

TRANSPORT FINDINGS

Does Policy Knowledge Affect Public Support for Gas Tax Alternatives? A Case Study in Northern New England

Clare Nelson¹, Gregory Rowangould¹¹ Civil & Environmental Engineering, University of Vermont

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Findings

Public opinion research finds that support for changes in motor fuels taxes or the “gas tax” is low in the United States. Prior research also finds that respondents who have less information about policy questions they are polled on are likely to provide more random and unreliable responses. We find that inaccurate and low levels of information are strongly tied to public opinions about gas tax alternatives. By addressing knowledge gaps using an informed choice questionnaire, we find support for replacing state gas taxes with either a mileage fee or a flat fee shifts substantially. Specifically, support for a mileage fee increased while support for a flat fee decreased.

1. QUESTIONS

Vermont is considering mileage fees to supplement declining state motor fuels tax or “gas tax” revenue, but public support for gas tax alternatives in the United States (U.S.) is low (Agrawal, Nixon, and San Jose State University. College of Business. Mineta Transportation Institute 2024; Agrawal and Nixon 2017, 2022, 2024; Duncan, Li, and Graham 2020; Duncan, Nadella, Clark, et al. 2017; Duncan, Nadella, Giroux, et al. 2017). Surveys and pilot programs find mileage fee opposition frequently stems from perceptions of higher costs, privacy concerns, and inequities for rural and low-income drivers (Agrawal, Nixon, and San Jose State University. College of Business. Mineta Transportation Institute 2024; CDOT and FHWA 2017; Duncan et al. 2014; Duncan, Nadella, Clark, et al. 2017; Duncan, Nadella, Giroux, et al. 2017; Hanley and Kuhl 2011; HDOT 2022; NAS 2016; Whitty and Imholt 2005). However, the public is typically ill-informed about policies they’re polled on (Gastil, Reedy, and Wells 2007; Page and Shapiro 1992), and less-informed respondents tend to answer more randomly than the well-informed (S. Althaus 1996; S. L. Althaus 1998; Axsen, Kurani, and Sovacool 2023; van Knippenberg and Daamen 1996). Research and policy advice based on survey data from ill-informed respondents is therefore less reliable (Banerjee et al. 2011; Kuklinski and Quirk 2000; Morwitz and Pluzinski 1996; Neijens 1987; Neijens, De Ridder, and Saris 1992; Price and Neijens 1997).

Prior mileage fee studies have not evaluated their study participant’s prior knowledge about transportation finance, and mileage fees in particular. We hypothesize the public lacks sufficient policy information to make informed choices and by addressing these knowledge gaps the apparent support for

mileage fees may be different than previously reported. Using a case study in three Northern New England states of the U.S., we examine the extent to which public policy support for gas tax alternatives shifts after the public engages with policy-relevant information in a unique informed choice questionnaire.

2. METHODS

We designed an internet-based survey questionnaire to assess public support for both a revenue neutral flat fee and mileage fee to replace state gas taxes in the U.S. states of Vermont, New Hampshire, and Maine. Policy support was determined using ballot-style voting opportunities with two educational treatments provided between votes. The questionnaire flowed as follows (see **Supplementary Material A** for the full questionnaire and **Supplementary Material E** for the survey method):

1. Vote 1 (Control Vote): Two ballot items, each asking respondents to vote “Yes” or “No” to replace their state gas tax with a) a \$220 flat fee per vehicle per year and b) a \$0.02 per mile travelled fee.
2. Cost Education: Personal estimates of respondent annual costs for a) state gas taxes, b) a \$220 flat fee per vehicle and c) a \$0.02 per mile travelled fee based on self-reported annual mileage and vehicle fuel economy information.
3. Vote 2: Identical to Vote 1
4. Policy Knowledge and Perceptions: Questions about perceptions of mileage fee costs and fairness and state gas tax knowledge.
5. Policy Education: Educational videos, created by the researchers, discussing the pros and cons of gas taxes and mileage fees (see **Supplementary Material B**).
6. Vote 3: Identical to Votes 1 and 2

The survey was fielded using quota-based sampling to proportionally match the socioeconomic characteristics of the study region between May 6th and June 3rd of 2022 for a final sample size of 658 responses. We compared the responses to state-level population data from the 2020 ACS 5-Year Survey and determined the sample is closely representative of the study area population.

