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Ideology, Incidence and the Political Economy of Fuel Taxes: Evidence from California 2018 Proposition 6

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A Research Report from the National Center for Sustainable Transportation

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16. Abstract
In 2018, California voters rejected Proposition 6, a ballot initiative that sought to repeal state gasoline taxes and vehicle fees enacted as part of the 2017 Road Repair and Accountability Act. This paper examines the relationship between support for the proposition, political ideology and the economic burdens imposed by the Act. For every hundred dollars of annual per-household costs imposed by the Road Repair and Accountability Act, support for proposition rose by 3–5 percentage points, roughly comparable to a commensurate increase in the share of "liberal" voters. Notably, the relationship between voting and the economic burden of the policy is seven times strong in the most conservative tracts relative to the most liberal tracts. This heterogeneity has important implications for the popular support for environmental taxes, as conservative areas in California and elsewhere tend to bear a higher burden from transportation and energy taxes than liberal areas.

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Ideology, Incidence and the Political Economy of Fuel Taxes: Evidence from California 2018 Proposition 6

EXECUTIVE SUMMARY

Economists argue for setting taxes so that energy prices equal to their marginal social cost, yet real-world pricing often falls short. In the U.S., energy and transportation taxes commonly miss the mark, either overshooting in regulated sectors like electricity or, more frequently, undershooting in areas like fuel taxation. In many settings, these discrepancies are attributed to distributional concerns and the perceived unfair burden such taxes could place on lower-income groups. This paper explores an alternative explanation: the complexities of achieving popular support for transportation taxes, a crucial factor in the broader acceptance and implementation of energy taxes.

Our investigation focuses on California's 2018 Proposition 6, which proposed repealing the fuel tax increases and vehicle fees set as part of the Road Repair and Accountability Act of 2017, and requiring future increases to undergo voter approval. Despite its defeat, the polling close to the election and the narrow 56% opposition to the Proposition highlight the contentious nature of transportation taxes. This case study serves as a lens to explore the dynamics of voter support and opposition to such fiscal measures.

By analyzing the Proposition 6 vote, we reveal patterns that shed light on the political economy surrounding transportation taxes. Our findings show a clear division: areas with more conservative leanings and higher economic burdens from the tax were more likely to support its repeal. Conversely, more liberal areas and those less economically impacted opposed the repeal. This polarization suggests that ideological and economic factors significantly influence public support for environmental taxes.

Our research further explores how reactions to the economic impact of transportation taxes vary across different demographics and political ideologies. Notably, the voting in conservative communities displayed a much higher sensitivity to the economic costs of such taxes compared to their liberal counterparts. This pattern underscores the significant role of political ideology in shaping public response to policy measures, particularly those related to energy and transportation.

The study highlights a critical challenge for policymakers: the burden of transportation and energy taxes fall more heavily on conservative and rural communities, due to difference in travel patterns, vehicle ownership and access to public transit. If these voters are also more sensitive to transportation and energy taxes when they reach the ballot box, energy and transportation taxes face an additional “headwind” when facing voters.

Our analysis contributes to a deeper understanding of the factors driving public support for, or opposition to, transportation taxes. Consideration of the political dynamics of support for transportation taxes is important as the U.S. transitions away from fuel excise taxes to

alternative infrastructure funding methods. Whether alternative transportation taxes enjoy popular support will help policymakers navigate the fiscal transition, as the vehicle market continues to shift away from conventional vehicles.

Introduction

Economists have long extolled the importance of setting the price of energy equal to marginal social cost. Yet, actual energy prices and taxes rarely align with Pigouvian ideals. Although, in some circumstances such as regulated electricity rates, prices exceed marginal social cost (Borenstein and Bushnell (2022)), most transportation and energy taxes in the U.S. are set below the socially-optimal levels (Parry and Small (2005)). While distributional considerations and the perceived regressivity of energy and transportation taxes are often cited as a rationale for taxes set below Pigouvian level[1], in this paper, we explore how popular support for or against transportation taxes may make adherence to the Pigouvian ideal difficult. Extending back to the time of the first oil embargo (Knittel (2014)), stated-preference surveys document the widespread popular opposition to gasoline tax increases relative to other policy approaches (e.g., fuel rationing or taxes on "gas guzzlers") as a path to reduce fuel consumption.

In this paper, we offer revealed-preference evidence on popular support for transportation taxes by studying the 2018 popular vote on California Proposition 6, the "Voter Approval for Future Gas and Vehicle Taxes and 2017 Tax Repeal Initiative." If approved by voters, the proposition would have had two immediate, tangible impacts on fuel tax policy in California. Proposition 6 would have rolled back the tax and fee provisions of the Road Repair and Accountability Act of 2017 (RRAA), the first major fuel tax and vehicle fee increase in California since more than two decades. At the time of passage, the California Department of Revenue projected the RRAA would raise over $5 billion per year, through increased fuel tax, registration fees, and a new annual road use charge for electric vehicles. In addition, it would have required a successful ballot proposition to approve any future state-wide fuel or transportation tax increase, extension or introduction. Despite opposition to Proposition 6 from prominent Democrats, polling on the Proposition remained close up to election day. However, the ballot initiative was ultimately defeated 56.8 to 43.2 percent.

We explore how support for transportation taxes and fees, measured as the fraction of voters opposed to Proposition 6, correlates with local ideological preferences and the economic burden imposed by the RRAA at the census tract level. We measure ideological preferences in a community by studying votes on other partisan propositions. We calculate household burden imposed by the RRAA at the census tract level economic burdens using detailed data on vehicle ownership and household travel patterns. Our analysis makes four contributions to the understanding of political economy of energy and transportation taxes.

First, we begin by regressing opposition to Proposition 6 on the economic burdens of the policy, the political preferences of the local community and a rich set of demographic covariates. We

[1] Although Poterba (1991) notes that gasoline taxes are less regressive when evaluated relative to household expenditures, regressivity remains a prominent concern (Chernick and Reschovsky (1997)), especially as high-income households increasingly adopt electric vehicles (Davis and Sallee (2020), Glaeser et al. (2023)). Counterintuitively, such considerations have also justified regulated per-unit prices that exceed marginal cost in circumstances where regulators view consumption as a proxy for household income, such as electricity (Borenstein (2012)), natural gas (Borenstein and Davis (2012)) and water (Porcher (2014)).

find that ideological preferences and economic incidence are correlated with support for environmental taxes, which in our setting is reflected in opposition to Proposition 6. More conservative areas and areas where the RRAA imposed higher costs (as a result of greater gasoline consumption, higher amounts of travel, or a different mix of vehicles) were more likely to vote in favor of repealing gasoline taxes than more liberal areas and areas where the economic costs imposed by the RRAA were lower. The effects are economically significant—for every one hundred dollars of annual per-household imposed costs, we estimate that support for the proposition rose by 3–5 percentage points.

Here, our results complement two related literatures, a long one on transportation taxes that relies on stated-preference survey data to evaluate support for transportation taxes (e.g., Agrawal et al. (2010), Kallbekken et al. (2013), Kaplowitz and McCright (2015), and Nixon and Agrawal (2019)) and a more recent one that uses popular votes to infer voter preferences. With regard to the former, we show that the conclusion, that economic and ideological considerations matter, map into actual behavior for the most politically-engaged part of the population. With regard to the latter, our estimates contribute to a set of papers that unpack the importance of economic and ideological factors using votes on propositions and referenda to infer voter preferences. While the majority of this literature exploits trade and economic shocks to examine preferences for redistributive policy (see e.g., Brunner et al. (2011), Dippel et al. (2015), Dorn et al. (2020)) or the valuation of public goods (e.g., Burkhardt and Chan (2017)), our paper relates most closely to Anderson et al. (2019) and Chan and Sayre (2023), both which study the failed carbon tax ballot initiatives in Washington State in 2016 and 2018. Here, our findings, that both ideological and economic considerations were correlated with voting for Proposition 6, mirror the findings of Anderson et al. (2019) and Chan and Sayre (2023), albeit in a different setting for a different type of tax.

Second, we explore how heterogeneity in the response to economic burdens varies by demographics and political ideology. Although the response to the economic burden of the RRAA is uncorrelated with income, education or race, we find a strong, monotonic relationship between the magnitude of the response to the economic burden of the tax and the political ideology of a community. Voting in the most conservative census tracts in California is roughly seven times more responsive to the economic burden imposed by the RRAA than voting in the most liberal census tracts. Our results echo those of Dorn et al. (2020) and Dippel et al. (2015) that find the response to economic considerations elicited the strongest effects on voting and political attitudes amongst conservative voters. Yet, our results also provide a counterpoint to Chan and Sayre (2023) that found evidence that economic considerations most strongly correlate with voting patterns on the failed carbon tax ballot initiatives in the most liberal areas in Washington state, suggesting that unique features of each initiative may play an important role.

Third, we show how heterogeneity in the response to economic burdens may have implications for popular support for transportation and energy taxes. In California (as well as many other parts of the country), residents in conservative regions tend to travel more, drive vehicles with lower fuel economy, are more likely to drive an SUV or truck, are less likely to drive an electric

vehicle and are less likely to use alternative forms of transportation.[2] Consequently, gasoline consumption on a per-capita basis in conservative regions tends to be higher than in more liberal areas. Similar patterns exist in household energy consumption—households in more conservative regions of the country spend a higher fraction of their disposable income on energy products and utilities. As a result, the burden imposed by energy or transportation taxes tends to fall more heavily on conservative and rural locations, areas for which our results suggest voting is most responsive to the economic considerations. Since energy and transportation taxes impose greater costs on voters who respond most strongly, aggregate popular support for transportation and energy taxes may face additional "headwinds." This intuition parallels that for Ramsey taxation, although in this setting, the tax falls more heavily on the most responsive consumers reducing aggregate support (rather than being levied more heavily on the least elastic goods to maximize welfare).

Fourth, we illustrate how the correlation between the economic burdens of taxes and heterogeneity in the response to those burdens impacts willingness-to-pay calculations for policy for the median voter. Traditionally, these calculations scale the support or opposition to a policy by extent to which economic burdens (or benefits) impact support for the policy. In essence, the calculation provides an estimate of the additional costs or benefits required to make the median voter in a location indifferent between supporting or opposing the policy. Yet, when the responsiveness to economic burdens is positively correlated with the burdens themselves, a naive estimate that does not account for heterogeneity systematically overstates willingness-to-pay in high-burden locations and understates willingness-to-pay in low-burden locations. In our setting, a naive estimate overstates the benefits that would be required to make conservative areas to be indifferent to higher transportation taxes and understates the amount by which liberal areas would be willing-to-pay to keep transportation taxes in place.

