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Status quo bias and public policy: evidence in the context of carbon mitigation

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Status quo bias and public policy: evidence in the context of carbon mitigation

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Abstract

This article examines whether individuals' preferences for government policy are affected by status quo bias. We designed a contingent valuation survey that asks respondents directly about their willingness to pay (WTP) for their state to be a part of a regional carbon mitigation policy. The survey has two randomized frames, which differ in whether or not their state is already part of the policy. We distributed the survey to a representative sample of Rhode Island residents ($N = 844$). We find that respondents who believe that Rhode Island would be joining the policy for the first time have a WTP to join of $170 (quite similar to previous research at a national scale), whereas those who believe Rhode Island is already part of the policy are willing to pay 2.5 times more, or $420, to stay in the program. Our results suggest that citizens greatly prefer existing carbon mitigation policies to new policies, which implies that carbon policy will be more successful if enacted through the legislature instead of popular vote.

1. Introduction

Despite broad support in the United States for government action to mitigate carbon emissions (Pew Research Center 2020), the federal government has not adopted national market based carbon mitigation policy. This has left the states to act on their own. Thirty-nine states plus the District of Columbia have enacted policies that set targets for reduction of greenhouse gasses or renewable energy generation (Center for Climate and Energy Solutions 2020). Market-based carbon policies are less common. Ten states in the Northeast and Mid-Atlantic enacted the Regional Greenhouse Gas Initiative (RGGI), which covers the power sector, and California enacted AB32, which includes a cap and trade program covering all sectors. Each of these state policies has been enacted through the state legislature or by executive order. Also at a state's disposal to create policy is a popular referendum. There have only been two referendums seeking to establish a market-based carbon policy (both in Washington State) and both have failed by large margins (Anderson *et al* 2019). However, climate policies are preserved at the ballot box when voters have the chance to repeal them: in 2010 California voters were given the chance to repeal AB32 at the ballot box through Proposition 23, and they overwhelmingly voted against repeal. What phenomenon drives the disparate voter preferences observed in Washington and California in voting on carbon mitigation policy? We hypothesize that status quo bias may help explain the divergent experience of these states and may provide lessons for states wishing to successfully implement new climate action policies.

Status quo bias, the tendency for people to prefer the existing state of affairs even when a change seemingly offers an improvement, is a remarkably robust finding in behavioral economics. Lab experiments have shown large disparities in willingness to pay (WTP) for items people do not own and willingness to accept (WTA) for items people do own, even when the items are randomly allocated low-value, everyday items such as coffee mugs and pens (Kahneman *et al* 1990). Field experiments have also found evidence of status quo bias in more consequential settings such as organ donation (Johnson and Goldstein 2003), retirement contributions (Thaler and Benartzi 2004), and residential electricity rate plans (Fowlie *et al* 2017).

We build on this literature to examine status quo bias in preferences for government policy. We seek to

address the extent to which people are more willing to pay for a policy framed as already in place than they are to pay for the same policy when framed as a change from the status quo. We investigate this question in the context of carbon mitigation. Specifically, we designed a contingent valuation (CV) survey that asks respondents directly about their WTP for their state being a part of a regional carbon mitigation policy. The existing policy context is the RGGI, which was implemented in 2008 by ten states in the Northeast and Mid-Atlantic, including Rhode Island, which is the focus of our survey. RGGI established a regional cap on CO_2 emissions from electric generating facilities that use fossil fuels and required all power plants to purchase permits when they produce CO_2. Despite being a landmark carbon market, the reality is that few people know about this policy, even in participating states. We exploited this ignorance to be able to ask the same population questions about approval of a carbon mitigation policy that under one frame does not exist and under a second frame already does. We used a referendum-style CV survey design building on Kotchen *et al* (2017) who estimated WTP for a carbon tax from a national sample. In our application, we distributed the CV survey among a representative sample of Rhode Island residents ($N = 844$). We find strong evidence of a disparity between WTA and WTP. While those who believe that Rhode Island would be joining the policy for the first time have a WTP to join of $170 (quite similar to Kotchen *et al*'s estimate), those who believe Rhode Island is already part of the policy are willing to pay 2.5 times more, or $420, to stay in the program.

