Public preferences for a state-level carbon cap-and-trade program

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ABSTRACT

We report upon the results from a set of survey-based choice experiments designed to assess state-level demand for carbon cap-and-trade programs with different attributes. The evidence from 1050 respondents confirms that these state-level preferences are strongly heterogeneous with respect to political ideologies and opinions about climate change. Our models allow us to calculate the implied social benefits of carbon emissions reductions. Our SBC measure complements existing measures of climate mitigation benefits based on the social cost of carbon (the SCC, which is an avoided-cost measure, as opposed to a willingness-to-pay measure). Willingness to bear the household costs of a cap-and-trade program is affected by the extent of carbon emissions reductions the program would provide, but also by the changes in the number of jobs in carbon-intensive industries and in "green" industries. We estimate the marginal rate of substitution between "carbon" jobs and "green" jobs for different preference classes. There is heterogeneity in the extent to which the share of permits auctioned, or the uses of auction revenue, affect demand, and evidence of the extent to which people would prefer a program that includes additional regulations to limit co-pollutant emissions by firms that buy carbon permits to cover increased carbon emissions. Methodologically, we account for systematic sample selection of respondents relative to the quota-driven sample of invitees from our internet panel, and we net out the effects of earlier randomized choice scenarios on later choices by the same respondent.

JEL classifications: Q54, Q51, Q58, C25

Keywords: Carbon cap-and-trade programs; choice experiments; carbon policy

1 Introduction

Even as the destructive effects attributed to climate change intensify (Intergovernmental Panel on Climate Change (IPCC) (2018) Intergovernmental Panel on Climate Change (IPCC) (2021)), the United States remains polarized about climate change policy (Egan and Mullin (2017)). Optimal design and successful implementation of carbon mitigation policy has proven to be exceedingly difficult and a subject of cardinal importance (Aldy and Pizer (2009)). Carbon pricing is often touted as the economically efficient and potentially politically feasible solution to the carbon emission crisis (e.g. Metcalf (2009), Chen and Hafstead (2019)). Carbon cap-and-trade programs have thus gained traction as a leading tool for climate change mitigation (Newell et al. (2014), Raymond (2019)).

Regional carbon cap-and-trade programs have been adopted, but the United States has yet to launch such a program at the federal level (see Schmalensee and Stavins (2017) for discussion). The increasingly urgent need for mitigation policy, along with federal inaction, may necessitate that regional coalitions or individual states, other than just California, implement policies at a sub-federal level (Fullerton and Karney (2018)). In 2019 and 2020, Oregon's legislature twice attempted, unsuccessfully, to create a carbon cap-and-trade program. Oregon's attempts and failure to launch such a program highlight the complicated and contentious political, environmental, and social concerns regarding environmental regulation (Farber (2012), Deryugina et al. (2019) and Fowlie et al. (2020)). Successful passage of a carbon cap-and-trade program for Oregon, and in other states, will rely on the extent to which policy makers understand population preferences for a number of key program attributes.

Lack of support for carbon cap-and-trade programs could be the product of a number of different factors. For instance, conservative politicians who oppose many types of regulations have employed the phrase "job-killing regulations" to sour the public against programs like cap-and-trade, despite a lack of conclusive evidence from existing programs (Coglianese et al. (2013)). Addi-

tionally, market-based carbon emission solutions, like cap-and-trade, have been criticized for their inattention to distributional impacts (e.g. Fullerton and Muehlegger (2019), Goulder et al. (2019) Pizer and Sexton (2019), and Feger and Radulescu (2020)). A number of the papers in the literature have found evidence that carbon pricing can be regressive (e.g. Burtraw et al. (2009), Grainger and Kolstad (2010), and Moz-Christofoletti and Pereda (2021)).[1] Carbon cap-and-trade programs also raise environmental justice concerns with respect to their distributional effects (Kaswan (2008), Farber (2012)). To date, these theoretically possible concerns have been largely unsubstantiated (e.g. [Fowlie et al. (2012), Anderson et al. (2018) and Hernandez-Cortes and Meng (2020)). They remain an impediment nonetheless.

The biggest obstacle to public support may simply be partisanship. A review of climate change opinion surveys in the United States by Egan and Mullin (2017) finds that not only is partisanship the paramount driver in support of carbon-reduction policies, but the gap between Republicans and Democrats has become even more pronounced in recent years. This assessment has been corroborated using revealed preference precinct-level voting data (e.g. Anderson et al. (2019)). This partisan division appears to be due, at least in part, to a considerable effort on the part of corporations fostering opposition to climate policies through misinformation campaigns (Farrell (2016), Westervelt (2018)). A better understanding of the factors that affect willingness to pursue these programs is necessary if policy makers are to design a carbon cap-and-trade program that has adequate public support.

In this study, we conduct a stated-preference survey to measure individual preferences for key attributes of carbon cap-and-trade programs. Using randomized choice experiments in an online survey, we collect a quota-based sample of about 1,000 Oregonians. Each survey asks respondents to consider six unique cap-and-trade programs. In each choice scenario, the respondent can cast an advisory vote in favor of the program or to keep the status quo (i.e. no program). We then use these six votes per person to estimate a random utility model. The marginal utilities estimated

[1] Carbon pricing policies also have the potential to be regressive in their benefits (Fullerton (2011)).

for this model allow us to calculate individuals' marginal willingness to pay (MWTP) for various program attributes. Importantly, the survey also collects sociodemographic information about each respondent. This enables us to infer differences in MWTP for programs with different attributes *across different sociodemographic groups* (e.g. income levels, zip codes, and political ideologies). Another advantage of our study is we are able to measure key sociodemographic characteristics for quota-screened and eligible respondents who subsequently drop out of the survey, which allows us to undertake systematic sample selection correction.[2]

The present study makes contributions to a number of different veins of research in the broader literature.[3] First, we make a contribution to the growing field of literature that has used stated-preference studies to understand public preferences for carbon pricing policies. Carattini et al. (2018) provide a survey of recent stated-preference work aimed at understanding public opposition to carbon pricing.[4] The bulk of the extant literature focuses on carbon taxes or undefined carbon reduction policies (Raymond, 2019). For instance, Kotchen et al. (2017) conducted a survey of Americans to measure the WTP for a carbon tax as well as preferences for how the tax revenue is spent. Their results indicate a substantial mean WTP ($177 per year). Additionally, 80% of the respondents indicated they would be in favor of using the revenue to fund green projects and 70% were in favor of using the revenue to support the a "just transition" for coal workers. Carattini et al. (2017) use a recent ballot initiative for context in a follow-up stated-preference survey. They focus on a carbon tax and find lump sum redistribution of tax revenue and "social cushioning" to be popular. They also find that including more information improves the acceptability of the policy.

Research has found that revenue recycling, and providing the public with tangible public bene-

[2]The survey screens potential respondents against quotas, so we learn the age, race, gender, income level, and zip code of every respondent before the respondent learns the topic of the survey.

[3]Appendix A provides more-detailed reviews of other papers in the related literature. Here, we merely summarize these papers by group.

