.2%*	*3.3%*	*0.0%*	*2.1%*	*100.0%*
Eight State Total	49,614,169	120,360	771,136	3,510,425	475,647	1,306,310	55,798,047
(percent of total)	*88.9%*	*0.2%*	*1.4%*	*6.3%*	*0.9%*	*2.3%*	*100.0%*

TABLE 5 Estimated Annual VMT Subject to the Gas Tax.

State	Urban	Mixed	Rural	Total	Percent of Total VMT
Arizona	21,102	3,074	1,349	25,525	96.5%
(percent of total statewide Gas VMT)	*82.7%*	*12.0%*	*5.3%*	*100.0%*	
California	141,583	7,683	3,203	152,469	99.0%
(percent of total statewide Gas VMT)	*92.9%*	*5.0%*	*2.1%*	*100.0%*	
Idaho	4,970	1,234	1,218	7,422	97.4%
(percent of total statewide Gas VMT)	*67.0%*	*16.6%*	*16.4%*	*100.0%*	
Montana	2,017	719	1,583	4,319	96.9%
(percent of total statewide Gas VMT)	*46.7%*	*16.6%*	*36.7%*	*100.0%*	
Oregon	12,515	2,280	1,151	15,946	97.6%
(percent of total statewide Gas VMT)	*78.5%*	*14.3%*	*7.2%*	*100.0%*	
Texas	93,168	15,133	6,059	114,360	92.9%
(percent of total statewide Gas VMT)	*81.5%*	*13.2%*	*5.3%*	*100.0%*	
Utah	10,178	492	756	11,426	96.1%
(percent of total statewide Gas VMT)	*89.1%*	*4.3%*	*6.6%*	*100.0%*	
Washington	25,164	4,105	1,709	30,978	98.2%
(percent of total statewide Gas VMT)	*81.2%*	*13.3%*	*5.5%*	*100.0%*	
Total	310,702	34,721	17,029	362,452	96.5%
(percent of total statewide Gas VMT)	*85.7%*	*9.6%*	*4.7%*	*100.0%*	

TABLE 6 Estimated Additional VMT Subject to Mileage-Based Fee.

State	Urban	Mixed	Rural	Total	Percent of Total VMT
Arizona	736	118	64	918	3.5%
(percent of total statewide Non-Gas VMT)	*80.2%*	*12.9%*	*7.0%*	*100.0%*	
California	1,459	81	33	1,573	1.0%
(percent of total statewide Non-Gas VMT)	*92.8%*	*5.1%*	*2.1%*	*100.0%*	
Idaho	127	36	36	199	2.6%
(percent of total statewide Non-Gas VMT)	*63.8%*	*18.1%*	*18.1%*	*100.0%*	
Montana	60	20	58	138	3.1%
(percent of total statewide Non-Gas VMT)	*43.5%*	*14.5%*	*42.0%*	*100.0%*	
Oregon	287	66	36	389	2.4%
(percent of total statewide Non-Gas VMT)	*73.8%*	*17.0%*	*9.3%*	*100.0%*	
Texas	6,502	1,488	726	8,716	7.1%
(percent of total statewide Non-Gas VMT)	*74.6%*	*17.1%*	*8.3%*	*100.0%*	
Utah	403	24	42	469	3.9%
(percent of total statewide Non-Gas VMT)	*85.9%*	*5.1%*	*9.0%*	*100.0%*	
Washington	433	84	37	554	1.8%
(percent of total statewide Non-Gas VMT)	*78.2%*	*15.2%*	*6.7%*	*100.0%*	
Total	**10,012**	**1,918**	**1,033**	**12,963**	**3.5%**
(percent total statewide Non-Gas VMT)	***77.2%***	***14.8%***	***8.0%***	***100.0%***	

TABLE 7 Average Fuel Efficiency for Vehicles Paying Gas Taxes.

State	Urban	Mixed	Rural
Arizona	22.7	22.1	20.9
California	27.0	26.3	25.2
Idaho	21.7	21.2	20.8
Montana	23.8	23.6	22.9
Oregon	21.3	20.3	19.9
Texas	21.6	20.5	19.9
Utah	22.8	21.8	21.1
Washington	22.6	21.5	21.2

TABLE 8 Estimated Daily VMT per Household in Urban, Mixed and Rural Census Tracts.

	Daily VMT Per Household		
State	**Urban**	**Mixed**	**Rural**
Arizona	37.3	45.8	41.4
California	42.1	46.0	39.4
Colorado	41.8	57.7	46.0
Idaho	44.5	52.6	44.8
Montana	41.0	51.6	42.8
Oregon	38.2	42.6	38.6
Texas	47.4	54.1	44.0
Utah	47.7	59.9	52.6
Washington	41.1	46.3	39.7

TABLE 9 Estimated Revenue Neutral Mileage-Based Fees Based on State-Level 2016 Gas Excise Tax Rates.