2. Methods and data

We conducted the survey in the fall of 2019. Approximately 70 trained university students administered the survey at five of the six Department of Motor Vehicle (DMV) registries in the state of Rhode Island. DMV sites were chosen as viable surveying locations for multiple reasons, which have been supported by previous literature as an optimal location for conducting intercept surveys (e.g. McGonagle and Swallow 2005, Borchers *et al* 2007). First, it is an efficient way to reach a large number of people in one gathering, increasing the likelihood of more people willing to participate. Second, it is representative of the population given there are a variety of tasks that require an in-person visit to the DMV, most recently being the task of obtaining a REAL ID. In our particular case, this helps reduce potential selection bias often associated with convenience sampling.

Our survey protocol was as follows. Teams of two surveyors were stationed in the waiting room of DMVs throughout the standard work week during open hours. Surveyors would sequentially approach people waiting and enquire if they would be willing to take an anonymous, confidential survey to be used for research purposes. Each willing participant was given a touch-screen tablet on which to take the survey. The survey took approximately 5 min. Participants could omit responses if they felt inclined, but only after a prompt asked them if they wanted to continue with the survey and leave the question blank. In compliance with IRB regulations, if the respondent was under 18 years of age, they were stopped from taking the survey.

We designed two versions of the key CV question of the survey to test our hypothesis, one that described the carbon policy as existent in Rhode Island ('Policy Endowed') and one that described the carbon policy as a possibility that could be enacted in Rhode Island ('Policy Absent'). Participants were shown one of two versions of the CV question that included a randomized price P. Those assigned to the Policy Endowed treatment were shown a description highlighting Rhode Island's membership in a multi-state carbon policy which read as follows (italics has been added for the purpose of showing differences between the two versions; bold font reflects what respondents actually saw).

> *Since 2008, Rhode Island has been a member of a multi-state program to reduce carbon dioxide emissions.* The program requires all power plants to purchase permits when they produce carbon dioxide. By 2030, the program is predicted to reduce carbon dioxide emissions by 30%. Revenue generated from the permit purchases is used to fund energy efficiency and renewable energy programs in each state. Power plants pass on the cost of the permits to consumers in the form of higher electric bills.
>
> Residents of participating states, *including Rhode Islanders*, pay about **$P more each year** in electric bills as a result of being a part of this multi-state program.
>
> If you had the chance, *would you vote to leave the program, or would you vote to stay in the program?*

Similarly, participants assigned to the Policy Absent treatment were shown a description highlighting that other states (but not Rhode Island) are members of a multi-state carbon policy which read as follows.

> *Some states have joined into a multi-state program to reduce carbon dioxide emissions.* The program requires all power plants to purchase permits when they produce carbon dioxide. By 2030, the program is predicted to

> reduce carbon dioxide emissions by 30%. Revenue generated from the permit purchases is used to fund energy efficiency and renewable energy programs in each state. Power plants pass on the cost of the permits to consumers in the form of higher electric bills.
>
> Residents of participating states pay about **$P more each year** in electric bills as a result of being a part of this multi-state program.
>
> If you had the chance, *would you vote for Rhode Island to join the program, or would you vote against Rhode Island joining the program?*

The random price, **P**, took on one of the following values (in US dollars): 5, 25, 45, 65, 95, 135, 185, 245. The range was set based on similar previous studies (Kotchen *et al* 2013, 2017), but we extended the range to account for likely greater approval among the Policy Endowed group. We assigned the middle four amounts with higher frequency as in Kotchen *et al* (2017), while fewer observations were assigned the values expected to make up the tails of our distribution as recommended by Alberini (1995). Although CV and other stated preference methods are subject to criticism due to their often-hypothetical nature (Carson 2012, Hausman 2012, Kling *et al* 2012), these methods are frequently used to estimate policy impacts and to assess public opinions (Arrow *et al* 1993, Johnston *et al* 2017).