[4]Other examples of stated preference studies that focus on preferences regarding carbon pricing include Berrens et al. (2004), Aldy et al. (2012), Kotchen et al. (2013), Duan et al. (2014), Yang et al. (2014), Gevrek and Uyduranoglu (2015), Raux et al. (2015), Lee and Heo (2016), Tvinnereim et al. (2017), Li et al. (2019), Rotaris and Danielis (2019), Böhringer et al. (2020), and Daziano et al. (2021).

fits, could significantly improve support for carbon pricing (Amdur et al. (2014), Beiser-McGrath and Bernauer (2019). In a similar vein, some national-level studies have focused on measuring preferences for the distribution of costs imposed by a climate change policy (e.g. Lee and Cameron (2008), Cai et al. (2010)). Brannlund and Persson (2012) use an internet-based survey in Sweden to measure preferences concerning an unspecified carbon pricing policy. They described policy alternatives in terms of (a) their development of green tech, (b) their ability to increase climate change awareness, (c) their monthly cost, (d) their *distribution* of costs, and (e) their geographic distribution of carbon reductions. They find that their respondents prefer policies that are (a) progressive, (b) have lower costs, and (c) raise awareness for climate change. On the other hand, Baranzini and Carattini (2017) conduct a qualitative-quantitative hybrid survey and find that individuals are more concerned about the environmental effectiveness of a carbon tax than with the distributional challenges that result, or the potential effects of the tax on firm competitiveness. It is likely that public preferences for carbon policies differ dramatically across contexts and geography.

In general, studies have avoided asking the public about a detailed carbon cap-and-trade program (e.g. Alberini et al. (2018)). However, there have been a few studies that have asked respondents about cap-and-trade programs. For instance, Kotchen et al. (2013) conducted a stated-preference survey that measured WTP for carbon reduction across different policy instruments (e.g. carbon tax, cap-and-trade, and a "policy to regulate carbon dioxide as a pollutant") and find no preference across instruments. However, their survey does relatively little to inform respondents about the various difference between these policies. Choi et al. (2018) and Baranzini et al. (2018) conduct surveys that focus on “offset” preferences, where offsets are one aspect of many carbon cap-and-trade programs.

To the best of our knowledge, the present study constitutes the most-detailed analysis of preferences for different possible attributes of alternative carbon cap-and-trade programs. Considering the leading role that carbon cap-and-trade programs are presently taking in climate change policy, this is an important contribution.

We also contribute to the body of work that measures public opinion regarding carbon policy at the state level (e.g. Holian and Kahn (2015), Burkhardt and Chan (2017), and Anderson et al. (2019)). Anderson et al. (2019) use voting data from two failed carbon tax bills in Washington State and find that political party affiliation is by far the biggest indicator of support or opposition to the policies, with political ideology accounting for 91% of the variation in vote shares across precincts. This finding is consistent with the broad review of climate change opinion surveys by Egan and Mullin (2017). While we rely on hypothetical advisory votes, we advance these studies by using individual-level data, rather than precinct-level data. This involves less measurement error than would be involved with the use of precinct-level averages as a proxy for individual characteristics.

Our study has the added benefit of measuring climate change policy opinions in a state (Oregon) that has recently experienced an onslaught of extreme temperatures and serious wildfires that are most likely attributable, at least in part, to the effects of climate change on long-term drought conditions. Using zip code information, we can match respondents to their local context, including local weather-related conditions, recent drought conditions, and wildfire exposure. This permits us to estimate the effects of exposure to some likely consequences of climate change on respondents' preferences for climate-change mitigation policy. This aspect of our analysis complements other work measuring the exposure effect (e.g. Spence et al. (2011), Bain et al. (2012), and Scannell and Gifford (2013)).

2 Basic Choice Model

2.1 Homogeneous preferences

Our choice experiments describe each potential cap-and-trade program in terms of nine attributes: (1) the monthly cost per household; (2) the percent change in carbon emissions (all negative); (3) the percent change in carbon-industry jobs (all negative); (4) the percent change in green-industry

jobs (all positive); (5) the percent of carbon emissions permits that would be auctioned to firms, rather than given away for free; (6)the percent of auction revenue that would be used to fund equipment/machinery as the economy adapt to carbon pricing; (7) the percent of auction revenue that would be used to help displaced workers or affected communities adapt to carbon pricing; (8) the percent of auction revenue that would be placed into the state's General Fund to replace existing taxes; and finally, (9) whether the program would include additional regulations on other co-pollutants, to prevent their levels from increasing around firms that may buy enough carbon permits to allow their emissions of carbon (and other co-pollutants) to increase.

Our model is based on the indirect utility of respondent i under carbon cap-and-trade Program A. Similar to the usual specification for a public policy choice model in the stated-preference literature, our simplest model is linear and additively separable in the attributes for each program:

$$
\begin{aligned}
(1) \qquad V_i^A = {} & \beta_1(Y_i - C_i^A) - \beta_2(\%\Delta carbon\ emissions)_i^A \\
& + \beta_3(\%\Delta carbon\ jobs)_i^A + \beta_4(\%\Delta green\ jobs)_i^A \\
& + \beta_5(\%permits\ auctioned)_i^A + \beta_6(\%revenue\ to\ equip)_i^A \\
& + \beta_7(\%revenue\ to\ workers)_i^A + \beta_8 \mathbf{1}(pollution\ regs)_i^A + \eta_i^A,
\end{aligned}
$$

Note that since the three percentages of auction revenue sum to 100, so we designate the percent of permit auction revenue going to the state's General Fund as the omitted category, with this share determined by the percentages not destined for the other two uses.

Indirect utility for respondent i under the status quo, V_i^N, involves no policy and therefore no decrease in household income, no carbon reduction, no changes in the numbers of carbon jobs or green jobs in the respondent's county, no auctioned permits and therefore no permit auction revenue to spend on equipment, workers, or to provide tax relief, and no extra regulations to prevent increases in local pollution. However, most researchers allow for some "inertia" associated with the status quo, and include a status quo indicator variable, $SQ^N = 1$ for the No Program alternative,

where $SQ^A = 0$ (implicitly) in equation (1) . This utility for the No Program alternative is given simply by:

$$V_i^N = \beta_1 Y_i + \beta_9 SQ^N + \eta_i^N, \tag{2}$$

since none of the features of Program A will be experienced.

Each respondent's choice between policy A and the status quo is determined by whether policy A yields greater utility. Let $\Delta V_i^A = V_i^A - V_i^N$ be the difference in indirect utilities for respondent i from policy A and the status quo option N, so that policy A is chosen if and only if $V_i^A \geq V_i^N$ or $\Delta V_i^A > 0$. Individual i's baseline level of income drops out, so our simplest linear-in-variables econometric specification is as follows.

$$\begin{aligned} \Delta V_i^A = {} & \beta_1(-C_i^A) + \beta_2(\%\Delta carbon\ emissions)_i^A \\ & + \beta_3(\%\Delta carbon\ jobs)_i^A + \beta_4(\%\Delta green\ jobs)_i^A \\ & + \beta_5(\%permits\ auctioned)_i^A + \beta_6(\%revenue\ to\ equip)_i^A \\ & + \beta_7(\%revenue\ to\ workers)_i^A + \beta_8 \mathbf{1}(pollution\ regs)_i^A - \beta_9 SQ^N + \varepsilon_i^A, \end{aligned} \tag{3}$$

where $\varepsilon_i^A = \eta_i^A - \eta_i^N$, an error term that is mean-zero.

The respondent is presumed to know their true utility for a specific program, and will vote for Program A if the utility difference, ΔV_i^A, is positive, and to vote against Program A if the utility difference is negative. The researcher, however, does not observe ε_i^A. The assumed distribution for this random error term determines the functional form of the log-likelihood function used to estimate the preference parameter vector $(\beta_1, ..., \beta_{10})$ in equation (6) via maximum likelihood methods.