Our findings have important implications for the ongoing policy debate about how to finance future road infrastructure in the U.S. Fuel prices are amongst the most salient in the economy and fuel taxes receive disproportional media treatment relative to commensurate increases arising from oil prices (Li et al. (2014)).[3] Yet, despite this and legislative support at the state-level that reflects popular opposition to gasoline taxes,[4] per-gallon fuel taxes have been the central source of infrastructure funding in the U.S. With the shift towards vehicle electrification and the attendant decline in revenue from fuel taxes, policy makers are actively considering how to transition towards other methods of infrastructure funding as the fuel tax base

[2] See, e.g., Sexton and Sexton (2014), Filippini and Wekhof (2021), and Archsmith et al. (2022)

[3] In contrast, the infrastructure investments, funded through a combination of state and federal transportation taxes and allocations from state and federal general funds, may be less tangible than the taxes paid every time a driver fuels at the pump.

[4] Past literature finds that gasoline taxes are negative correlated with lagged state gasoline pre-tax prices (Goel and Nelson (1999)) and lagged state gasoline consumption (Hammar et al. (2004)), suggesting that politicians may be reticent to increase taxes at times and in areas where household fuel consumption costs are greater. Likewise, Decker and Wohar (2007) finds a negative correlation between the lagged employment in the trucking industry and diesel taxes.

declines[5] and fuel-based excise taxes grow increasingly regressive (Glaeser et al. (2023)). The political feasibility of changes to the gasoline tax or other methods of funding, such as road-user charges or mileage-based taxes, will be central to that debate and to the long-term prospects for maintaining earmarked funding for infrastructure as the transportation mix shifts away from petroleum-based fuels.

Our findings have important implications for the ongoing policy debate about how to finance future road infrastructure in the U.S. For the past century, per-gallon fuel taxes have been the central source of infrastructure funding in the U.S. With the shift towards vehicle electrification and the attendant decline in revenue from fuel taxes, policy makers are actively considering how to transition towards other methods of infrastructure funding as the fuel tax base declines[6] and fuel-based excise taxes grow increasingly regressive (Glaeser et al. (2023)). The political feasibility of changes to the gasoline tax or other methods of funding, such as road-user charges or mileage-based taxes, will be central to that debate and to the long-term prospects for maintaining earmarked funding for infrastructure as the transportation mix shifts away from petroleum-based fuels.

Background and History of Proposition 6

Ballot initiatives and referenda (collectively "propositions") are forms of direct democracy where citizens vote directly upon policy, on laws passed by the legislature or on constitutional amendments. California is one of 18 states that allow voters to amend the state constitution by ballot initiative, and one of 26 states that allow voters to mandate new statutes (initiatives) or repeal laws previously enacted by the legislature (referenda). In California, ballot propositions require supporters to collect signatures from registered voters equal to 8% of the people who participated in the previous election (roughly 585,000 signatures). Ballot propositions cannot be reversed by the legislature after being approved by the electorate, but rather can only be reversed through a subsequent ballot proposition.

In this paper, we study Proposition 6 on the 2018 general election ballot. Proposition 6 was a voter-sponsored ballot proposition that sought to amend the California constitution in response to the Road Repair and Accountability Act of 2017 ("RRAA"), also known informally as Senate Bill 1. The RRAA, passed by the state legislature in a party-line vote and signed into law on April 28, 2017, allocated $54 billion to infrastructure investments over a decade. The RRAA financed the investment through three transportation fees. First, the RRAA raised gasoline and diesel excise tax rates by $0.12 and $0.20 per gallon on November 1, 2017, with built-in CPI adjustments beginning in 2020. The excise taxes applied to petroleum-based and green fuels (e.g., biodiesel and ethanol). Second, the RRAA introduced a new Transportation Improvement

[5] https://www.nytimes.com/2015/01/03/business/energy-environment/support-for-gas-tax-increase-still-nil-despite-falling-prices.html, https://www.forbes.com/sites/jamesmorris/2022/02/12/electric-vehicles-will-need-new-taxation-or-governments-will-lose-billions/?sh=5654846527ed

[6] https://www.nytimes.com/2015/01/03/business/energy-environment/support-for-gas-tax-increase-still-nil-despite-falling-prices.html, https://www.forbes.com/sites/jamesmorris/2022/02/12/electric-vehicles-will-need-new-taxation-or-governments-will-lose-billions/?sh=5654846527ed

Fee ("TIF") levied annually when drivers register their vehicles. The fee scaled with vehicle value, from $25 per year for vehicles worth less than $5,000 to $175 per year for vehicles worth more than $60,000. Like the excise taxes, the RRAA indexed the TIF to CPI so that it increased over time. Finally, the RRAA also levied a new, annual $100 road-use fee for electric vehicles beginning in 2020, supplemental to any TIF levied on the electric vehicle. At the time of passage, the California Legislative Analyst's Office forecasted tax revenues from the three fees at $5.2 billion per year, of which the bill allocated roughly $1.9 billion to highway infrastructure projects, $1.8 billion to local infrastructure projects, $0.8 billion to transit programs and the remainder to active transportation, enforcement, urban planning and research initiatives.[7] The California Department of Finance estimated that the fees levied by the RRAA would impose direct costs of roughly $10 per month for the average driver.[8]

The goal of Proposition 6 was two-fold: to repeal fuel tax increases and vehicle fees that were enacted in 2017, including those associated with the Road Repair and Accountability Act of 2017 (RRAA) and to amend the state constitution to require voter approval (via ballot propositions) for any imposition, increase or extension of fuel taxes or vehicle fees in the future. If passed, Proposition 6 would have immediately reduced gasoline and diesel excise taxes by $0.12 and $0.20 per gallon respectively, eliminated the Transportation Improvement Fees associated with vehicle registration, and prevented the introduction of the electric vehicle road-use fee.

Prominent state and national Republicans expressed support for the proposition, including U.S. House Speaker Paul Ryan, (then) California House Majority Leader Kevin McCarthy, California Representatives Doug LaMalfa, Devin Nunes, Ken Calvert and Mimi Walters, and Republican gubernatorial candidate John Cox, as did the California Republican Party. Proponents framed the vote on Proposition 6 as a vote on high gasoline excise taxes, with the ballot committee "Yes on Prop 6, Repeal the Gas Tax" leading the petition campaign to place Proposition 6 on the ballot.[9] Backers argued that excise taxes contribute to California's gasoline prices being amongst the highest in the contiguous U.S., with the price of regular-grade gasoline averaging $3.48 per gallon in 2018 relative to a nationwide average of $2.72 per gallon. Quoting the argument offered in support of Proposition 6 in the 2018 Official California Voter Information Guide:

> "Prop. 6 does two things. It repeals the massive increase in gas, diesel and car taxes imposed by the Legislature just last year. Second, it requires voter approval for any future attempt by the Legislature to do it again. That's it." - John Cox, Delores Chavez, and Peggi Buff[10]

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[7] https://www.lao.ca.gov/reports/2017/3688/2017-transportation-package-060817.pdf
[8] http://rebuildingca.ca.gov/faqs
[9] https://ballotpedia.org/California_Proposition_6,_Voter_Approval_for_Future_Gas_and_Vehicle_Taxes_and_2017_Tax_Repeal_Initiative_(2018)
[10] California Secretary of State, "Official Voter Information Guide November 2018." pg 42.

Opponents of Proposition 6 included prominent Democrats (including Governor Jerry Brown, Democratic gubernatorial candidate Gavin Newsom, and mayor of Los Angeles Eric Garcetti), industry and trade organizations, labor unions, the California Chamber of Commerce and the California Democratic Party. Opponents emphasized the need to fund aging infrastructure, the passage of which would undermine road quality and transportation safety.

> ”I can’t believe the proponents of this ballot measure really want Californians to keep driving on lousy roads and dangerous bridges. Taking billions of dollars a year from road maintenance and repair borders on insanity.” - Governor Jerry Brown[11]

Opponents of the proposition out-raised supporters roughly ten-to-one, spending $46 million to defeat Proposition 6 relative to roughly $5 million dollars in support.[12] Yet, despite the funding gap and strong opposition by labor and industry groups, the outcome of Proposition 6 was uncertain near to the election. During the week of October 14, 2018, the Public Policy Institute of California polled support for the Proposition 6 at 41%, while a Survey USA poll estimated 58% support. Online prediction markets estimated the probability that Proposition 6 would pass at roughly one-third a few days before the vote.[13] Ultimately, the electorate voted down Proposition 6 with 57% of voters opposed, leaving the fuel taxes and vehicle fees of the RRAA intact.

Data

We combine publicly available voting data, demographic data from the census, and data on vehicle ownership and travel intensity at the census-tract-level to examine how electoral support or opposition to Proposition 6, and by extension, transportation taxes and fees, correlates with ideological beliefs and economic considerations.[14] Table 1 presents the tract-level summary statistics for a subset of voting, ideological, economic and demographic variables.

We obtain data on voting and electoral registration in the 2018 general election from the Statewide Database maintained at University of California, Berkeley.[15] There are over 20,000 voting precincts in California, but due to the availability of demographic and vehicle ownership data, we aggregate voting data from the precinct-level to the 8,057 census-tracts in California. To do so, we use the crosswalk provided by the Statewide Database that maps the fraction of

[11] The Sacramento Bee, ”Gas tax repeal would strip California lawmakers’ ability to pass increases,” September 14, 2017

[12] https://ballotpedia.org/California_Proposition_6,_Voter_Approval_for_Future_Gas_and_Vehicle_Taxes_and_2017_Tax_Repeal_Initiative_(2018)

[13] https://www.predictit.org/markets/detail/5000/Will-California-voters-approve-gas-tax-repeal-ballot-initiative-in-2018.

[14] All publicly-available data and the code used for the analysis is available at the online repository: https://www.openicpsr.org/openicpsr/project/198176/view

[15] https://statewidedatabase.org

each precinct attributable to each overlapping census tract.[16] Our dependent variable is the share of votes in opposition to Proposition 6. For ease of interpretation, we focus on "support" the RRAA and opposition to Proposition 6 as our primary outcome variable. We also use the voting data to construct several proxies for the political preferences of each census tract. We calculate our primary proxy for the ideological preferences from voters' support for other ballot propositions in 2018. Following Anderson et al. (2019), we use principal component analysis and use the first component of voting on the other ten ballot propositions[17] as an index for the ideological preferences of a community.[18] The first component explains 71 percent of the variation in voting across the other ten ballot propositions. We scale the first component to a zero to one range, where higher numbers corresponding to greater support for the "liberal" position on ballot propositions. As alternatives, we construct three other measures of ideology: (1) average support for the "liberal" position on other partisan propositions[19], (2) the fraction of registered voters who chose to self-identify as a members of the Democratic or Green parties, and (3) the fraction of voters supporting the 2018 Democratic gubernatorial candidate, Gavin Newsom. All of the measures are highly correlated—the correlation between our preferred index and the three alternative measures of ideology are 0.994, 0.897 and 0.956, respectively.[20] Turnout for the 2018 midterm election was exceptional, driven by the contentious elections for the U.S. Congress. State-wide, 64.5% of voters cast a ballot in the 2018 California midterm elections, the highest turnout for a midterm election in 36 years. Virtually all of these voters cast a vote on Proposition 6—only 4% of voters who cast a ballot in the election abstained from voting on Proposition 6.