The major benefit of sampling only Rhode Island residents is that the respondents will be similar in both observable and unobservable ways. If we were to sample residents inside and outside of the policy boundary, this may not be true and inference could be biased. If no RI resident knew about RGGI, then we could randomize respondents between Policy Endowed and Policy Absent frames. However, because we wanted to avoid deception and some residents do know about RGGI, we preceded the CV question with a qualifier question that included knowledge of RGGI. The question asked participants to select which multi-state policies Rhode Island participates in. Six policies in total were presented to the participants, three of which were true policies Rhode Island participated in, including RGGI, while the remaining three were fictitious policies. If participants correctly selected RGGI as a current Rhode Island policy, they were assigned to the Policy Endowed treatment group. Otherwise, participants were randomly assigned between the Policy Endowed (40%) and Policy Absent (60%) conditions. We set the randomization to be uneven in an attempt to have equal sized group, knowing that some would correctly identify RGGI. Based on pilot testing of RGGI knowledge, we expected correct identification to be 5%–10%. Adding a qualification question was necessary to eliminate the risk of respondent deception, which would occur if a respondent was placed in the Policy Absent group but knew that it existed and Rhode Island participated. We provide the full question text in the supplementary material.

A summary of the qualifier question responses is shown in figure A1 (available online at stacks.iop.org/ERL/16/054076/mmedia) in the supplementary material. Surprisingly, about 50% of respondents correctly identified that Rhode Island participated in RGGI. However, this does not necessarily reflect actual knowledge. While 55% and 60% correctly identified the other two true policies, between 35% and 40% of respondents believe Rhode Island participated in one of the three fictitious policies. Thus, the evidence suggests there is some underlying level of knowledge, but it is far from 50%, which more likely reflects the yes/no aspect of the question. Overall, these results are consistent with prior findings of Americans' generally low level of interest in and knowledge about politics in general and specific policies (Campbell *et al* 1960, Delli Carpini and Keeter 1996). The largest consequence of this answer distribution is that our sample is more skewed towards the Policy Endowed group that we had hoped.

Following the CV question, participants answered additional questions about political party affiliation, voting frequency, climate change beliefs, race and ethnicity, homeowner status, income, education, sex, and city of residence.

We only include respondents that completed the CV question in our sample. Rather than drop participants with missing responses to demographic questions, we imputed missing values with the sample means and created a suite of indicator variables equal to one if a particular question was not answered. We include these indicator variables as controls in our empirical model to non-parametrically control for measurement error induced through imputation. Overall, 90% of our sample had zero missing control variables, while 5.3% of the sample were missing one control variable and the remaining 4.7% were missing two or more control variables. Our final sample for analysis includes 844 participant surveys.

Table A1 in the supplementary material presents summary statistics of the data. Roughly two-thirds of our sample were assigned to the Policy Endowed treatment based on their response to the qualifier question. The sociodemographic means from the survey match the statewide population well in terms of age, income, education, and political party affiliation. This bolsters our confidence in the sampling strategy, and we consider our results generalizable to the Rhode Island population.