If each individual in the sample is presented with $t = 1, ..., T$ choices, the joint probability

(likelihood) function for this conditional logit model is then given by

$$\mathscr{L}(\beta) = \prod_{i=1}^{N}\prod_{t=1}^{T}\prod_{j=1}^{J}\left(\frac{exp(V_i^{jt})}{\sum_{k=1}^{J} exp(V_i^{kt})}\right)^{y_{itj}} \tag{4}$$

where $y_{itj} = 1$ if alternative j is chosen and is zero otherwise. To yield a unique set of parameter estimates, it is necessary to normalize by differencing utility relative to a numeraire alternative—the No Program option in our case. For the numeraire alternative, the utility differences is zero so that term in the ratio becomes $exp(0) = 1$:

$$\mathscr{L}(\beta) = \prod_{i=1}^{N}\prod_{t=1}^{T}\prod_{j=1}^{J}\left(\frac{exp(\Delta V_i^{jt})}{1+\sum_{k=1}^{J-1} exp(\Delta V_i^{kt})}\right)^{y_{itj}} \tag{5}$$

In our data, there are only two alternatives in each choice set, but $T = 6$ choice sets: $j1 = (A,N)$, $j2 = (B,N)$, $j3 = (C,N)$, $j4 = (D,N)$, $j5 = (E,N)$, $j6 = (F,N)$. Thus the function is even simpler for each choice occasion when $J = 2$ (a binary conditional logit model):[5]

$$\mathscr{L}(\beta) = \prod_{i=1}^{N}\prod_{t=1}^{T}\prod_{j=1}^{J}\left(\frac{exp(\Delta V_i^{jt})}{1+exp(\Delta V_i^{kt})}\right)^{y_{itj}} \tag{6}$$

The fitted model can be used to solve for each respondent's marginal willingness to pay (WTP) for each of the policy attributes described in our choice tasks. For the homogeneous-preferences specification in equation (6), we set the utility difference, ΔV^A, equal to zero and solve for the program cost, C_i^{A*}, that would make their representative individual indifferent between paying the cost and enjoying the benefits of the program, or keeping the money and doing without the program. This maximum total willingness to pay for a policy with a specified set of characteristics

[5]The model is only slightly more complex if there is more than one choice set for each individual and we wish to accommodate similarities among the choices for any given individual.

will be given by:

$$(7) \qquad \widehat{WTP}_i^A = C_i^{A*} = \frac{\hat{\beta}_2}{\hat{\beta}_1}(\%\Delta carbon\ emissions)_i^A + \frac{\hat{\beta}_3}{\hat{\beta}_1}(\%\Delta carbon\ jobs)_i^A + \frac{\hat{\beta}_4}{\hat{\beta}_1}(\%\Delta green\ jobs)_i^A + \frac{\hat{\beta}_5}{\hat{\beta}_1}(\%permits\ auctioned)_i^A + \frac{\hat{\beta}_6}{\hat{\beta}_1}(\%revenue\ to\ equip)_i^A + \frac{\hat{\beta}_7}{\hat{\beta}_1}(\%revenue\ to\ workers)_i^A + \frac{\hat{\beta}_8}{\hat{\beta}_1}\mathbf{1}(pollution\ regs)_i^A - \beta_9(-1)$$

where in the difference between any program and the status quo, $\Delta SQ^N = -1$ for any active program. We take advantage of the mean-zero error term and predict WTP_i^A at the mean error.[6]

The parameters in this random utility model, when estimated by maximum likelihood, are distributed asymptotically joint normal (typically with non-zero covariances). Willingness to pay estimates, therefore, rely on one of several methods for accommodating the fact that the ratio of two normally distributed random variables has a mean that is undefined. Researchers often use the Krinsky and Robb (1986) parametric bootstrap simulation method, which relies on a large number of random draws from the joint distribution of the estimated parameter vector, with each draw being used to calculate marginal WTP for a given attribute, or total WTP (TWTP) for a specified program, according to the formula in equation (7). Over the large number of draws, a sampling distribution is built up for $\widehat{WTP}$. Descriptive statistics for the distribution of individual WTP function coefficients, or for total WTP, are calculated across all these random draws. Researchers typically use the mean and median, and the 90 or 95% interval, which function as point estimates and an interval measure for predicted marginal WTP for each program attribute in equation (7), or for total WTP.[7]

[6]The negative sign on the cost term in equation (6) means that after we set the utility-difference to zero and subtract cost term from both side, the negative sign conveniently cancels.

[7]Some alternative strategies for deriving interval estimates for either some marginal WTP or for TWTP include the

Marginal willingnesses to pay for each program attribute are simply one type of marginal rate of substitution that can be estimated using this choice model. Marginal rates of substitution between attributes A and B are given by the *negative* of the ratio of the marginal utilities for each attribute.[8] Equation (6) can likewise be used to quantify other types of tradeoffs that people are willing to make in considering carbon cap-and-trade policies, not just the tradeoff between income and the the other attributes of the program.

For example, another politically important feature of all these cap-and-trade programs is that they result in a loss of jobs in the carbon-intensive sector. Rather than thinking about willingness to pay (i.e. willingness to put up with higher costs for more of each other attribute), we can instead think about willingness to incur job losses in the carbon sector to enjoy the benefits of the policy. We could again set the utility difference equal to zero and solve for the $(\%\ carbon\ jobs\ lost)_i^A$ that would make people just indifferent between getting the carbon cap-and-trade program and its carbon-reduction benefits, along with those job losses, or forgoing the program and protecting those jobs. Willingness to swap (WTS) carbon-intensive jobs for a carbon-reduction program with a given set of other attributes could be calculated as:

$$\begin{aligned} WTS(\%\Delta carbon\ jobs)_i^A = & \frac{\hat{\beta}_1}{\hat{\beta}_3}(C_i^A) - \frac{\hat{\beta}_2}{\hat{\beta}_3}(\%\Delta carbon\ emissions)_i^A - \frac{\hat{\beta}_4}{\hat{\beta}_3}(\%\Delta green\ jobs)_i^A \\ & - \frac{\hat{\beta}_5}{\hat{\beta}_3}(\%permits\ auctioned)_i^A - \frac{\hat{\beta}_6}{\hat{\beta}_3}(\%revenue\ to\ equip)_i^A \\ & - \frac{\hat{\beta}_7}{\hat{\beta}_3}(\%revenue\ to\ workers)_i^A - \frac{\hat{\beta}_8}{\hat{\beta}_3}\mathbf{1}(pollution\ regs)_i^A \end{aligned}$$

delta method and Fieller's method. Hole (2007) developed an add-in for Stata (wtp.ado) that can calculate marginal WTP measures in clogit models that are linear and additively separable. Another Stata add-in (wtpcikr) supports models that are either linear or logarithmic in the additively separable net income variable and can be used following probit, logit or bivariate probit commands.

[8]For the WTP calculations, cost C_i^A is technically the attribute of the program, but we model net income as the factor that drives utility for the consumer. The marginal rate of substitution between program attributes and net income ($Y_i - C_i^A$) is positive, although the marginal rate of substitution between program attributes and cost itself (C_i^A, a "bad") would be negative, since more of some desirable attribute would be required to make up for a higher cost.

It can be challenging to keep track of the signs on the variables in the data and how these interact with the signs on the marginal utilities that are specifically associated with *increases* in these variables. For example, all cap-and-trade programs offered in the survey have $(\%\Delta carbon\ emissions)_i^A < 0$ and $(\%\Delta carbon\ jobs)_i^A < 0$). But they likewise have $(\%\Delta green\ jobs)_i^A > 0$. The marginal utility of net income, β_1, is expected to be positive. The marginal utility for an increase in carbon emissions, β_2 should be negative, at least if the average person is concerned about the negative effects of climate change.