The RRAA imposes two types of fees on households: a per-gallon excise tax on gasoline and a registration fee inclusive of the electric vehicle road-use tax. The costs of the RRAA (and the economic incentive to support Proposition 6) consequently depend on gasoline consumption and the mix of vehicles owned within each census tract.[21] We merge four datasets to construct a measure of the economic incidence of the RRAA. Data purchased from Experian reports the make-model-model-year of all vehicles purchased from the fourth quarter of 2017 to the third quarter of 2018 at the census tract level. We merge this with data from the DataOne VIN decoder to obtain vehicle characteristics including fuel type and gas mileage (at the make-

[16] Formally, the SWDB crosswalk calculates the percentage overlap at the census-block level, described in https://statewidedatabase.org/info/metadata/disaggregation_of_prec_to_block.pdf

[17] See online appendix table A1 for a description of propositions on the 2018 general election ballot.

[18] Although there were twelve ballot propositions, Proposition 9, an initiative to split California into three separate states, was ruled unconstitutional by the California Supreme Court and removed from the ballot.

[19] We exclude three ballot propositions from this calculation. We exclude Propositions 3 and 7, both of which lacked a clear liberal / conservative position, and Proposition 11 for which the wording of the proposition was unclear.

[20] Online Appendix Figure A1 presents scatter plots of our preference measure of ideological preferences against our three alternative measures of ideological preferences. We find that the choice of variable makes little qualitative difference to our results.

[21] As discussed above, the RRAA also increased diesel excise taxes. Although diesel taxes paid to transport goods might, plausibly, be partially borne by consumers in the form of higher prices of goods and services, we omit these costs from the calculation of the economic incidence of the RRAA.

model-model-year level), from which we construct the fuel-economy distribution of newly-owned vehicles in each census-tract. The California Department of Motor Vehicles reports the share of electric vehicles registered as a fraction of the total light-duty fleet in 2018. Finally, the Bureau of Transportation Statistics provides tract-level estimates of mean daily vehicle miles traveled at the household level.

We construct an estimate of the additional excise taxes imposed on the average household in census tract i as the product of the twelve cent per gallon excise tax increase[22] and the annual number of gallons of gasoline consumed for a household driving the average vehicle. Formally,

$$Annual\ Gas\ Tax\ Burden = 0.12 * (1 - EV_i) * \frac{VMT_i}{MPG_i} * 365 \quad (1)$$

where EV_i is the share of electric vehicles, VMT_i is the estimate of daily vehicle miles traveled from the Bureau of Transportation Statistics, and MPG_i is the average fuel economy of gasoline-powered vehicles.[23] Importantly, our data provide a high degree of geographic variation based on the observable characteristics of vehicle ownership and travel patterns at the census-tract level. This allows us to compare, for example, census tracts with voters who are equally conservative, but face different burdens imposed by the RRAA as a result of the types of vehicles they own and the amount they tend to drive.[24]

The cost of the Transportation Improvement Fee imposed by the RRAA is a function of the value of the vehicle, so the actual burden varies substantially across census tracts based on the price of vehicles owned in those locations. We do not observe the distribution of vehicle values within each census tract. Here, we rely on an estimate from the California Department of Finance that, on average, vehicles in California would pay a Transportation Improvement Fee of $48 per annum. Although this likely underestimates the registration fees paid in affluent areas and overestimates in less affluent areas. To this, we add the annual $100 road use fee that RRAA levies on electric vehicles and estimate the average combined vehicle fees per household in each census tract *i*.

$$Annual\ Vehicle\ Fees_i = \big((EV_i * 100) + 48\big) * vehicles\ per\ household_i \quad (2)$$

In the mean census tract, the average household travels approximately forty miles per day, drives a car with fuel economy of 28 miles per gallon and consumes 1.4 gallons of fuel. Scaled up by the gasoline tax imposed by RRAA yields average annual costs of roughly $62 per year in

[22] Consistent with Marion and Muehlegger (2011), we assume that state gasoline taxes are fully borne by consumers.

[23] Implicitly, our calculation assumes that the number of gallons of gasoline consumed daily by the average household is given by $(1 - EV_i) * VMT_i/MPG_i$. Although we lack households-level data on vehicle miles traveled by census tract, Levinson and Sager (2023) finds little evidence that vehicle miles traveled are correlated with fuel economy.

[24] The spatial variation in our setting relies on observable ownership and travel patterns at the census tract level. Chan and Sayre (2023) offer an alternative approach using spatial micro-simulation to simulate the distribution of household-level economic burdens based on local demographics and the relationship between demographics and energy consumption in the Consumer Expenditure Survey.

increased gasoline tax costs.[25] The transportation improvement fee and electric vehicle road-use tax would average an additional $88 per year in increased fees for the typical household. Tract-level vehicle fees and gasoline taxes imposed by the RRAA are positively correlated, illustrated in figure 2. Locations with lower fuel consumption also tend to have fewer vehicles per household.[26]

Finally, we track local infrastructure spending from the RRAA. Caltrans publicly reports each infrastructure project that uses RRAA funds, the amount of funds used by the project, and the assembly district in which the project occurred. We use this data to estimate the average annual infrastructure investment financed by the RRAA in each assembly district between 2017–2023 per household. We obtain tract-level demographic variables for income, race, gender and educational attainment from the American Communities Survey (ACS) 2018 5-year estimate.

Descriptive results

We begin by presenting a set of descriptive statistics to illustrate the variation in support for or opposition to Proposition 6, ideological preferences and the economic burden imposed by the RRAA. Table 1 presents the tract-level summary statistics for a subset of voting, ideological, economic and demographic variables. Turnout for the 2018 midterm election was exceptional, driven by the contentious elections for the U.S. Congress. State-wide, 64.5% of voters cast a ballot in the 2018 California midterm elections, the highest turnout for a midterm election in 36 years. Virtually all of these voters cast a vote on Proposition 6—only 4% of voters who cast a ballot in the election abstained from voting on Proposition 6.

Table 1. Summary statistics.

Variable	N	Mean	Std. Dev.	Min	Max
Gas Tax Support (voting no on Prop 6)	8001	0.58	0.14	0.22	0.97
Liberal Index (2018 Propositions)	8001	0.65	0.15	0.12	0.96
Liberal Party Registration	8001	0.45	0.12	0.13	0.79
Conservative Party Registration	8001	0.24	0.13	0.019	0.66
Decline to State Party Registration	8001	0.28	0.048	0.077	0.56
Turnout (2018 General Election)	8001	0.63	0.12	0.16	1
Gas Tax Abstentions	8001	0.038	0.013	0	0.18
Vote Share for Democrat Governor	8001	0.64	0.17	0.13	1
RRAA Total Annual Costs ($100s / HH)	7870	1.50	0.30	0.38	2.6
RRAA Annual Gas Tax ($100s / HH)	7870	0.62	0.13	0.18	1.1
RRAA Annual Fee ($100s / HH)	7977	0.88	0.20	0.048	1.9

[25] We assume, throughout, that consumers bear the entire burden of gasoline taxes, consistent with Marion and Muehlegger (2011) that finds that state gasoline taxes are fully passed through to consumers.
[26] We also estimate that local infrastructure investment average $191 per year per household. The difference between average infrastructure investment and household-level direct costs is a result of the diesel fuel tax increase.

Variable	N	Mean	Std. Dev.	Min	Max
RRAA Local Benefits ($100s / HH)	8001	1.90	1.08	0.51	5.6
Average Gas Price	7805	3.75	0.13	3.20	4.8
Household Weekday Gallons	7870	1.41	0.29	0.42	2.4
Household Vehicle Miles	7872	39.4	7.86	12.7	62.8
Share of Total Miles in Vehicles	7849	0.67	0.036	0.40	0.79
Miles per Gallon	7996	27.7	1.16	18	41.7
Vehicles per Household	7977	1.90	0.40	0.11	3.12
Commute Minutes	7986	31.6	6.7	5.5	77.6
Household Income	7962	77349	37705	2499	250001
White	7989	0.61	0.21	0	1
Male	7989	0.50	0.044	0	1
BA degree fraction	7987	0.20	0.11	0	1
Population	8001	4883	2216	0	38932
Population Density	8001	8716	9704	0	151487

Roughly 58% of the voters opposed Proposition 6, voting to retain the gasoline taxes and fees imposed that financed the RRAA infrastructure investments. This is slightly lower that the fraction of registered liberal voters in California—roughly two-thirds of voters who self-identify with a political party are registered members of the Democratic or Green parties.[27] Notably, opposition to Proposition 6 was also lower than support for the 2018 Democratic gubernatorial candidate, Gavin Newsom (64.5%), or for Joseph Biden in the 2020 Presidential Election (65.2%). State-wide averages mask substantially heterogeneity across census tracts and geographies within California. Figure 1 plots the cumulative distribution function and histogram of opposition to Proposition 6. Although, on election day, roughly 58 percent of voters opposed the proposition, Proposition 6 received majority support in roughly one-third of California's census tracts.

In the mean census tract, the average household travels approximately forty miles per day, drives a car with fuel economy of 27.7 miles per gallon and consumes 1.4 gallons of fuel. Scaled up by the gasoline tax imposed by RRAA yields average annual costs of roughly $62 per year in increased gasoline tax costs.[28] The transportation improvement fee and electric vehicle road-use tax would average an additional $93 per year in increased fees for the typical household. Tract-level vehicle fees and gasoline taxes imposed by the RRAA are positively correlated,

[27] Roughly 45% of voters are registered members of the Democrat or Green Parties, 24% are registered members of the Republican, Libertarian or Peace and Freedom parties, and 28% are either unaffiliated, declined to state or are registered as Independents.