	Fuel Tax	Mileage-Based Fee
State	**$ Per Gal**	**$ Per Mile**
AZ	0.180	0.0077
CA	0.300	0.0110
ID	0.320	0.0145
MT	0.270	0.0112
OR	0.300	0.0139
TX	0.200	0.0087
UT	0.294	0.0125
WA	0.445	0.0195

TABLE 10 Reduction in Average Costs Under a Mileage-Based Fee for Households in Urban, Mixed and Rural Census Tracts by State.

State	Urban	Mixed	Rural
AZ	-0.7%	1.7%	6.1%
CA	-0.3%	2.4%	6.3%
ID	-1.0%	0.9%	3.1%
MT	-1.4%	-0.4%	1.9%
OR	-1.0%	2.9%	4.8%
TX	-0.5%	1.6%	3.1%
UT	-0.6%	3.4%	5.5%
WA	-1.0%	3.6%	4.8%

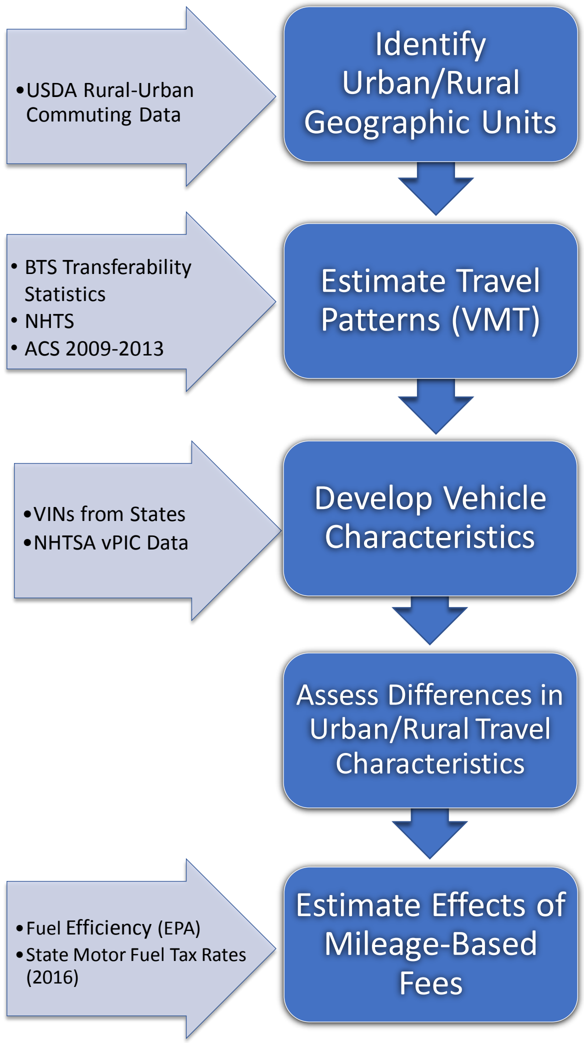

FIGURE 1 Study Flow Diagram.