The marginal utilities of (increases in) carbon-intensive jobs and green-industry jobs, β_3 and β_4, should both be positive (assuming jobs are good). We have no priors, however, about the signs of the coefficients on the other program attributes: β_5, β_6, β_7, β_8 and β_9. Preferences about ways in which the programs could be implemented, and therefore the possible distributional consequences of these programs, remain an empirical question, and these preferences may be heterogeneous within the sample.

Note that using intuition analogous to that for marginal WTP estimates, equation (**??**) allows us to determine, for example, what percent of jobs in carbon-intensive industries in their county people would be willing to give up to achieve a given percent *reduction* in carbon emissions, holding all other program characteristics constant. This is an elasticity-type measure. Likewise, we can use this equation to determine what percent of jobs in carbon-intensive industries in their county people would be willing to give up to get given percent increase in the number of green jobs in their county via a cap-and-trade program, holding all other program attributes constant.

Finally, there is also an analog to the concept of a total willingness to pay. If we are given the cost and effectiveness of a carbon cap-and-trade program, along with the percent increase in green jobs that would result, as well as the five variables that define how the program would be implemented, equation (**??**) can tell us what percentage of jobs in carbon-intensive industries people would be willing to sacrifice, in that context, to achieve a one percent decrease in carbon

emissions.[9]

2.2 Heterogeneous preferences

2.2.1 Mixed logit models

Mixed logit models are *continuous* mixture models. The mixed logit model starts from a homogeneous-preferences specification as in equation (6). However, instead of assuming that each marginal utility parameter is a true but unknown constant, identical for everyone in the sample, the mixed logit allows some or all of the marginal utilities to have a distribution across the population. An explicit functional form must be selected for the assumed distribution of each parameter, and the goal of estimation shifts to estimation of the central tendency and dispersion of these parameters in the population. Instead of just estimating the expected value of marginal utility, therefore, we typically estimate both the mean and the standard deviation of the *distribution* of that marginal utilities, across the population. These distributions accommodate "unobserved heterogeneity" in preferences. We do not seek to attribute this heterogeneity to any specific, observable respondent characteristics. Instead, we merely permit heterogeneity in preferences to exist.

Mixed logit probabilities are the integrals of ordinary conditional logit probabilities, with the integrals taken over the density function for the random parameters in the model. Suppose we begin with the conditional logit choice probabilities that individual i will select alternative j, where we now denote this logit probability as L_{ij}. We now normalilze on alternative J, to permit unique estimates of the parameters β:

$$L_{ij}(\beta) = \frac{exp(\Delta V_i^{jt})}{1 + \sum_{k=1}^{J-1} exp(\Delta V_i^{kt})} \tag{8}$$

[9] A bootstrap approach, or the delta method, or Fieller's method would likewise need to be used to provide point and interval estimates for this percentage, since we are still dealing with ratios of utility parameters estimated by maximum likelihood.

The mixed-logit probability that individual i will select alternative j is given by:

$$P_{ij}(\beta) = \int L_{ij}(\beta) f(\beta) d\beta \tag{9}$$

where $f(\beta)$ is the density function for the parameter vector that accommodates unobserved heterogeneity in preferences, and the observed portion of utility, V_i^{jt} (which captures at least the baseline attributes of each alternative, as featured in equation (1)), is embedded in the $L_{ij}(\beta)$ term. The mixed logit probability formula can be interpreted as a weighted average of the standard conditional logit formula evaluated at all the different values of the parameter vector β, where the weights are given by the parameter density function $f(\beta)$, also known as the "mixing distribution." We note that if the mixing distribution is degenerate at a set of fixed β parameters, the mixed logit model collapses to just the standard conditional logit model. If the mixing distibution is discrete, the mixed logit model becomes the latent class model (i.e. a finite mixture model) described in the next section.

Mixed logit estimation algorithms permit the user to choose among a variety of distributions for each parameter. If the parameter vector is assumed to be multivariate normal with mean vector b and covariance matrix W, then the mixed-logit choice probabilities are given by:

$$P_{ij} = \int \left(\frac{exp(\Delta V_i^{jt})}{1 + \sum_{k=1}^{J-1} exp(\Delta V_i^{kt})} \right) \phi(\beta | b, W) d\beta \tag{10}$$

A log-normal distribution is sometimes chosen, however, because of its ability constrain the sign on a parameter. Parameters can be individually noisy but independent, or they can also be correlated across individuals in the sample. For example, people with a higher-than-average marginal (dis)utility from losses of jobs in the carbon-intensive sector may also derive lower-than-average marginal utility from gains of jobs in the green sector. These could be older workers with less ability to change careers. Other people in the sample may have a lower-than-average (dis)utility from losses of carbon jobs but a higher-than-average marginal utility from gains in green jobs.

These folks could be younger and still flexible in their career choices. A mixed logit with correlated preference parameters permits these more-general forms of heterogeneity in preferences while still permitting us to estimate 'average" preferences for use in scaling WTP estimates from a representative sample to the entire population.

In cases where there is more than one choice per individual, there may be some commonality among different choices by the same individual. In estimation of the mixed logit by maximum simulated likelihood methods, it is appropriate to make one draw from the joint distribution of the preference parameters *per individual*, rather than separate draws for each choice occasion.

Mixed-logit models that allow for unobserved variation in preferences are relatively parsimonious. For our model in equation (6), there are eight basic marginal utility parameters. If we allow each of these parameters to be random but independent, the parameter space expands to 16. If we had enough data to permit all parameters to be random and also correlated across respondents, there would be eight parameter means and eight corresponding parameter standard errors to estimate, along with the $8(8-1)/2 = 28$ off-diagonals of the symmetric parameter covariance/correlation matrix to estimate. Random parameters mixed-logit models, especially when there are repeated choices for each respondent, can greatly improve a researcher's ability to estimate the average preferences in the population, controlling for unobserved heterogeneity. But mixed logit models do not help us identify interesting systematic variation in preferences according to observed respondent characteristics—namely *observed* preference heterogeneity that may be very important to our understanding of the *distributional consequences* of a policy, when we are likely to need to understand which groups of people are willing to pay more for these programs (i.e. will derive greater benefits) and which are willing to pay less (i.e. will derive lesser benefits).[10]

[10]For the preliminary results reported in this version of the paper, we use Stata's mixlogit algorithm. For subsequent versions of the paper, we expect to shift to the specialized choice-modeling algorithms offered in Apollo, a software package based on the R language, offered by the Choice Modelling Centre at Leeds University in the UK.

2.2.2 Latent class models

Many researchers working with choice data now entertain latent-class models. In these models, it is assumed that respondents' preferences are a finite mixture of a small number of underlying preference types, each with it own vector of preference parameters, β_c, for each preference class c, entering into the expression for ΔV_i^{jt}. Within preference class c, individual i's choice probabilities are given by:

$$P_i(\beta_c) = \prod_{t=1}^{T} \prod_{j=1}^{J} \left(\frac{exp(\Delta V_i^{jt})}{1 + \sum_{k=1}^{J-1} exp(\Delta V_i^{kt})} \right)^{y_{itj}} \tag{11}$$

These latent preferences are assumed to be homogeneous within class c, so that only the linear-in-variables preference parameters $\beta = (\beta_1, ..., \beta_9)$ would be estimated for each class.