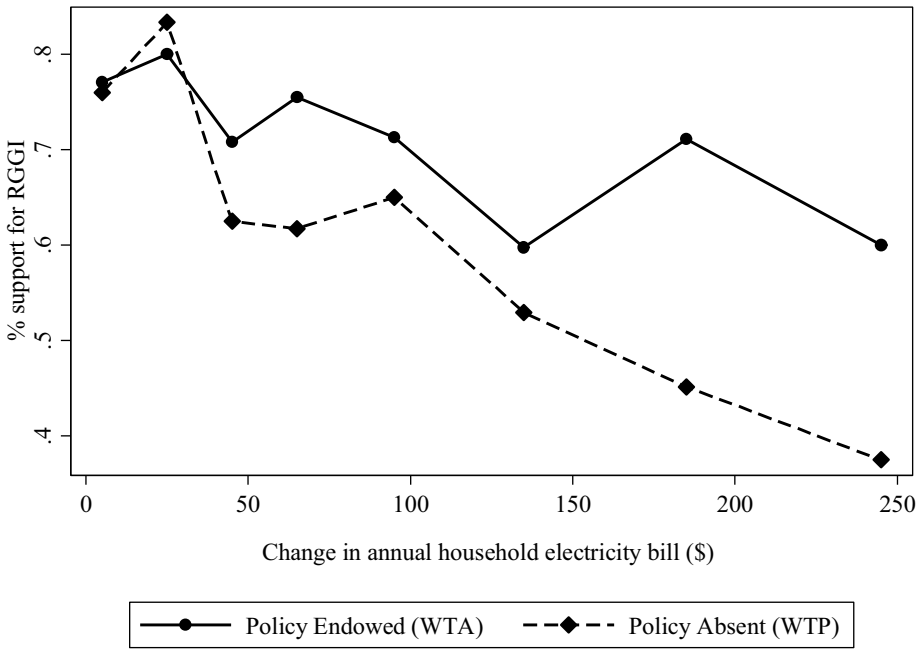

Figure 1. Support for carbon mitigation policy as function of electricity bill ($).

2.1. Modeling framework

Since our CV question is binary choice, we estimate a logistic regression of the following form to estimate our treatment effects,

$$\Pr(\text{Support}_i) = \alpha + \beta_1 \text{Price}_i + \beta_2 \text{Endowed}_i + \beta_3 \text{Price}_i \times \text{Endowed}_i + \boldsymbol{X}_i\boldsymbol{\gamma} + \varepsilon_i \quad (1)$$

Price is the random dollar amount shown to the participant, Endowed is an indicator variable equal to one if the participant received the Policy Endowed treatment, and $\boldsymbol{X}$ is a vector of individual control variables: demographics, political party affiliation, and self-reported cause of climate change. The coefficients of interest are β_1, β_2 and β_3. β_1 is the effect of price on support for the Policy Absent group. We expect $\beta_1 < 0$, as this essentially implies a downward sloping demand. β_2 is the difference in the intercept for the Policy Endowed group relative to the Policy Absent group. We expect $\beta_2 > 0$ because the Policy Endowed group are expected to have greater support for carbon mitigation policy based on prior findings. β_3 is the difference in price responsiveness of the Policy Endowed group relative to the Policy Absent group. We expect $\beta_3 > 0$ and $|\beta_3| < |\beta_1|$ because the Policy Endowed group will be more likely to support the policy at high dollar amounts, but price will still have a negative impact on approval.

We use the coefficient estimates from the above logistic regression to estimate individual WTP and WTA for carbon policy using the following expressions,

$$\text{WTP} = (\alpha + \bar{\boldsymbol{X}}\boldsymbol{\gamma}) / -\beta_1 \quad (2)$$

$$\text{WTA} = (\alpha + \bar{\boldsymbol{X}}\boldsymbol{\gamma} + \beta_2) / -(\beta_1 + \beta_3) \quad (3)$$

where $\bar{\boldsymbol{X}}$ is the vector of the control variables evaluated at their respective means. Effectively, these are the estimated price points at which the mean respondent is indifferent between being in the program and being out of the program. We estimate confidence intervals around the estimated WTP and WTA values using the delta method. If our expectations about the signs and magnitudes of β_1, β_2, and β_3 hold, then WTP $<$ WTA.

3. Results

We first examine the raw data; figure 1 presents the unconditional rates of approval for the two treatment groups as a function of household electricity bills. Both groups make choices consistent with economic theory; as price goes up, support goes down. However, the slope is flatter for the Policy Endowed group, meaning they are less price responsive. The wedge in support between the two groups begins at $45 and is largest at $185.

We now turn to the more rigorous results of our logistic regression of equation (1), which we present as marginal effects in table 1 for ease of interpretation. Starting with Price (β_1), the coefficient estimate is −0.00156, meaning that for the Policy Absent group a $10 increase in electricity bill reduces support for carbon mitigation policy by about 1.56%. The coefficient on Policy Endowed (β_2) is small in magnitude and not statistically different from zero, meaning that the Policy Endowed and Policy Absent groups have about the same level of support for very

Table 1. The effect of policy endowment on support for carbon mitigation policy.