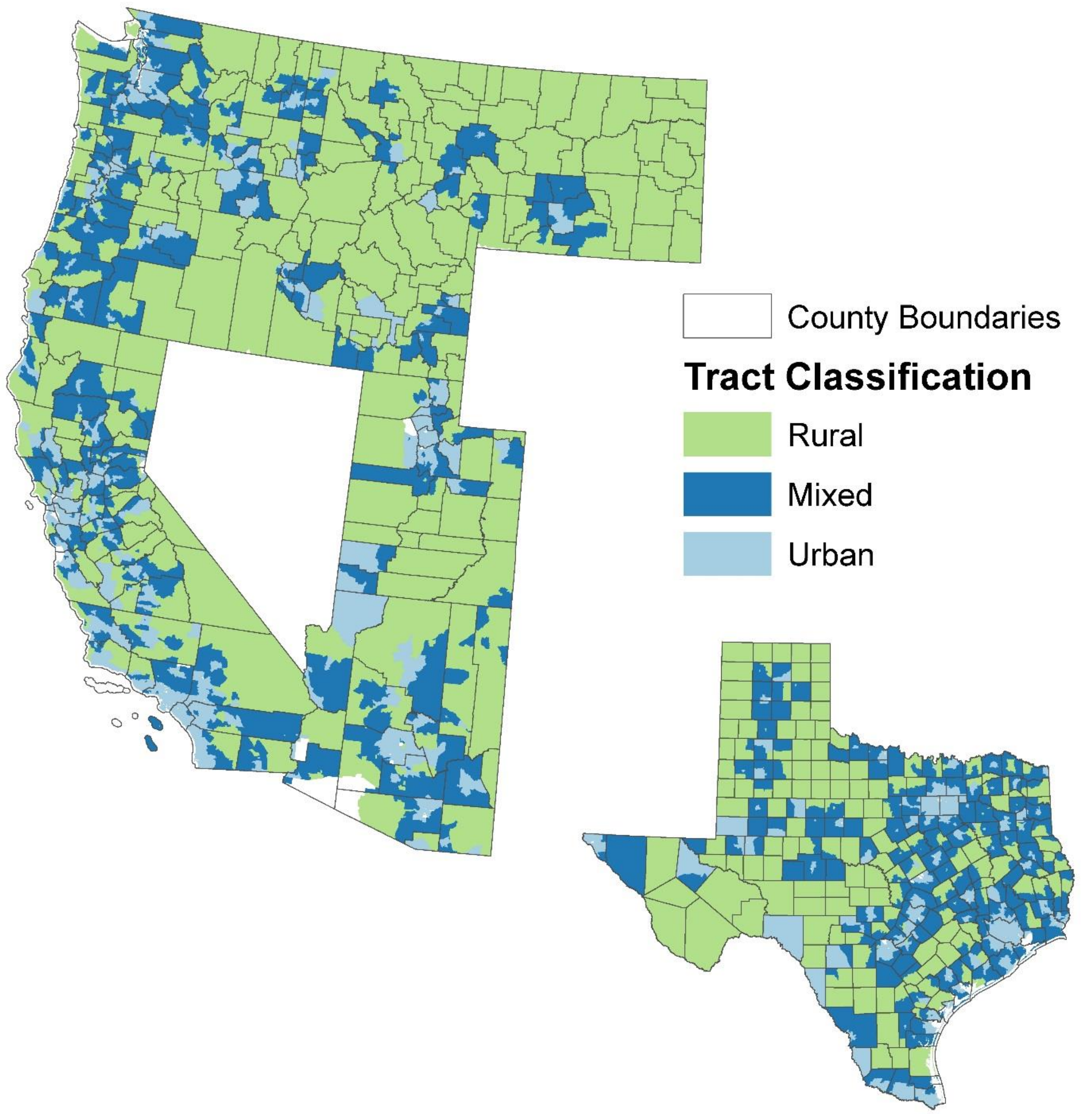

FIGURE 2 Urban/Mixed/Rural Classifications by Census Tract.

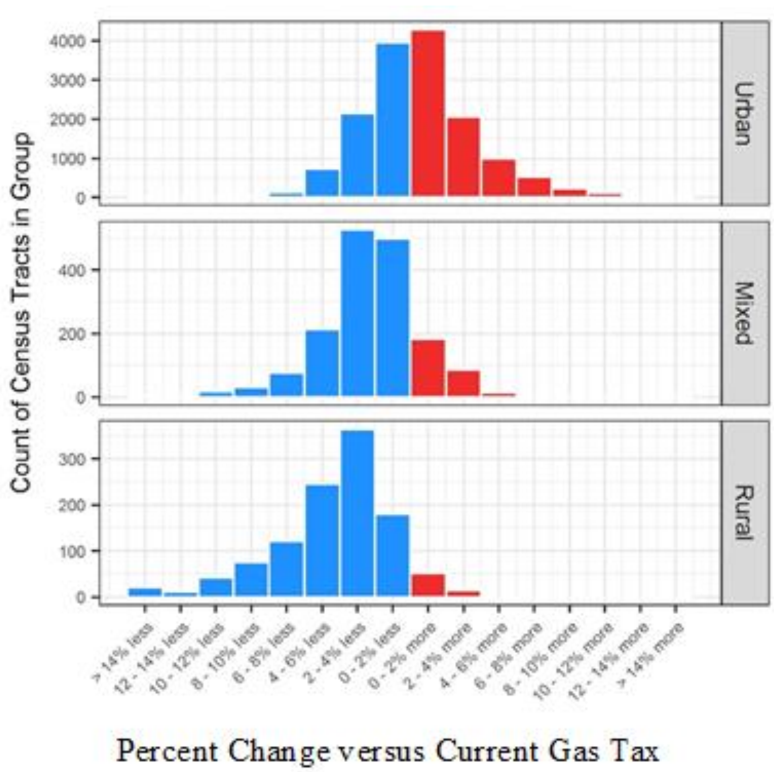

FIGURE 3 Distribution of Effects of a Mileage-Based Fee on Households in Urban, Mixed and Rural Census Tracts.