The difference from the split-sample model in equation (**??**), however, is that we *do not observe* class membership. Instead, preference class membership is only *probabilistic*. These distinct sets of preference parameters are subsumed in a model that also employs a class membership equation. The respondent's latent *class membership* probability depends not on the attributes of the different cap-and-trade programs, but exclusively on the individual or neighborhood characteristics of the respondent. Let s_i be a vector of such (typically sociodemographic) characteristics for respondent i or the population in their geographic area (e.g. ZIP code, county, etc.).

These respondent characteristics do not differ across alternatives in the program choice tasks, so the class-membership part of the model takes the form of a so-called multinomial logit model, where the probability of belonging to a particular class involves a different set of multinomial logit coefficients for each class (and the coefficients are normalized to zero for an arbitrarily designated numeraire class). The same set of respondent characteristics leads to different probabilities of belonging to each preference class only because the *coefficients* that multiply these characteristics differ across classes. Thus if there are C different preference classes, there will be $C-1$ sets of coefficients on the vector of respondent or neighborhood characteristics that determine the

probabilities of class membership. Then, conditional on class membership, the model embeds a conventional conditional-logit-type choice model for each class that involves homogeneous preferences within that class.

The the probability that individual i belongs to preference class c is given by the multinomial logit probability:

$$\pi_{ic}(\theta_c) = \frac{exp(s_i\theta_c)}{1+\sum_{l=1}^{C-1} exp(s_i\theta_l)} \tag{12}$$

where the vector s_i typically includes a constant term and θ_c is a conformable vector of class-membership model coefficients for class c, with θ_C normalized to 0 for identification (i.e. so that the θ vectors are uniquely estimated). The full set of class membership coefficients is then $\Theta = (\theta_1, ...\theta_{C-1})$. For the full latent class model, the joint likelihood of individual i's choice will then be:[11]

$$\mathscr{L}(B,\Theta) = \sum_{c=1}^{C} \pi_{ic}(\theta_c) P_i(\beta_c) \tag{13}$$

Latent class models can be somewhat balky to estimate when there are many respondent characteristics to consider. Suppose there are k_1 individual or neighborhood characteristics for respondents, k_2 carbon cap-and-trade program attributes, and C latent classes are being entertained. Then the parameter space for the model will be on the order of $(C-1)\times k_1 + C \times k_2$. The greatest success generally comes from starting with an extremely parsimonious specification and gradually adding more respondent characteristics (implicitly freeing up their coefficients to be non-zero). For each additional program attribute, C additional parameters are added to the model. For each additional respondent characteristic, $C-1$ additional coefficients are added. For each additional class of preferences, $k_1 + k_2$ more parameters must be estimated.[12]

[11] For repeated choices by the same individual, the model can be estimated to allow for commonalities in choices within an individual.

[12] For the results presented in this version of the paper, we use Stata's lclogit2 algorithm to search for a set of

2.2.3 Preferences that vary systematically with observable respondent characteristics

When the researcher has a wealth of information about respondent characteristics, it is possible to estimate models where each marginal utility parameter in the choice model is permitted to vary systematically as a function of these characteristics, as indicated by the data. We reserve for future extensions of this paper a set of specifications that accommodate this "observable" preference heterogeneity via interaction terms between program attributes and respondent characteristics, as selected by LASSO methods. Specifications such as these can be very useful in helping to establish the so-called construct validity of the preference estimates. If marginal utilities vary in ways one would expect across people with different characteristics, these relationships add credence to the empirical results.

3 Outline of Survey and Data

3.1 Sketch of the survey instrument

Our survey was initially drafted in the lead-up to the consideration of Oregon House Bill 2020 in the winter of 2019, but the state legislature's vote on that bill never took place because the Republican house members left the state to prevent the Democratic members from reaching a quorum. Thus we shelved the project for several months until Oregon Senate Bill 1530 was proposed for the 2020 session, when the same exodus of Republican representatives occurred. After the 2020 legislative session concluded, however, Oregon experienced the worst wildfire season in years, and significant drought conditions continue. We resolved to redesign the cap-and-trade survey and use it to try to determine which features of a potential cap-and-trade program might account for heterogeneity in support. Casual empiricism suggests that attitudes toward climate change are

parameter estimates that brings us close to the maximum likelihood solution but does not produce a parameter variance-covariance matrix. These estimates are then used as starting values for the follow-on algorithm, lclogitml2, to attain the maximum likelihood solution and produce the parameter variance-covariance matrix needed for hypothesis testing and for the calculation of WTP estimates. In future versions of the paper, we expect to use Apollo's R-based altorithms.

determined predominantly by partisanship. The goal of our survey, therefore, is to explain some of the options for cap-and-trade program design and to learn whether support for cap-and-trade programs in Oregon varies only with political ideology, or whether there is evidence of systematic differences in support as a function of program attributes, other individual characteristics, or neighborhood characteristics for the respondent.

The survey was developed during the winter and spring of 2021, and the full launch commenced on August 5, 2021. Quota sampling was used to produce an sample of completed responses for which the marginal distributions of age (over 18), gender, race, and household income are consistent with the marginal distributions for these variables in the population of Oregon.

The structure of our survey is described in detail in Appendix B. One instance of the randomized survey instrument, as it would be viewed by a respondent, is included as Appendix G.

3.2 Sample Selection

One challenge in using data based on a voluntary survey is the distinct possibility of sample selection bias. If characteristics that determine an individual's propensity to complete the survey also systematically affect their WTP for these program, then the WTP estimates from a naive model risk being biased. For instance, if people who work in the logging industry are less likely to complete our survey *and* have a lower WTP for carbon emission reduction then we will tend to overestimate WTP for carbon emission reductions in the general population of the state. On the other hand, if people in higher income brackets have higher marginal values of their time and are thus less likely to take the survey, and these higher-income people are also more willing to pay the costs of a carbon cap-and-trade program , then we will tend to underestimate the WTP in the general population. Given the highly politicized and socially polarizing nature of climate change policies we are acutely aware of the necessity of evaluating our data for sample bias, and to correct for this bias if it exists.

To address sample selection, we leverage a set of "screening" sociodemographic variables

elicited from all survey invitees, including those who drop out after learning the survey's topic. These variables include self-reported age, gender, race, and income bracket, as well as the potential respondent's ZIP code of residence). Based on the ZIP code information for the respondent's neighborhood (we asked respondents to report their neighborhood ZIP code if they collected their mail from a PO Box), we merge in a host of external information that can be geographically indexed to ZIP codes or their centroids.[13]

The external data sets we employed to create profiles of each respondent's neighborhood include: the American Community Survey 5-year ZCTA-level data (2014-2019), the MIT Election Data and Science Lab's County Presidential Election Returns (2020), Oregon State Office Returns for 2016 state legislative district votes (by major party), drought data from National Drought Mitigation Center, and wildfire data from Wildland Fire Decision Support System. We create population proportion sociodemographics (e.g. share of the population for each ZIP code that has access to the internet) as well as a number of climate-related statistics for each zip code (e.g. Drought Monitor rating, or distance to the nearest wildfire in 2020). The zip-code-level profiles are constructed to capture political ideologies, salience of climate change, and other sociodemographics that we hypothesize may impact each potential respondent's prpensity to continue with the survey, to completion, after learning its topic.