Variables	Coefficients (standard error)
Price ($)	−0.00156***
	(0.00036)
Policy endowed (=1 if yes)	−0.02629
	(0.05530)
Policy endowed × price	0.00095**
	(0.00045)
Age (years)	−0.00057
	(0.00096)
Education (years)	0.01496*
	(0.00782)
Income ($)	0.00027
	(0.00035)
Male (=1 if 'yes')	−0.01800
	(0.03067)
Democrat	0.11736***
	(0.03730)
Republican	−0.05099
	(0.03840)
Climate change caused by humans (=1 if 'yes')	0.24532***
	(0.03026)
Not sure about cause of climate change (=1 if 'yes')	0.10352**
	(0.04911)
Under-represented minority (=1 if 'yes')	−0.06416
	(0.04069)
Observations	844
Pseudo R-squared	0.138

Table presents marginal effects evaluated at the mean of the logistic regression model. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

small prices. The coefficient on the interaction of Policy Endowed and Price (β_3) is positive, but smaller in magnitude than β_1, as expected. This coefficient describes the divergence in support between the two treatment groups as electricity bills increase, and the sum of β_1 and β_3 is the price responsiveness of the Policy Endowed group. Summing these coefficients, we find that for the Policy Endowed group, a $10 increase in electricity bill reduces support for carbon mitigation policy by about 0.61% on average, and this is statistically significantly different than the price responsiveness for the Policy Absent group. These results are robust to specifications using alternate control variables and estimating the model only on subsamples of participants self-reporting being active voters and those who demonstrated policy knowledge in the qualifier question. These results are presented in the supplemental material. We also investigated whether certain groups were more or less likely to be impacted by status quo bias, but found no evidence of heterogeneity by partisan affiliation, income, or education.

Our results also indicate that several socioeconomic and opinion variables have a significant effect on carbon mitigation support. On average, one additional year of education increases support by 1.5%, while non-white respondents support carbon mitigation policy 6.4% less than white respondents. Those who identify as Democrats support carbon mitigation policy 11.7% more than unaffiliated respondents, whereas Republican support is 5.1% less than the unaffiliated. However, this difference is not statistically significant. Unsurprisingly, climate change beliefs also correlate with support for carbon mitigation policy. Respondents who believe humans are the primary cause of climate change, support carbon mitigation policy 24.5% more than those that believe climate change is a natural climate pattern or that there is no evidence the Earth is warming. Interestingly, those that are not sure about the cause of climate change support carbon mitigation policy 10.4% more on average compared to those with 'natural pattern' or 'no evidence' beliefs. While this group is unsure about what is causing climate change, they still believe it is happening and support taking action to mitigate further damages.

We now present the WTP and WTA estimates derived from model results described above. We calculate that WTP for the Policy Absent group is $169.72 (SE = 22.06). This WTP amount is remarkably similar to the $177 estimated by Kotchen *et al* (2017) in a national survey measuring demand for a new carbon tax in the United States. Using a national sample, Kotchen *et al* (2017) estimate a WTP of $177 for a new carbon tax in the United States, and their measure has the same theoretical construct as our study. Given that our WTP result is nearly identical to their result, we consider this valuation to exhibit convergent validity as described in the valuation literature (Mitchell and Carson 1989). We find that WTA for the Policy Endowed group is $420.28 (SE = 173.01). The ratio of WTA to WTP is 2.48, meaning that those with the policy in place are willing to pay about 2.5 times more on average to keep the policy than those without the policy are willing to pay to enact it. The WTA/WTP ratio is a common way to quantify the divergence in preferences caused by endowment, and our estimated ratio is within the range found by a variety of previous studies (Tunçel and Hammitt 2014).

4. Discussion

To the best of our knowledge, this paper is the first to empirically identify divergence of WTA and WTP for carbon mitigation policy, and for that matter any policy. Specifically, we find that those who are endowed with a carbon policy implemented through the legislature have a WTA of $420 yr^{-1} to repeal the policy and forgo any associated benefits while those given the opportunity to vote on such a policy via public referendum are willing to pay $170 yr^{-1} to implement it.