[28] We assume, throughout, that consumers bear the entire burden of gasoline taxes, consistent with Marion and Muehlegger (2011) that finds that state gasoline taxes are fully passed through to consumers.

illustrated in Figure 2. Locations with lower fuel consumption also tend to have fewer vehicles per household.[29]

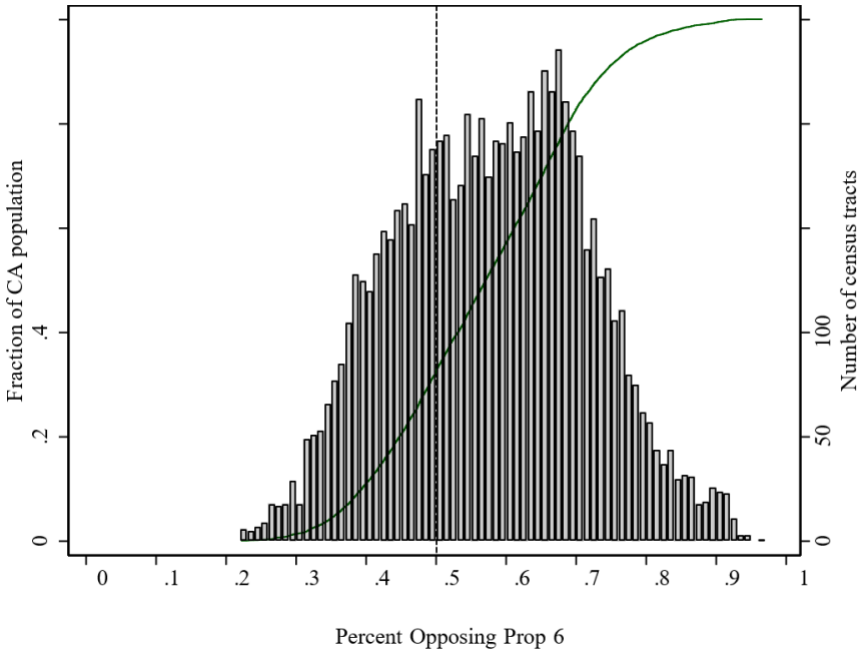


Figure 1. Prop 6 opposition, by census-tract.

[29] We also estimate that local infrastructure investment average $191 per year per household. The difference between average infrastructure investment and household-level direct costs is a result of the diesel fuel tax increase.

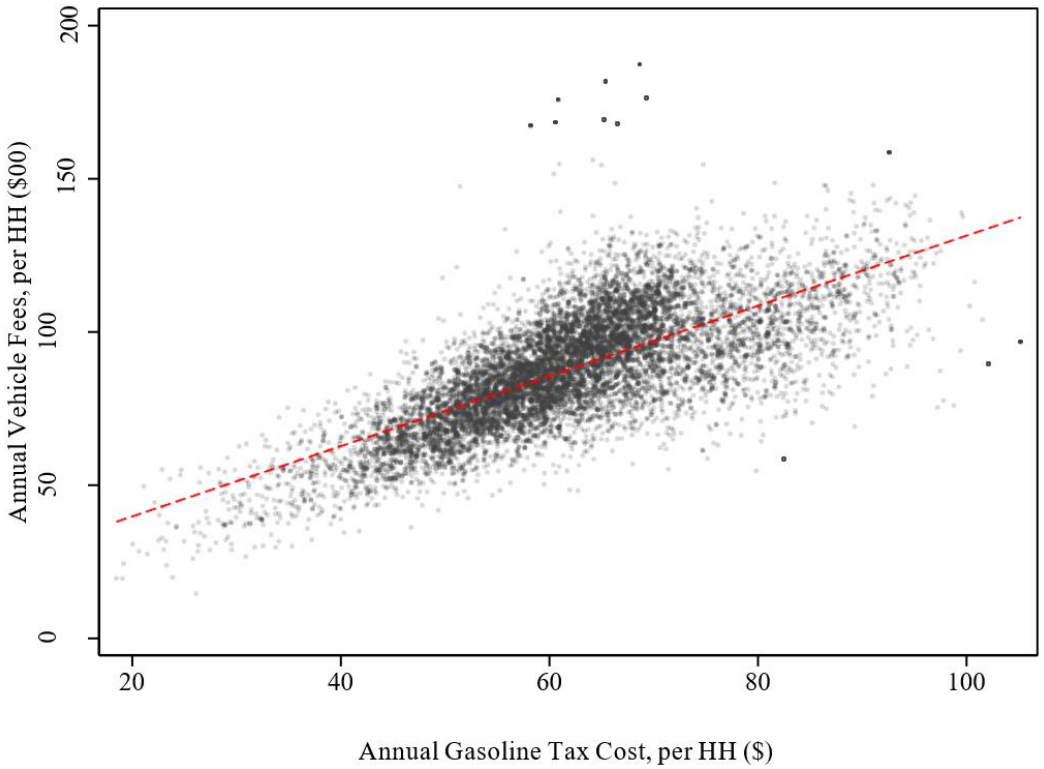
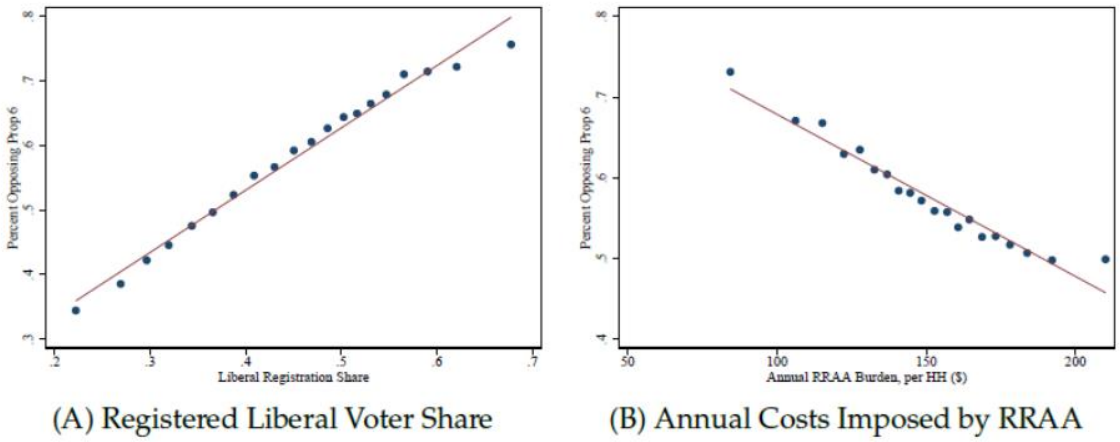


Figure 2. RRAA gasoline tax and vehicle fee burdens, by census-tract.

Opposition to Proposition 6 correlates strongly with both the political ideology of the census tract and the economic burden imposed by the RRAA through higher gasoline taxes. Figure 3 illustrates the bivariate correlations between opposition to Proposition 6, liberal party affiliation and the annual gas taxes imposed by the RRAA. The binned scatter plots illustrate a strong linear relationships between opposition to Proposition 6 and liberal party affiliation (Panel A) and gas tax burdens (Panel B). Liberal party affiliation and opposition to Proposition 6 exhibit a strong positive correlation. In census tracts in the most conservative ventile, roughly two-thirds of voters supported Proposition 6, whereas roughly three-quarters of voters opposed Proposition 6 in census tracts in the most liberal ventile. Likewise, the burden of annual gas taxes imposed by the RRAA is negatively correlated with opposition to Proposition 6. In the census tracts least exposed to the gasoline taxes imposed by the RRAA, voters strongly opposed Proposition 6, whereas voters were split on Proposition 6 in the decile of census tracts most exposed to gasoline taxes.



(A) Registered Liberal Voter Share (B) Annual Costs Imposed by RRAA

Figure 3. Prop 6 opposition, ideology and RRAA burden.

Geographically, areas that opposed Proposition 6, have relatively liberal electorates and faced relatively low exposure to gasoline taxes overlap substantially.

Figure 4 maps the three metrics aggregated to the county level. Panel A maps political opposition to Proposition 6 at the county-level. Voters in the San Francisco metro area were most strongly opposed to Proposition 6, as were voters in Santa Barbara and Los Angeles counties. In contrast, voters in interior counties, were less strongly opposed to Proposition 6. In fact, in many interior counties, repealing the RRAA enjoyed the support of a majority of voters. These patterns mirror the well-known pattern of political partisanship in California (Panel B). Voters on the California coast are much more liberal, on average, than voters in interior counties. But, these areas are also areas that tend to be less exposed to gasoline taxes (Panel C) and thus, face less economic incentive to repeal the RRAA by supporting Proposition 6.

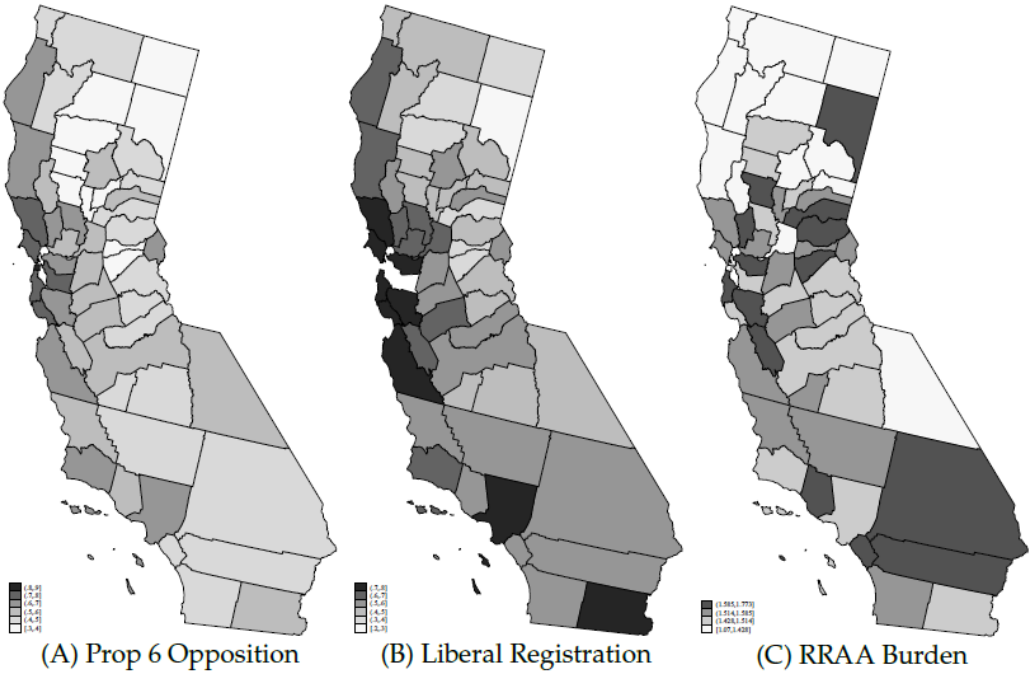


Figure 4. Proposition support, ideology and economic burden, by county.