We use a probit model to estimate each *eligible* potential respondent's propensity to complete the survey. We then allow the fitted propensity to shift all of our estimated preference parameters. This ad hoc correction approach allows us to simulate, counter-factually, what would have been the marginal utility from each program attribute had everyone in the estimating sample been equally as likely to complete the survey as the average for all eligible respondents.

It should be noted that while we correct for sample selection in terms of the willingness of individuals to complete a carbon cap-and-trade survey, another potential type of sample selection

[13] Additionally, a handful of other survey response variables are know for all respondents (e.g. day survey was taken and if the survey was taken on a mobile device).

remains unavoidable: people who are willing to take an (internet) survey upon an invitation from Qualtrics may not be representative of the general population. While this other form of sample selection is perhaps of lesser concern, it exists nonetheless and is difficult to address.

4 Estimation and Results

4.1 Sample Selection

4.1.1 Inventory of candidate explanatory variables

To correct for sample selection, we use a probit model to estimate propensity to complete the survey. When creating the zip-code-level profiles, we cast a wide net to find candidate explanatory variables. It is not feasible to include, simultaneously, the full set of variables (self-reported screening sociodemographic variables from the survey and all the available zip code variables, and their interactions) in the probit model. Thus we resort to LASSO methods, in R, to pair down the list of potentially useful explanatory variables.

Variables included in LASSO estimation must be available for every potential respondent who cleared the quota-based the screening process (i.e. reported their age, income, gender, race, and zip code) and made it to the consent page (where they learn the topic of the survey)). If respondents dropped out at any point after the screening process, they are considered non-respondents and get the value of 0 for the indicator variable *Got to end of survey*. In addition to being zero for cases of attrition, the variable *Got to end of survey* will take on the value of 0 if the survey response is deemed to be of insufficient quality (e.g. where the respondent gave nonsense answers to questions that required a typed response, or when the total time to complete the survey was too little to have permitted anyone to have read the questions adequately to provide an informed response (i.e. less than 7.5 minutes). See Appendix C for details.

Table 1 shows the descriptive statistics for the available explanatory variables that LASSO

methods determine to be relevant in predicting people's propensities to respond to the survey. The variables shown were retained by LASSO estimation either individually or as part of a pairwise interaction. The first row, *Outcome: 1=Got to the end of the survey*, is the response rate for this survey. This relatively high response rate, about 65%, may reflect Oregonians' strong feelings (both positive and negative) toward climate policy. Rows *1=Gender female* through *1=Used a mobile device* represent information collected by the survey for all individuals who make it through the screening process. The variables in the subsequent rows are for the respondent's ZIP code (Census ZCTA), county, or other geographic proximity.

Table 1: Descriptive statistics: individual explanatory variables used in response/non-response models (retained by LASSO estimation either individually or as part of a pairwise interaction term)

	mean	sd
Outcome: 1=Got to end of survey	0.644	0.479
1=Gender:Not male	0.547	0.498
1=Gender:Male	0.453	0.498
1=Own age:18 to 24	0.129	0.336
1=Own age:25 to 34	0.247	0.431
1=Own age:35 to 44	0.174	0.379
1=Own age:45 to 54	0.112	0.315
1=Own age:55 to 64	0.132	0.338
1=Own age:65 and up	0.206	0.405
1=Own age:75 and up	0.058	0.234
1=Own hhld inc:100-125K	0.121	0.327
1=Own hhld inc:150-175K	0.029	0.167
1=Own hhld inc:175-200K	0.020	0.139
1=Own hhld inc:220K up	0.040	0.197
1=Own hhld inc:30-50K	0.127	0.333
1=Own hhld inc:50-75K	0.204	0.403
1=Own hhld inc:75-100K	0.133	0.339
1=Own hhld inc:lt 20K	0.142	0.349
1=Race:Black	0.041	0.199
1=Race:White	0.834	0.372

Continued on next page

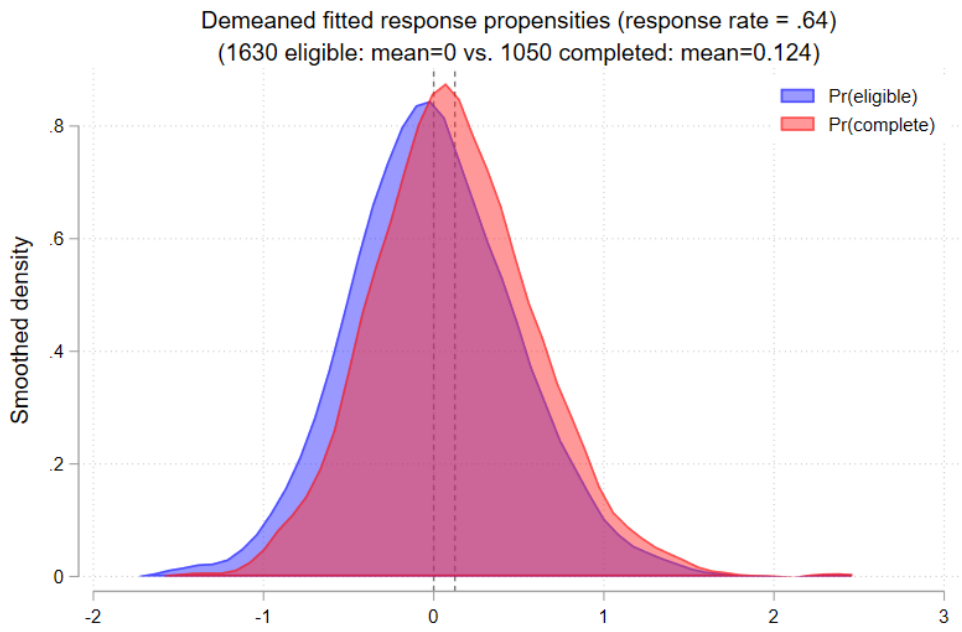
Table 1 – continued from previous page

1=Started survey on Fri	0.119	0.324
1=Started survey on Mon	0.187	0.390
1=Started survey on Sat	0.183	0.387
1=Started survey on Sun	0.177	0.382
1=Started survey on Thu	0.102	0.303
1=Started survey on Wed	0.121	0.327
1=Used a mobile device	0.678	0.467
CDC SVI cnty-Hsg type, transp.	0.747	0.213
County pr: Dial-up internet	0.003	0.002
County pr: Internet w/o subsc.	0.025	0.012
County pr: No internet	0.065	0.033
County pr: Other internet	0.010	0.011
County pr: Satellite internet	0.047	0.026
Dist. nearest wildfire 2010-19	93608.087	51393.059
Dist. nearest wildfire 2020	0.268	0.179
Sq. miles; nearest wildfire 2020	71.629	118.484
ZCTA pr:Asian	4.554	4.938
ZCTA pr:Black	1.978	2.547
ZCTA pr:Other race	3.014	2.855
ZCTA pr:Two or more races	4.913	1.813
ZCTA pr:Below poverty line	0.127	0.093
ZCTA pr:Inc gt 1.5 pov. level	0.780	0.089
ZCTA pr:Income 35 to 50K	0.126	0.021
ZCTA pr:Indus:Arts/ent.	9.926	3.490
ZCTA pr:Indus:Profsci.	11.099	4.197
ZCTA pr:Indus:Publ. adm.	13.902	5.188
ZCTA pr:Indus:Transp.	4.392	1.848
ZCTA pr:Indus:Wholes.	2.663	1.245
ZCTA pr:Internet access	86.081	5.328
ZCTA pr:Live in rural area	0.155	0.238
Observations	1630	

4.1.2 Selection model

We use a probit model to estimate response propensities for a model that uses the explanatory variables (levels and interactions) that are retained by our LASSO models. Table 1). Identical to the outcome variable for the LASSO selection model, the probit model's outcome variable is equal to 1 if the respondent completed a survey that passed basic quality checks, and equal to 0

Figure 1



otherwise. The fitted response propensities are the relevant product of the model, so we relegate the individual selection model parameter estimates to Appendix C.