We then assessed the extent to which the educational treatments shifted policy support using regression modelling (see **Supplementary Material C** for full model descriptions). A fixed-effects model evaluated whether our educational treatments significantly shifted respondent support for either of the gas tax alternatives. A multinomial logistic regression model evaluated possible associations between attitudinal, socioeconomic and travel-related factors with the likelihood of a respondent changing their support. All

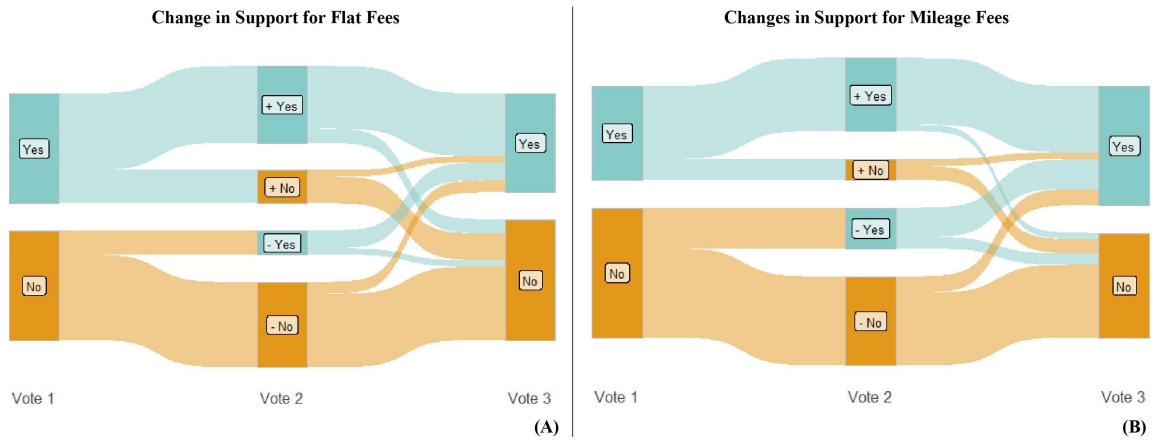


Figure 1. Shifts in Support for Gas Tax Alternatives Before and After Education. A) Support for replacing the gas tax with a \$220 flat fee, and B) Support for replacing the gas tax with a \$0.02 per mile travelled fee.

independent variables were taken directly from survey questions except for attitudinal variables, which were developed using principal-axis factor analysis from a series of Likert-scale attitudinal statements (see **Supplementary Material D**).

3. FINDINGS

We find respondents in our study were generally misinformed about the gas tax. 55% of respondents incorrectly believed the gas tax was a sales tax, rather than an excise tax; 50% incorrectly believed their state gas tax was increased within the last year; and 57% did not know what gas tax revenues are used for.

After engaging with policy-relevant education, policy support shifted substantially ([Figure 1](#)). Between the first and third vote, 34% of respondents changed their vote, with an 11% increase in support for mileage fees and a 4% decrease in support for flat fees.

The fixed effects models find these policy support changes were statistically significant ([Table 2](#)). Relative to a respondent's first vote, the odds of supporting a mileage fee increase by more than 4 times while the odds of supporting a flat fee are cut in half after both the policy and cost education. Since we did not randomize the order of the educational treatments, we cannot state the independent effect of the policy education.

Several factors are associated with the effect of education on changes in policy support. Relative to those who did not change their vote ([Table 3](#)), we find support for flat fees is more likely to increase after both the policy and cost education amongst those who drove more (higher annual VMT), those who felt a mileage fee would be unfair to low-income households, and those with lower educational attainment. Support for flat fees is more likely to decrease after both the policy and cost education amongst households

TABLE 2. Fixed Effects Model: Impact of Education on Individual Changes in Support for Gas Tax Alternatives

<i>Predictors</i>	Mileage Fees			Flat Fees		
	<i>Odds Ratios</i>	<i>St. Error</i>	<i>p</i>	<i>Odds Ratios</i>	<i>St. Error</i>	<i>p</i>
Vote 2 (Cost Education)	3.10	0.66	<0.001	0.60	0.12	0.012
Vote 3 (Cost and Policy Education)	4.27	0.93	<0.001	0.53	0.11	0.002
N _{Respondent} [*]	222			223		
R ² _{adj} ^{**}	0.142			0.096		

* Number of respondents who changed their vote at some point across the survey

** $R^2_{adj} = 1 - [(Residual\ Deviance - K) / (Null\ Deviance)]$ where K is the number of additional parameters relative to the null model (Long 1997)

with more children, those who found out they would lose money with a flat fee, and those who were less resistant to change. Support for mileage fees increases after education amongst respondents who drove less and had higher incomes, while support decreases amongst those who drove more and had lower incomes. Notably, perceptions of mileage fee fairness are not statistically significant predictors of mileage fee support post-education.