We highlight the negative correlation between the burdens imposed by the RRAA and local ideology in Figure 5 which plots the fraction of voters in each census tract registered as a member of either the Democratic or Green party against the burden imposed by the RRAA. On average, the most liberal decile of census tracts in California face three-quarters the imposed-RRAA burden of the least liberal decile of census tracts ($126 versus $171, respectively). Residents in the more liberal census tracts tend to drive fewer miles per week, drive more fuel efficient vehicles and are more likely to other methods of transportation than driving.[30]

[30] Scatter plots illustrating these relationships are included in Online Appendix.

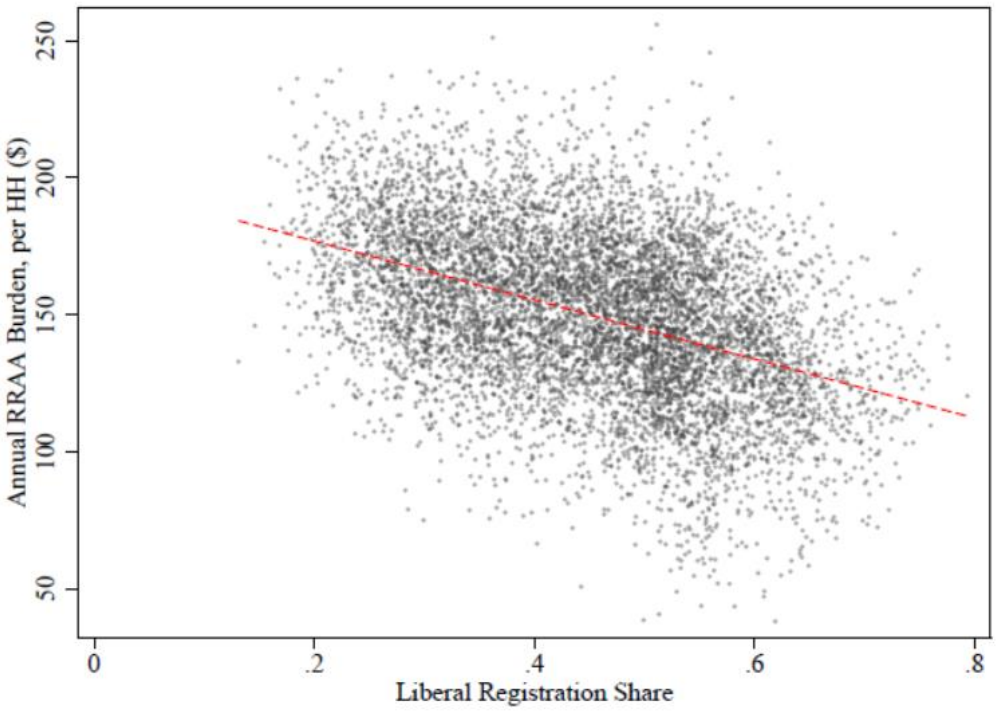


Figure 5. RRAA tract-level burden and ideology.

Methodology and Results

We begin by asking a similar question to past work: what is the relative importance of political ideology and economic considerations for popular support for transportation taxes? We regress the share of votes in favor of the gasoline tax (i.e., in opposition to Proposition 6) on our ideology measure (i.e., mean support for the "liberal" position on other 2018 ballot measures), the costs imposed by RRAA for the mean household in the census tract, and demographic characteristics to unpack the relative importance of each in explaining voting on Proposition 6.[31] Despite potential challenges with using aggregate data as a proxy for a representative consumer (see, e.g., Lang and Pearson-Merkowitz (2022)), a growing literature follows a similar approach to quantify consumer preferences for redistribution (e.g., Brunner et al. (2011), Dippel et al. (2015), Dorn et al. (2020)) or environmental policy (e.g., Anderson et al. (2019), Chan and Sayre (2023)). Formally

$$Y_i = \alpha + \beta Liberal\ Index + \gamma RRAA\ Cost_i + \theta X + e_i \quad (3)$$

where *Liberal Index*$_i$ is the index created from the first principal component of voting on the other ten ballot propositions and rescaled to a zero (conservative) to one (liberal) index *RRAA Costs*$_i$ are the annual costs and fees in hundreds of dollars per annum imposed by the RRAA for the mean household. Like most papers studying revealed-preference data on voting, the

[31] For ease of interpretation, we code our dependent variable in terms of "support" for the gasoline tax—that is, since Proposition 6 sought to repeal the gasoline tax, we assign a value of 1 for votes in opposition to Proposition 6, and a value of 0 for votes in support of Proposition 6

analysis is limited to a single cross-section—the voting patterns and characteristics of the roughly 8,000 census tracts in California in the 2018 election. Thus, we also include binned sociodemographic covariates (X) related to the racial, gender, education attainment and income distribution of the census tract to control for other differences across census tracts that might be correlated with both voting and either political ideology or the economic burdens imposed by the RRAA. We cluster our standard errors geographically, by county.

Table 2. Voting, ideology and economic incidence.

	(1)	(2)	(3)	(4)	(5)	(6)
Liberal Index (0 - 1)	1.07***		1.05***	0.87***	1.03***	0.87***
	(0.037)		(0.036)	(0.017)	(0.033)	(0.018)
Annual RRAA taxes and fees, per HH		-0.24***	-0.047***	-0.027***	-0.048***	-0.027***
		(0.043)	(0.014)	(0.0062)	(0.013)	(0.0062)
Local Annualized funding, per HH					0.0070***	0.00057
					(0.0021)	(0.0017)
Observations	7923	7834	7834	7832	7834	7832
R-Squared	0.91	0.62	0.91	0.95	0.91	0.95
Demographics	Binned	Binned	Binned	Binned	Binned	Binned
County FE				X		X

Notes: Robust standard errors, clustered by county, are in parentheses. *, **, and *** denote significance at 10%, 5% and 1% significance level. The dependent variable is the fraction of voters in the census tract opposing Proposition 6. All columns include demographic and socioeconomic controls: the share of population in 8 different race categories, the share of population in 16 income level bins, in 5 education level bins, in 12 commute time bins, the share of population that is male, the share that is Hispanic, the share of residents that own their home, median age of residents, mean household size, and log population density, and the share of housing in 26 bins for home value. Columns (4) and (6) add fixed effects for the fifty-five counties in California.

Columns (1) and (2) of Table 2 present the bivariate correlations between gas tax support, ideology and the costs imposed by RRAA, conditional on the binned demographic variables. Analogous to the unconditional binned scatter plots presented in Figure 3, we find a positive correlation between the ideology and support for gasoline taxes and a negative correlation between the costs imposed by the RRAA on the mean household and support for gasoline taxes.

Column (3) includes both ideology and the costs imposed by RRAA to address covariance between ideology and the costs of RRAA. Again, we estimate a positive coefficient on ideology and a negative coefficient on the costs imposed by RRAA, although in both cases, the coefficients are attenuated relative to those in Columns (1) and (2), consistent with a negative correlation between the ideology of a census tract and the costs imposed by RRAA illustrated in Figure 5. Similar to past work, we gauge the relative importance of economic considerations and ideological preferences by comparing the magnitudes of the coefficients of our two primary coefficients of interest. One hundred dollars of additional costs imposed by the RRAA

on the mean household in a census tract is associated with a 4.7 percentage point reduction in support for transportation taxes. This relationship is roughly equivalent to a 0.044 point reduction in the liberal index—roughly comparable to moving from the median to the thirty-fifth percentile of census tracts in California, ranking the census tracts by ideology. In column (4), we add county fixed effects and identify the coefficients on ideology and imposed costs off of within-county variation, controlling for geographically-correlated unobservables. The coefficients on ideology and tax burden attenuate, suggesting that the estimates in column (3) are driven both by within-county variation but also variation across counties that is uncorrelated with binned demographics. In the latter case, one hundred dollars of additional annual cost is associated with a three percentage point reduction in support for gasoline taxes.

Tax revenues generated by RRAA fund infrastructure projects in California. While many of the highway infrastructure projects benefit citizens throughout the state, local infrastructure and transit projects create benefits that accrue to residents of nearby communities. In Columns (5) and (6), we include the amount of investment in local infrastructure and transit projects, funded by the RRAA, in each community.[32] As with revenues, we normalize infrastructure funding to annual funding per household in each census tract. Although the coefficients on local funding are positive, they are close to zero and, once we include county fixed-effects, not statistically significant. Local infrastructure funding from the RRAA has relatively little correlation with opposition to Proposition 6. The asymmetry between the economic burdens and local infrastructure funded by the RRAA is unsurprising. While the investment spending in a local community might be correlated with local infrastructure needs, the funds provided by the funds provided by the RRAA were allocated to projects in California, RRAA funding is only one part of the infrastructure funding budget provided by the state to a range of local, county and regional transportation authorities. Not only might voters fail to understand sources of infrastructure funding, but they might rationally conclude that transportation funding is fungible and would be reallocated in the event that Proposition 6 passed. Furthermore, this result is consistent with past empirical work—Lang et al. (2022) finds evidence that voters often misperceive the imposed costs of funding public goods. In contrast, gasoline taxes are amongst the most salient in the economy. The gasoline taxes and vehicle fees imposed by the RRAA were easily communicated and were a central piece of the platform of the Republican gubernatorial candidate, John Cox. We find a consistent relationship between imposed gasoline taxes and vehicle fees that is an order of magnitude greater than that for local infrastructure spending, on a dollar-for-dollar basis.

Does the response to economic burdens vary by demographic group?

A natural extension of the results in Table 2 is to consider whether the voting of some demographic groups is more strongly correlated with the economic burdens imposed by the RRAA. In ways, this question parallels the survey literature on energy tax preferences (e.g., Dolvsak et al. (2020), Mildenberger et al. (2022), Ewald et al. (2022)) that uses survey data to

[32] The California Department of Transportation tracks each local project funded by the RRAA. Each local infrastructure or transit project is assigned to communities based on the geographic scope reported by the DOT.

unpack the relationship between demographics and stated-preferences for environmental policy. Our setting offers revealed-preference evidence on a similar question, specifically, the degree to which voting of different demographic groups on Proposition 6 correlated with the costs imposed by the RRAA.