The variables selected by LASSO are used to estimate the probit model shown in Table C1, and the fitted model is used to calculate a response propensity for each person in the sample of eligible respondents (recall those who cleared the screening process to the point of encountering the subject of the survey are eligible. We subtract from each individual's response propensities our estimate of the mean response propensity in the eligible group. In the Figure 1, we plot the distribution of these response propensities for the entire eligible group and for the subset of respondents who completed the survey with responses that passed our basic quality assessment. In the kernel density for each group, we include vertical lines at zero for the "eligible" group, and at the mean (0.073) of the de-meaned response propensity when the sample is limited to just the respondent group.

4.2 Program choice model: Homogeneous preferences

Our choice experiments involve binary choices between one cap-and-trade program and the status quo. Each of our six cap-and-trade programs is described in terms of a common set of attributes. The cost of the program is in dollars per household per month. The benefit from the program is the *percentage change in carbon emissions* to be achieved with the program (always negative). Other attributes of the program include its consequences in terms of jobs: the expected *percentage-point change in carbon-intensive industry jobs* (always negative), and the *expected percentage-point change in green industry jobs* (always positive). Other program attributes include the *percentage share of carbon permits that will be auctioned*, and for permit auction revenues, the *percentage share that will be spent on equipment and machinery* that will help households and industries adapt to a lower-carbon economy, and the *percentage share that will be spent to help workers and communities* adapt to the new conditions. The remaining percentage share of revenues (the omitted numeraire share) will be added to Oregon's General Fund and used to replace other existing tax revenues.[14]

Table 2 gives descriptive statistics for the different cap-and-trade programs offered to respondents; each respondent sees a different set of six randomly generated programs, called A through F. Our sample of 6252 programs reflects six program choices for each of 1042 respondents.

Table 2: Descriptive statistics for cap-and-trade programs. Observations = programs (i.e. attributes of alternative 1; six programs per respondent)

	mean	sd
1=chosen alternative	0.471	0.499
Monthly cost	195.306	101.871
Prop change in C emissions	-0.456	0.226
Prop change in carbon jobs	-0.112	0.064
Prop change in green jobs	0.110	0.062

Continued on next page

[14] See Appendix E for details on how the choice sets were generated for our cap-and-trade program alternatives.

Table 2 – continued from previous page

Share of permits auctioned	0.458	0.230
Share of rev. for equip.	0.304	0.213
Share of rev. to workers	0.305	0.215
1=New regs other pollut.	0.495	0.500
1=Status quo alternative	0.000	0.000
Observations	6300	

Our simplest program choice specification is shown as Model (1) in Table 3. The respondent's choice between the program being offered and "No Program" depends on all of the program attributes as well as the usual "Status quo" indicator variable. The coefficient on "Status quo" conveys the extent to which respondents are systematically more or less likely to choose "No Program" regardless of the attributes of the particular cap-and-trade program they are being offered.

Table 3: Comparison of marginal utilities for homogeneous conditional logit, logit with ad hoc selection terms, and logit with ad hoc selection correction only for the marginal utility associate with the green jobs attribute

	(1) Homogeneous preferences	(2) Add selection correct. terms	(2) Selection for green jobs only
1=chosen alternative			
Monthly cost	-0.00308***	-0.00311***	-0.00309***
	(0.000291)	(0.000295)	(0.000290)
(Monthly cost) × (dm:$\hat{RP}$)		0.000505	
		(0.000864)	
Prop change in C emissions	-0.471***	-0.469***	-0.467***
	(0.139)	(0.141)	(0.139)
(Prop change in C emissions) × (dm:$\hat{RP}$)		0.0183	
		(0.413)	
Prop change in carbon jobs	1.438***	1.460***	1.420***
	(0.448)	(0.456)	(0.448)

Continued on next page

Table 3 – continued from previous page

(Prop change in carbon jobs) × (dm:$\hat{RP}$)		-0.392	
		(1.299)	
Prop change in green jobs	0.860*	1.101**	1.115**
	(0.454)	(0.471)	(0.466)
(Prop change in green jobs) × (dm:$\hat{RP}$)		-2.636*	-3.147***
		(1.407)	(0.633)
Share of permits auctioned	0.0369	0.0764	0.0385
	(0.117)	(0.120)	(0.117)
(Share of permits auctioned) × (dm:$\hat{RP}$)		-0.634*	
		(0.341)	
Share of rev. for equip.	-0.205	-0.212	-0.216*
	(0.128)	(0.132)	(0.128)
(Share of rev. for equip.) × (dm:$\hat{RP}$)		-0.0528	
		(0.382)	
Share of rev. to workers	0.171	0.119	0.143
	(0.127)	(0.130)	(0.127)
(Share of rev. to workers) × (dm:$\hat{RP}$)		0.399	
		(0.361)	
1=New regs other pollut.	0.185***	0.200***	0.187***
	(0.0528)	(0.0540)	(0.0529)
(1=New regs other pollut.) × (dm:$\hat{RP}$)		-0.197	
		(0.157)	
1=Status quo alternative	-0.225*	-0.227*	-0.233**
	(0.115)	(0.117)	(0.115)
(1=Status quo alternative) × (dm:$\hat{RP}$)		-0.0691	
		(0.335)	
Max. log-likelihood	-4269.76	-4251.89	-4255.88
No. respondents	1050	1050	1050
No. choices	6300	6300	6300
No. alternatives	12600	12600	12600
SBC reduct. (dollars/ton)	47	47	47
MRS(cbn jobs, grn jobs) @ mix now	1.89	1.5	1.44
	(4.16, -.37)	(3.06, -.05)	(2.91, -.03)

Continued on next page

Table 3 – continued from previous page

MWTP(Prop change in C emissions)	-152.61	-150.76	-151.08
	(-237.58, -67.64)	(-236.53, -64.97)	(-236.06, -66.09)
MWTP(Prop change in carbon jobs)	466.30	468.94	459.23
	(169.66, 762.93)	(169.54, 768.34)	(163.36, 755.09)
MWTP(Prop change in green jobs)	278.97	353.78	360.74
	(-12.73, 570.66)	(52.19, 655.37)	(60.21, 661.26)
MWTP(Share of permits auctioned)	11.97	24.53	12.46
	(-62.12, 86.07)	(-50.02, 99.09)	(-61.43, 86.35)
MWTP(Share of rev. for equip.)	-66.36	-68.25	-69.85
	(-148.88, 16.16)	(-152.45, 15.94)	(-152.47, 12.77)
MWTP(Share of rev. to workers)	55.32	38.08	46.31
	(-26.20, 136.85)	(-44.25, 120.41)	(-34.89, 127.51)
MWTP(1=New regs other pollut.)	60.12	64.10	60.39
	(24.69, 95.53)	(27.84, 100.36)	(24.95, 95.82)
MWTP(1=Status quo alternative)	-72.84	-72.80	-75.23
	(-143.92, -1.74)	(-145.02, -.58)	(-146.13, -4.31)

Coefficient standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model (1) in Table 3 reveals that in this simple linear and additively separable specification, the monthly cost and the change in carbon emissions that the program would bring about are both statistically significant and with the expected signs. (The changes in carbon emissions are negative, so the the negative coefficient implies that reductions in carbon emissions with increase utility.) Both carbon-intensive industry jobs ("carbon jobs") and green-industry jobs ("green jobs") in the respondent's county confer statistically significant positive marginal utility. Thus the losses in carbon jobs under each cap-and-trade policy will decrease statistically significant disutility. Green industry jobs also have significant positive marginal utility.