Overall, we find lacking, or incorrect policy knowledge affects the reliability of public opinion research on mileage fees and that simple education experiences can address these knowledge gaps, providing more credible information to policy makers and researchers alike.

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TABLE 3. Multinomial Logit Model: Factors Affecting Changes in Support for Gas Tax Alternatives after Education

	Flat Fees				Mileage Fees			
	No:Yes		Yes:No		No:Yes		Yes:No	
Predictors	Odds Ratios	St. Error	Odds Ratios	St. Error	Odds Ratios	St. Error	Odds Ratios	St. Error
(Intercept)	0.06**	0.07	0.43	0.39	0.79	0.69	0.20	0.24
SOCIO-DEMOGRAPHICS								
Income (standardized)	0.40	0.25	0.46	0.24	0.43*	0.22	0.46	0.32
Reference: Employed								
Retired	0.81	0.43	1.23	0.48	0.78	0.30	1.26	0.71
Unemployed	0.98	0.34	1.08	0.40	0.58*	0.18	1.15	0.52
Reference: White								
Hispanic/Latino/Spanish	0.57	0.34	0.33*	0.21	0.27**	0.17	0.29	0.23
Other Race	0.97	0.47	0.80	0.37	1.32	0.52	0.92	0.49
Reference: Male								
Female	2.32***	0.72	0.92	0.23	2.10***	0.52	1.02	0.35
Other Gender	1.65	1.08	1.65	0.80	2.31*	1.16	2.22	1.36
Reference: Some college education								
Completed higher education	1.46	0.58	1.24	0.40	0.61*	0.18	0.83	0.36
Some High school	2.94***	1.21	1.23	0.46	1.02	0.33	0.94	0.46
Age [yrs]	0.98*	0.01	1.01	0.01	1.00	0.01	1.00	0.01
Children	0.79	0.13	1.43***	0.17	0.83	0.11	0.99	0.16
Household Size	1.00	0.18	1.20	0.18	1.11	0.16	1.06	0.22
ATTITUDES								
Level of Altruism	0.78*	0.12	1.16	0.17	1.14	0.15	1.39*	0.26
Resistance to Change	1.07	0.17	0.80*	0.11	1.01	0.13	1.20	0.21
Vehicle Dependence	0.97	0.15	0.97	0.13	0.97	0.13	0.76	0.13
Reference: Neutral or fair opinion								
Believe MF is unfair for rural	0.89	0.12	0.94	0.11	0.89	0.10	0.96	0.15
Believe MF is unfair to low income	1.29*	0.17	0.98	0.11	1.00	0.11	0.91	0.13
Reference: Not important								
Future funding is important	0.89	0.11	0.84*	0.08	1.08	0.11	0.89	0.12
Privacy is important	1.14	0.15	1.06	0.13	0.93	0.10	1.07	0.17
Cost is important	1.05	0.15	0.89	0.11	0.88	0.10	1.08	0.18
COMMUNITY AND TRAVEL								
Annual Vehicle Miles Travelled (standardized)	3.92*	2.89	1.14	0.94	0.33**	0.19	3.13*	1.88
Reference: Does not drive electric/hybrid vehicle								
Drives electric/hybrid vehicle	0.44	0.49	0.35	0.24	0.54	0.43	0.93	0.66
Reference: Urban Core								
High Commuting	1.63	0.53	0.99	0.28	1.18	0.33	1.21	0.43
Rural	1.18	0.39	0.86	0.24	1.08	0.28	0.53	0.22
COST								
Reference: Losing money with the policy								
Saving money with the policy	1.40	0.55	0.36**	0.14	1.07	0.27	0.51	0.22
Observations	590				590			
R ² Tjur / R ² adjusted	0.120 / 0.118				0.083 / 0.081			

* p-value less than 0.10, ** p-value less than 0.05, *** p-value less than 0.01



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SUPPLEMENTARY MATERIALS

Supplemental Material A

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