Heterogeneity in the response to the economic burden of a policy has important implications for popular support and feasibility of taxes, if the burdens in inequitably imposed. This is illustrated by a simple model of political support where the fraction of a group with demographics x facing costs of the policy c that votes in favor of ballot initiative is given by S(x, c) = α + βx + γc + λx ∗ c. In the model, β and γ denote the relationships between support for the policy and demographics and economic costs, respectively, and λ denotes how the relationship between support and economic costs changes with demographics. Denoting the joint PDF of the ideology and costs imposed by the policy on individuals in a jurisdiction as f (x, c), we can aggregate support for the policy in the jurisdiction as:

$$\int_x \int_c S(x,c) f(x,c) dc dx = \alpha + \beta E(x) + \gamma E(c) + \lambda [E(x)E(c) + cov(x,c)] \quad (4)$$

If there is no relationship between demographics and the response to the cost of a program (i.e., λ = 0) or if demographics and costs imposed are uncorrelated (i.e., cov(x, c) = 0), aggregate support for the policy simplifies into a function of the expected values of x and c. But, if the burdens of the policy are inequitably shared (i.e., cov(x, c) $\neq$ 0 and magnitude of the response to the economic variable shifts as demographic change (λ $\neq$ 0), the covariance can either increase or decrease aggregate support for the policy. In our setting, if the RRAA tends to impose higher costs on less responsive groups, support for the RRAA will be higher than if the costs are equitably shared. In contrast, if the gasoline and fees fall more heavily on more responsive voters, aggregate support for the RRAA will be lower. This intuition echoes the familiar intuition of Ramsey taxation—maximizing welfare with linear taxes requires shifting the relative tax rates onto inelastic products. Here, aggregate political support is greatest in settings where the burden of a policy falls disproportionately on groups whose voting is least responsive to the costs of the policy.

We bring the intuition of the simple model above to the voting data on Proposition 6. To estimate heterogeneity in the relationship between voting and the economics costs imposed by the RRAA, we separate census tracts into deciles based on four demographic covariates: (1) the fraction of voters who were registered in 2018 as members of the Democratic or Green parties32, (2) median income, (3) share of population identifying as white, and (4) share of population with a 4 year college degree. Although California, on average, is one of the most left-leaning states, there is substantial heterogeneity in ideology within the state. Conservatives outnumber liberals roughly 2:1 in the least liberal decile of census tracts in California, which is a higher ratio than the state-wide averages for all but a handful of states.[33] In contrast, in the most liberal decile of census tracts, voters registered for as Democratic or Green Party members outnumber Republican and Libertarian registered voters by roughly 10 to 1.

[33] https://www.pewresearch.org/religion/religious-landscape-study/compare/party-affiliation/by/state/

We interact dummy variables for the first through ninth decile for each of the four covariates with the costs imposed by the RRAA on the mean household in census tract i, and estimate a specification similar to that used in Table 2.

$$Y_i = \alpha + \beta LiberalIndex_i + \sum_k \sum_j \gamma_{jk} RRAA\ Costs_i * Decile_{ijk} + \Theta X_i + \epsilon_i \quad (5)$$

where X include the previously-used set of demographic variables, k denotes the set of four demographic covariates of particular interest (liberal, income, fraction white and bachelor's degree share), and $Decile_{ijk}$ is a dummy variable equal to one if a particular tract falls within the jth decile of the state-wide distribution of demographic k. Because we omit the tenth decile for each category, the coefficient on the uninteracted costs imposed by the RRAA provides an estimate of how voting responds to economic costs in a census tract in top decile for all four categories.

Figure 6 plots the decile-specific coefficients and 95% confidence intervals each of the interactions between economic costs and the deciles of liberal registration (panel A), income (panel B), white fraction of the population (panel C) and the fraction of the population with a bachelor's degree or higher (panel D). Notably, the results in Panel A suggest a clear monotonic relationship where the correlation between the economic burden of the RRAA and voting gets progressively weaker as we move from the most conservative to the most liberal census tracts. In the most conservative locations, every $10 of annual household costs is associated with one additional percentage point of support for Proposition 6.

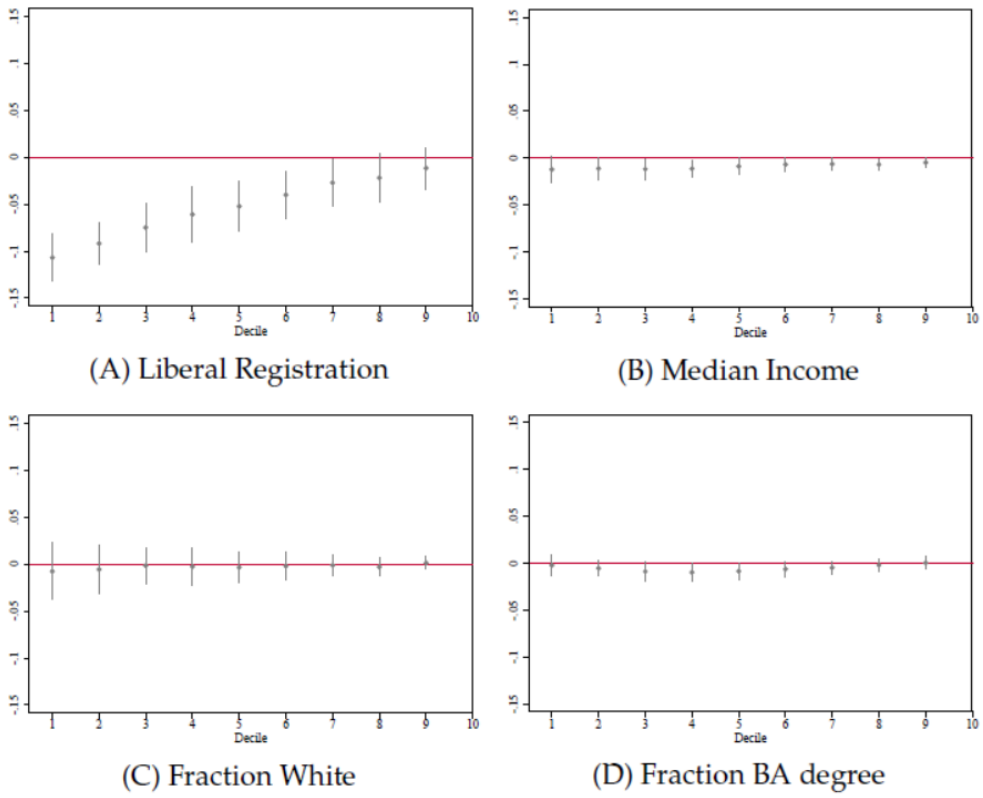


Figure 6. Responsiveness to economic burden by Demographic Deciles.

Moving to more and more liberal deciles, the relationship between costs and support for Proposition 6 erodes—by the tenth decile there is no longer a statistically significant relationship between the economic burdens imposed by the RRAA and voting support for gasoline taxes. In contrast, we find little variation in the coefficients by income decile (panel B), decile of fraction white (panel C) and educational attainment decile (panel D). Although some of the individual coefficients are statistically distinguishable from zero, they are small in magnitude (relative to the coefficients for political ideology) and do not exhibit a monotonic relationship as does political ideology. After conditioning on the political alignment of a community, additional demographics have little impact on the correlation between voting behavior and economic burdens.

As already illustrated in Figure 5, more conservative areas of California tend to bear a higher burden from the RRAA. Residents in these areas tend to drive more, own lower fuel economy vehicles, own fewer electric vehicles and are less likely to take alternative forms of transportation. The findings in Figure 6 suggest that more conservative areas also exhibit a stronger correlation between how they vote and the tax burden they bear. This has implications for popular support for transportation taxes in California, as the voters most responsive to tax burden are also the ones who are most likely to face high burdens imposed by the RRAA. For reference, if the tax burden was shared equally by conservative and liberal regions alike, our results imply that state-wide support for the RRAA would be half a percentage point greater. In such a world, falling support in liberal tracts would be more than offset by a reduction in opposition in conservative tracts. Notably, the features that lead the most conservative California counties to bear a higher transportation cost burden are also present in the United States more broadly. Drivers in more conservative states tend to drive more miles per year, drive lower fuel economy vehicles, are more likely to drive trucks or SUVs and less likely to drive electric vehicles. (Archsmith et al. (2022)). To the extent the voting of conservative regions outside California is also more sensitive to economic burdens, transportation taxes might face additional headwinds.

The way in which Proposition 6 was framed by Democrats and Republicans offers one possible explanation as to why voting in conservative areas was more strongly correlated with economic burdens. Conservative proponents of Proposition 6 framed their arguments largely around costs, emphasizing the reduction in vehicle fees and gasoline taxes that Californians would enjoy if Proposition 6 were passed and the relatively high transportation taxes faced by Californians relative to residents of other states. Proposition 6 and the repeal of the gas tax was a prominent policy goal of the Republican gubernatorial candidate, John Cox and was viewed as a potential issue that would help to increase Republican turnout in the midterm election.[34] In contrast, liberal opponents of Proposition 6 tended to focus on the infrastructure investment that would be forgone if the ballot measure passed, framing the proposition as one that would impact infrastructure safety and quality. Past research suggests that how issues are framed offers an explanation for heterogeneity in response by political ideology to policies. Hardisty et

[34] https://www.latimes.com/politics/la-pol-ca-california-governor-john-cox-gavin-newsom-issues-20181105-htmlstory.html

al. (2010) finds evidence that a framing environmental policy as a tax (rather than alternative language) elicited strong opposition from conservative voters, whereas liberal voters did not differentially respond to how the issue was framed. Dorn et al. (2020) and Dippel et al. (2015) find similar evidence that the response to economic considerations elicited the strongest effects on voting and political attitudes amongst conservative, rather than liberal, voters. Lang et al. (2022) finds evidence that voters respond to perceived, rather than actual, costs. Greater response to the economic costs of the policy in conservative areas might arise if strategic framing of the issue by John Cox and other conservative candidates made these costs more salient to conservative voters. But, greater response to economic considerations by conservative voters is not universal. Interestingly, Chan and Sayre (2023) found that support for state-wide carbon taxes in Washington to be most responsive to economic incidence in the most liberal tracts, suggesting that the heterogeneous response to the economic burdens (or benefits) of policy may be malleable.

Along these lines, we explore several possible mechanisms for why voting in conservative census tracts is more strongly correlated with economic burdens. Table 3 presents the regression results for a linear analogue to Equation (5)

$$Y_i = \alpha + \beta LiberalIndex_i + \gamma RRAA\ Costs_i + \sum_k \lambda_k RRAA\ Benefits_i * X_k + \theta X + \epsilon_i \quad (6)$$

where X_k are the four demographic covariates (indexed by k): liberal voter registration share, median income, fraction white and bachelor's degree share.