We believe our results may provide an explanation for previously observed carbon policy voting behavior. In addition to estimating mean WTP and WTA, we can predict levels of support for policies that have specific price points. Specifically, we assess how our results elucidate the carbon policy votes that took place in California and Washington. Burtraw *et al* (2012) estimated that AB32 costs the average California household approximately $100 annually. In our Policy Endowed condition, the predicted average level of support for climate policy at an annual cost of $100 is 69.14%, which is relatively similar to the actual level of support for maintaining AB32 (61.6%) when put to a vote through Proposition 23. Bernton (2018) reports estimates that I-1631, the most recent carbon tax initiative in Washington State, would cost the average household in the range of $200–300 annually. In that referendum, 43.4% of voters supported implementation. In our Policy Absent condition, we predict support levels of 35.5% at a cost of $250. The fact that our results align well with observed voting behavior strengthens the criterion validity of our WTP and WTA estimates (Mitchell and Carson 1989, Johnston 2006).

The mechanism that drives status quo bias in public policy preferences is an interesting remaining question (Bowler and Donovan 2000, Dyck and Pearson-Merkowitz 2019). One potential mechanism is familiarity and comfort with the current state. Cherry *et al* (2014) use a lab experiment to study people's willingness to impose Pigouvian taxes on themselves (and other participants). They find that trial periods with the tax increase participants' willingness to vote for taxes. While not their focus, this finding relates to status quo bias because once people have experienced the 'tax policy,' they are more likely to approve as we see in our study. However, our findings point to an even stronger manifestation of status quo bias, as most respondents were unaware of their participation in the carbon program prior to our survey.

Voting comes with its own set of challenges, and prior work in political science points to additional mechanisms for status quo bias. Voters appear to be more likely to prefer the status quo when the complexity of the measure increases (Samuelson and Zeckhauser 1988, Eichenberger and Serna 1996, Dyck and Pearson-Merkowitz 2019, Hessami and Resnjanskij 2019). Voters face considerable difficulties in estimating the personal consequences of accepting or rejecting a proposition, often because of the incomprehensible nature of the referendum wording (Magleby 1984, Reilly and Richey 2011). Often the only information on a ballot referendum that can be understood by the average voter is the dollar figure; what the money is to be used for or if it is a large or small increase in taxes is beyond all but the most sophisticated voters. Given these previous findings, it is reasonable that voters would reject a proposed carbon policy due to the complexity of its structure and/or monetary and social costs. Whereas those voters who are told they have been living with this policy are more likely to reject abandoning the policy because of uncertainty of impacts.

Our research findings have practical application as well. Climate policy is best implemented on regional, national, or, ideally, global levels due to the fact that pollution does not respect political borders. Our research suggests that, not only is the federal government the most logical level of government to implement carbon mitigation policy from this perspective, but also that policies passed by the federal government will be tolerated by voters since the only way policy is enacted federally is through Congressional or Executive action. However, future research should investigate if voters are more or less willing to support carbon mitigation policy at the state or federal level.

While more research is needed (replicating findings in other contexts, probing mechanisms), these findings may provide practical guidance for policy change. The evidence suggests it may be more prudent to push for new policy through the legislature rather than put to popular vote when there are direct costs likely for voters. Politicians as a group are strongly motivated to abandon or modify existing policies (Majumdar and Mukand 2004, Cai *et al* 2009, Fu and Li 2014). Sheffer *et al* (2018) find that politicians as a group are more risk-seeking than the general population. While legislators are found to not exhibit status quo bias, political science experiments with legislators suggest that 'legislators want to be more responsive to public opinion than they are in their natural state and can be if given solid information about constituent beliefs' (Butler and Nickerson 2011). These prior studies suggest that legislator behavior may be influenced by learning about constituent status quo bias and, thus, our results provide valuable information to assist legislators in pivoting their policy stances and proposals to align with constituent beliefs. In the context of the current research on voter preferences, our work suggests that advocating for new carbon mitigation policies through the legislature is more likely to be tolerated by voters than supported at the ballot box. Gaining further understanding of voter and legislator preferences and decision making processes may impact enactment of carbon mitigation policy to combat the effects of climate change.

Data availability statement

The data that support the findings of this study are available upon reasonable request from the authors.

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