We begin, in column (1) with the analogue to the non-parametric results presented in Panel A of Figure 6, using the share of voters opposing Proposition 6 as the dependent variable. Our findings are qualitatively similar—although we find that the burden imposed by the RRAA increases support for Proposition 6, the response to the economic burden diminishes with the share of liberal voters in the census tract.

Table 3. Economic burden, ideology and turnout.

	(1) Prop 6 Vote Share	(2) Prop 6 Abstention	(3) 2018 Turnout	(4) Newsom Vote Share
Liberal Index (0 - 1)	0.57***	0.013	-0.18***	0.77***
	(0.034)	(0.0092)	(0.044)	(0.042)
Annual RRAA taxes and fees, per HH	-0.23***	-0.0063	-0.013	-0.16***
	(0.029)	(0.0065)	(0.044)	(0.021)
RRAA taxes and fees * Lib. Reg. Share	0.32***	0.0022	-0.0064	0.30***
	(0.029)	(0.0071)	(0.027)	(0.017)
Observations	7831	7831	7831	7831
R-Squared	0.94	0.46	0.84	0.98
Demographics	Binned	Binned	Binned	Binned

Notes: Robust standard errors, clustered by county, are in parentheses. *, **, and *** denote significance at 10%, 5% and 1% significance level. The dependent variables in columns (1), (2), (3) and (4) are fraction of voters who

opposed Proposition 6, the rate of abstention on Proposition 6, voter turnout in the 2018 general election, and the fraction of voters supporting Gavin Newsom in the 2018 general gubernatorial election. All columns include demographic and socioeconomic controls: the share of population in 8 different race categories, the share of population in 16 income level bins, in 5 education level bins, in 12 commute time bins, the share of population that is male, the share that is Hispanic, the share of residents that own their home, median age of residents, mean household size, and log population density, and the share of housing in 26 bins for home value.

In next three columns, we consider three possible ways in which voting in the most conservative census tracts in California might be particularly sensitive to economic burdens: (1) abstentions on Proposition 6, (2) voter turnout and (3) voter preferences, conditional on voting on Proposition 6. Although the voting data does not disaggregate voting patterns by party registration, aggregate statistics on abstentions, turnout and voting provide suggestive evidence of competing mechanisms. For instance, if conservative voters are more likely to vote on Proposition 6 or to turnout at all when facing high transportation tax burdens, we would expect the number of abstentions on Proposition 6 to fall and voter turnout to rise in conservative tracts facing higher tax burdens from the RRAA. In columns (2) and (3), we find little support for either of these hypotheses. Unlike the vote share on Proposition 6, we do not see that the relationships between voter turnout or abstention and the economic burden of the RRAA to be pronounced particularly in more conservative census tracts. In contrast, we see some evidence that, like support for Proposition 6, support for the Republican gubernatorial candidate, John Cox, is higher in conservative census tracts that face higher burdens than equally conservative census tracts facing lower burdens from the RRAA. To what extent this reflects a shift in attitudes, versus an increase in conservative turnout offset by a decline in liberal turnout remains a question for future inquiry.

Willingness to pay and heterogeneity in response

Commonly, studies of popular votes calculate estimates of willingness to pay to keep a policy in place. If we assume that the coefficient on the economic burdens imposed by a policy reflects an estimate of the average marginal utility of income for those who voted, we can scale the amount by which a proposition passes or fails in a locality by the inverse of the coefficient on economic covariates to obtain a "willingness-to-pay" estimate. The estimate captures the amount of additional costs or benefits required to make the median voter in the locality indifferent to the policy. In our setting, the willingness to pay (WTP) captures how much the average household in each census tract would be willing to pay to keep the policy in place for tracts that greater than majority support for gasoline taxes. Conversely, for tracts that voted against RRAA, the WTP estimate describes how much the average household in a given tract would be willing to pay to repeal the policy.

Building on the preceding sections, we consider how heterogeneity in the response to the economic burden of taxes impacts willingness to pay estimates. We begin by following the standard approach, clearly described in Anderson et al. (2019) and Burkhardt and Chan (2017), in which local vote share is regressed upon ideological and economic covariates. Formally, we estimate the logit specification:

$$y_i = \alpha + \beta LiberalIndex_i + \gamma RRAA\ Costs_i + \theta X + \epsilon_i \quad (7)$$

where $y_i = \ln\left(\frac{s_i}{1-s_i}\right)$ in which s_i represents the share of voters in tract i supporting the gasoline tax (opposing Proposition 6), and Liberal Index$_i$ and RRAA Cost$_i$ are the ideological and economic incidence variables from Table 2. Following Anderson et al. (2019) and Burkhardt and Chan (2017), we interpret the fitted value $\hat{\gamma}$ as the average marginal utility of income across all census tracts.[35] Scaling the value of y_i by the inverse of $\hat{\gamma}$ provides an estimate of the average willingness to pay by for the policy in each census tract, formally calculated for tract i as: $y_i/\hat{\gamma}$.

As an alternative, we estimate a variant of the specification above that allows for heterogeneity in the response to the economic burdens of taxation. For parsimony, we regress the vote share for Proposition 6 on the ideological and economic covariates and linear interactions of economic covariates with income, education, fraction white and ideology, mirroring the specification in equation (7):

$$y_i = \alpha + \beta LiberalIndex_i + \gamma RRAA\ Costs_i + \sum_k \gamma_k RRAA\ Costs_i\ *\ X_k\ + \theta X + \epsilon_i \qquad (8)$$

where y_i remains $\ln\left(\frac{s_i}{1-s_i}\right)$ and X_k are the four demographic covariates (indexed by k): liberal voter registration share, median income, fraction white and bachelor's degree share. We present the coefficients on taxes and fees from both specifications in Table 4. The signs of the economic coefficients are consistent with our previous results—in the aggregate, economic considerations are negatively correlated with support for transportation taxes, but the relationship between economic considerations and voting is stronger in conservative tracts than in liberal tracts. Based on the coefficients in column 2 and the demographics for each tract, we construct tract-specific of γ reflecting how responsive we would expect voting in that tract to be, as a function of the demographic interaction terms. We plot the histogram of the tract-specific values of γ in Figure 7.

[35] WTP estimation relies on an interpretation of electoral support for RRAA as the utility derived from living in an RRAA policy regime and the assumptions that voters had an accurate understanding of the costs imposed by RRAA at the time of voting, that the estimated household incidence of RRAA policy (described in section 3) is accurate, and that the estimated incidence of the RRAA is uncorrelated with the error term in the regression (i.e., no omitted variable bias).

Table 4. Voting and demographic-specific economic incidence.

	(1)	(2)
Liberal Index (0 - 1)	4.63***	2.84***
	(0.15)	(0.21)
Annual RRAA taxes and fees, per HH	-0.36***	-0.90***
	(0.033)	(0.12)
RRAA taxes and fees * Lib. Reg. Share		1.15***
		(0.16)
RRAA taxes and fees * Median Income (000s)		0.00067**
		(0.00027)
RRAA taxes and fees * White share		0.16
		(0.14)
RRAA taxes and fees * BA share		-0.55***
		(0.17)
Observations	7834	7831
R-Squared	0.92	0.94
Demographics	Binned	Binned

Notes: Robust standard errors, clustered by county, are in parentheses. *, **, and *** denote significance at 10%, 5% and 1% significance level. The dependent variable is the log odds of the vote share in the census tract opposing Proposition 6. Both columns include demographic and socioeconomic controls: the share of population in 8 different race categories, the share of population in 16 income level bins, in 5 education level bins, in 12 commute time bins, the share of population that is male, the share that is Hispanic, the share of residents that own their home, median age of residents, mean household size, and log population density, and the share of housing in 26 bins for home value.

Relative to the common value of gamma estimated in column 1 (denoted by the vertical red line), the tract-specific values of gamma vary substantially. More liberal tracts tend to have tract-specific values of gamma that are closer to zero while more conservative tracts, all else equal, tend to have values of gamma that are larger in magnitude. Conservative tracts in the left tail of the distribution have demographics that suggest almost twice the sensitivity to the economic burdens imposed by the RRAA relative to the common value of gamma estimated in column (1). At the other extreme, a group of liberal tracts in the right tail of the distribution have a profile that suggest virtually no relationship between opposition to Proposition 6 and the economic burdens imposed by the RRAA, mirroring the estimates for the most liberal decile of tracts in Figure 6.

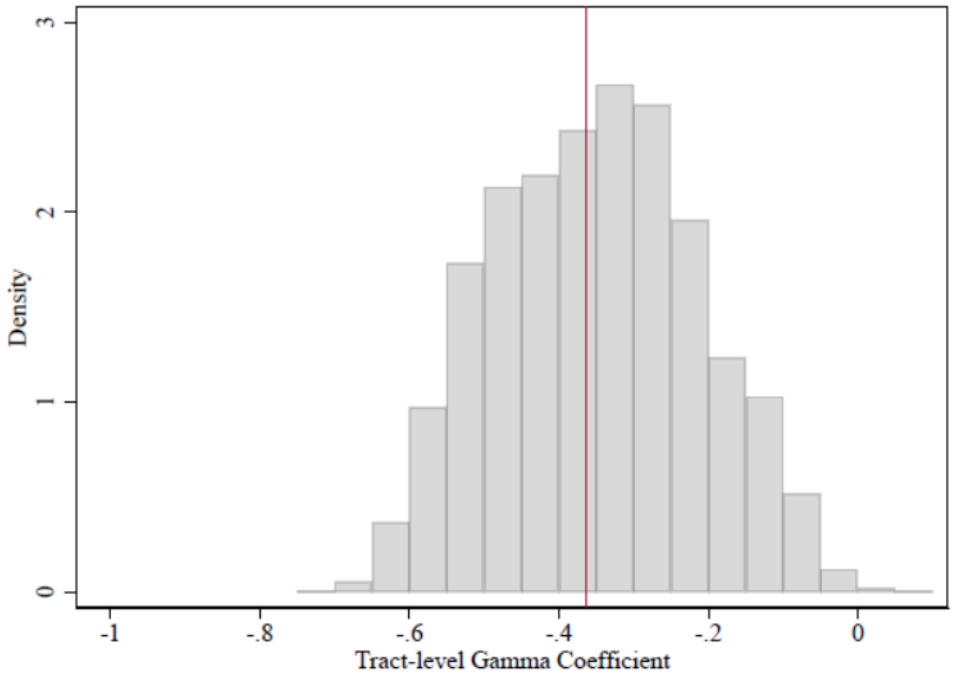


Figure 7. Distribution of tract-level response to economic burden.

Just as we constructed willingness-to-pay estimates for each tract based on the common value of γ estimated in column 1, we use the tract-specific values to construct a second willingness-to-pay estimate for each tract. We then aggregate tract-specific willingness-to-pay estimates across California (weighting by population) to estimate the state-wide distribution of willingness-to-pay to keep the transportation taxes subject to the Proposition 6 in place. We plot the two willingness-to-pay cumulative distribution functions in Figure 8.[36]

Notably, the distribution using the tract-specific values of gamma (in navy) is not a mean-preserving spread of the distribution using the common value of gamma (in red). The use of the tract-specific values of gamma shifts the willingness-to-pay distribution to the right, reducing the willingness-to-pay to avoid the RRAA for tracts that tended to support Proposition 6 and increasing the willingness-to-pay to maintain the RRAA in tracts that tended to oppose Proposition 6. For liberal census tracts, a tract-specific value of gamma close to zero implies that the willingness-to-pay estimate from the common value of gamma would tend to understate true willingness-to-pay. A tract that tends to be less responsive than the average would require a larger shift in costs to induce the tract to be indifferent to the policy under consideration. In contrast, a common value of gamma would tend to overstate how much a conservative tract (that is more responsive to the economic costs of the policy) would need to receive to make it indifferent. Allowing for heterogeneity in our setting leads to economically

[36] Unsurprisingly, willingness-to-pay aligns with the ideological preferences of different regions. Online Appendix Figure A4 plots the average willingness-to-pay at the county level, using a common value of gamma in panel A and the tract-specific values of gamma in panel B.

meaningful changes in the aggregate willingness-to-pay to maintain the RRAA. The median willingness to pay in California, reflecting the amount by which further cost increases might led Proposition 6 to pass, rises roughly 15 percent, from $79 to $91. The effects for mean willingness to pay are more striking, as the most liberal locations also tend to be least sensitive to the economic costs of the policy. Under a common value of gamma, mean annual willingness to pay per capita is approximately $86, close to estimate of median willingness to pay. Allowing for values of gamma to vary by tract, mean annual willingness more than doubles to $180 per capita.

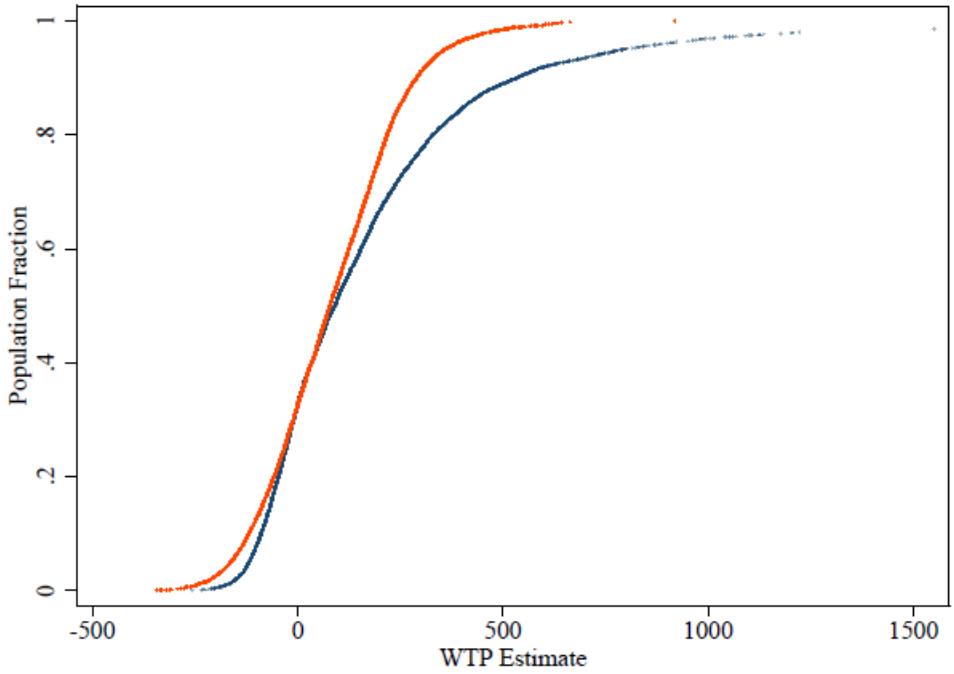


Figure 8. Willingness to pay distributions, with and without tract-specific response.

Conclusion

In this paper, we examine the role that economic and ideological considerations play in popular support for gasoline taxes, as observed through voting on California Proposition 6 in 2018. Consistent with past papers, we find that both ideological and economic considerations matter. But, we also find substantial heterogeneity in the response to economic burden of taxes that across party lines, after controlling for income, education and race. Notably, the more conservative an area, the more responsive voting in the area is to the economic burden imposed by the Road Repair and Accountability Act.

In our setting, this heterogeneity, combined with the correlation between the burdens of gasoline taxes and ideology, has important implications for the political economy of gasoline taxes. In California, gas taxes face additional headwinds since gasoline tax burdens tend to fall more heavily on conservative communities that are particularly sensitive to those economic costs. It is instructive to note the parallel to Ramsey taxation in which the deadweight-loss-

minimizing schedule levies higher taxes on the most inelastic, and therefore least responsive, goods. If demographic groups are differentially responsive to taxation, aggregate support would be greater if the burdens fell disproportionately on groups whose voting was less sensitive to economic burdens.

Our study only focuses on gasoline taxes in California, but one avenue for future research might be to test for heterogeneity in both burdens and response in other parts of the country. Although we lack the data to recreate tract-level fuel tax burden outside of California, Figure 9 graphs the share of the state's popular vote for Democratic U.S. House of Representative candidates in the 2018 election against the share of household expenditures spent on transportation fuels (red) and energy utilities (blue). As is the case for tract-level gasoline tax burden in California, more liberal states spend a smaller fraction households expenditures on transportation and energy utilities. Although these relationships reflect a combination of different habits, technology and income levels, they inform the distributional burden of environmental taxes, similar to those raised by Pizer and Sexton (2019), and suggest that uniform energy policy would tend to impose a greater burden on more conservative states. If voters in these states are also more responsive to economic burdens, this would imply that national policy might face similar "headwinds" in terms of aggregate support.

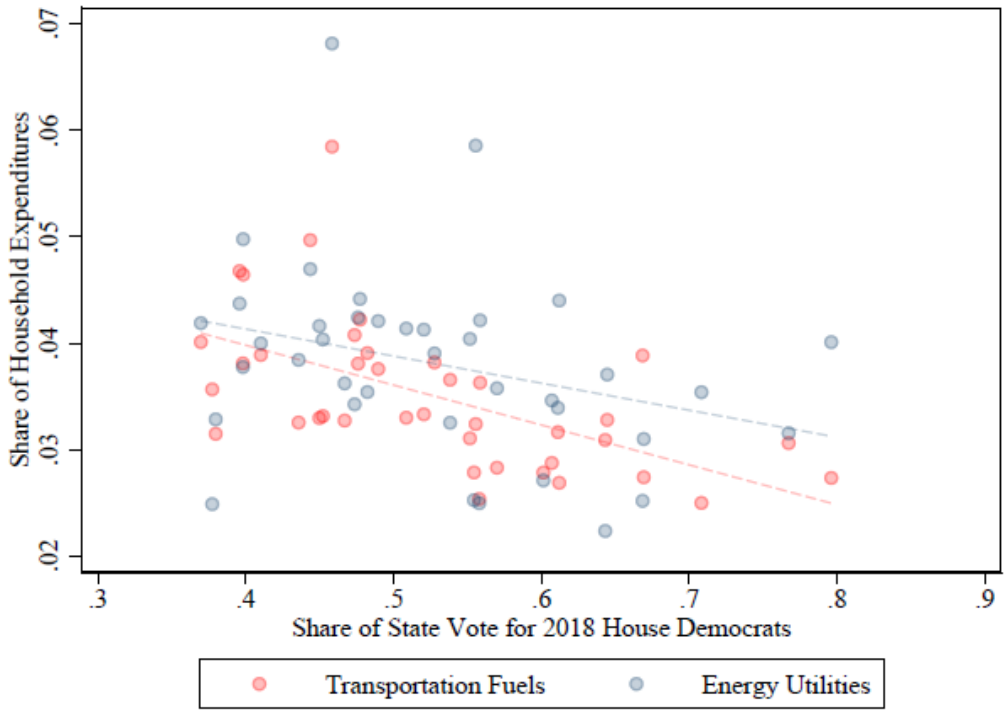


Figure 9. Transportation fuel and energy utility expenditure share and state political ideology.

Yet, our findings and the related literature also suggests that the relationship between voter attitudes and economic burdens may be malleable. While our finding, that voting in the most conservative areas is the most responsive to economic considerations, echoes findings from Hardisty et al. (2010), Dippel et al. (2015) and Dorn et al. (2020), Chan and Sayre (2023) finds

largely the opposite result when studying the popular vote on the Washington state carbon tax Initiative 732. In a similar vein, relative to the popular vote in Washington to enact a new carbon tax, Proposition 6 began from a different starting point in which the tax is already in place and vote is to repeal the existing tax. Past work (e.g., Kallbekken et al. (2011), Borjesson et al. (2012)) finds evidence of asymmetries between adoption of new taxes and removal of existing taxes. Although we are unable to explore this distinction our setting, it remains an important avenue for future research. Whether the different findings reflect nuances between the populations of California and Washington, differences in policy details and framing or reflect starting-point-bias has important implications for the political economy of environmental policy, especially in jurisdictions where policy faces direct consideration by the electorate.

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Data Summary

We have posted the code and publicly available data in the archive at https://www.openicpsr.org/openicpsr/project/198176/view. Due to a data agreement, we are unable to publicly post the data on the census tract level vehicle fleet purchased from Experian and the vehicle fuel economy data purchased from DataOne described in the text of the paper.

The posted R and Stata code included in the archive reads in the raw data, performs all data cleaning and manipulation, and creates all figure and tables in the body of the paper and in the appendix. A replicator should expect all of the code to run in less than 10 minutes.

The archive also includes a README file that includes specific details of how to access the publicly available datasets.

Products of Research

Please see the section of the paper entitled “Data” for a comprehensive list of the datasets and sources used for the analysis.

Data Format and Content

Please see the README file in the data archive with details about the format, source and details of each of the raw data files used in the analysis.

Data Access and Sharing

All publicly available data used in the analysis is posted in the online repository above. Due to a data agreement, we are unable to publicly post the data on the census tract level vehicle fleet purchased from Experian and the vehicle fuel economy data purchased from DataOne described in the text of the paper.

Reuse and Redistribution

All data used in this paper, with the exception of the data purchased from Experian and the data purchased from DataOne, is publicly available and provided as part of this archive under CC-BY-4.0 license and CC-BY-NC-ND 4.0 licenses.