On average, in this fixed-coefficient specification, respondents may derive positive utility from a greater share of auctioned permits, but this effect is not statistically significant. On average, in terms of the point estimates, respondents may tend to derive positive marginal utility if more of the permit auction revenue is spent to help households and firms buy lower-carbon equipment and machinery. Likewise, they may derive positive marginal utility from auction revenue going to displaced workers and communities. However, neither of these preferences are statistically signif-

icant. However, there is a strong positive statistically significant utility associated with additional regulations to limit other pollutants. The status quo effect is negative, overall, suggesting that respondents, on average, prefer some cap-and-trade program to no program.

For most of our tables of choice model estimates, the bottom panel features a point estimate of the social benefits from a reduction of one ton of carbon emissions (SBC). These numbers can, in principle, be compared to measures in the literature for the social cost of carbon (SCC). Our SBC estimates, for Oregon, are based on the estimated marginal willingness to pay (MWTP) for a one percentage-point reduction in Oregon's carbon emissions. Respondents were shown graphics during the survey that conveyed that the approximate aggregate annual carbon emissions for Oregon at present is about 64 million metric tons, so total carbon emissions per month average about 5,333,333 tons. A 1.0 proportional change in these emissions would thus be about 5,333,333 tons per month. The total number of households in Oregon is about 1,649,000. Thus whatever estimate we get for the $MWTP_{emissions}$ needs to be multiplied by $\frac{1{,}649{,}000}{5{,}333{,}333}$ to yield the aggregate willingness to pay by Oregon households to have Oregon's carbon emissions reduced by 1 metric ton. According to Model 1 in Table 3, this SBC estimate is about \$46/ton of carbon.

A second measure of interest included in the bottom panel of each table is a point estimate of the marginal rate of substitution (MRS) between carbon jobs and green jobs. This measure involves the estimated coefficients on the proportional change in carbon jobs and the proportional change in green jobs, in the respondent's own county, as a result of these cap-and-trade programs. The ratio of the two coefficient is:

$$\begin{aligned} \frac{\beta_{\text{Prop change in carbon jobs}}}{\beta_{\text{Prop change in green jobs}}} &= \frac{\partial(\text{Green jobs})/\text{Green jobs}}{\partial(\text{Carbon jobs})/\text{Carbon jobs}} \\ &= \left[\frac{\partial(\text{Green jobs})}{\partial(\text{Carbon jobs})}\right]\left[\frac{\text{Carbon jobs}}{\text{Green jobs}}\right] \end{aligned} \tag{14}$$

so that the MRS (i.e., the number of green jobs willingly sacrificed to keep one carbon job):

$$MRS(\text{Carbon jobs, Green jobs}) = \frac{\partial(\text{Green jobs})}{\partial(\text{Carbon jobs})} \tag{15}$$

$$= \left[\frac{\beta_{\text{Prop change in carbon jobs}}}{\beta_{\text{Prop change in green jobs}}}\right]\left[\frac{\text{Green jobs}}{\text{Carbon jobs}}\right]$$

Alternatively, if we wish to know how many green jobs people would require, on average, to make up for the loss of one carbon job, we would use the negative of this MRS. The ratio of the two coefficients is constant, but the MRS also depends on the ratio of green jobs to carbon jobs. Thus we cannot quote a specific willingness to be compensated by green jobs for lost carbon jobs without specifying the ratio of these two types of jobs. The MRS will be smaller when there are relatively more carbon jobs and fewer green jobs. It will be larger when there are relatively fewer carbon jobs and more green jobs. As a representative ratio of green jobs to carbon jobs, we will use the state-level ratio, and report a point estimate and a confidence interval for this representative MRS (when interval estimates are available). However, a separate MRS could be calculated for each county in the state.[15]

The bottom panels of our tables of marginal utility estimate also provide estimates of the marginal willingness to pay (MWTP) for each attribute, along with a confidence interval when interval estimates are available. For Table 3, calculations for the confidence intervals employ the delta method.[16]

Model (2) in Table 3 shows the logit estimates after our ad hoc selection correction is employed for all of the marginal utility parameters in the basic model. The only statistically significant difference between our Model (1) estimates and Model (2) is for the proportional change in green jobs. After selection correction, we see that the coefficient on marginal utility for green jobs increases in magnitude and remains positive and statistically significant at the 5% level. The neg-

[15] We plan to calculate each of these county-level predicted MRS measures for a later version of this paper.

[16] These interval estimates are derived using Stata's WTP.ado add-in.

ative coefficient on the interaction between the green jobs attribute and the demeaned selection propensity indicates that the *more* likely a respondent is to participate in the survey, the *lower* their marginal utility from an increase in green jobs.[17] Model (3) in Table 3 provides the parameter estimates when a selection correction term is included only for the marginal utility associated with changes green jobs. Model (3) involves eight parameter restrictions relative to Model (2), but the maximized log-likelihood increases by only about three points, suggesting that the restrictions embodied in Model (3) cannot be rejected.

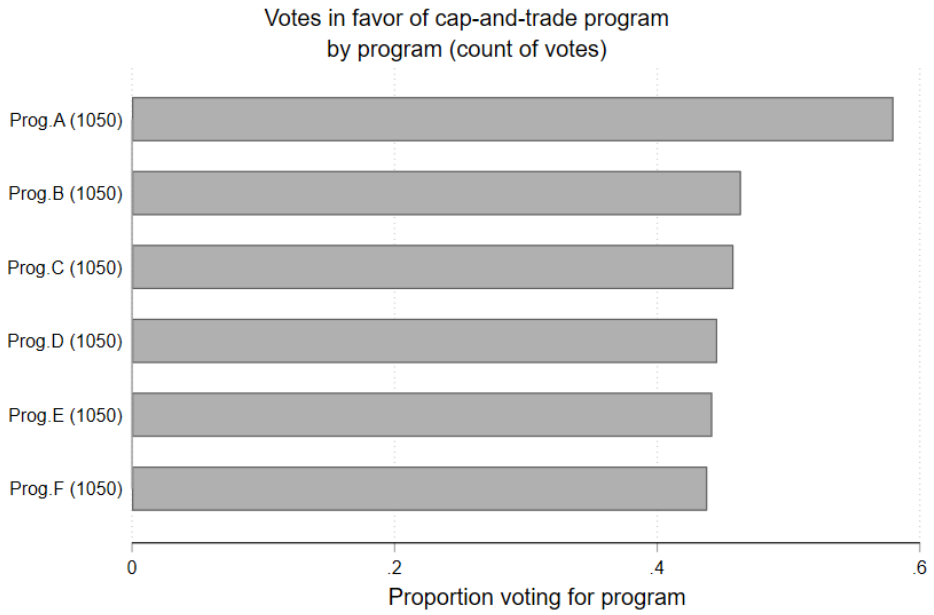
4.2.1 Program A Differentials

Our respondents seem to be systematically more likely to vote "Yes" for Program A than for the other programs they were offered. The proportion of respondents voting "yes" on each of the six programs should be constant, since all programs were randomized. But Figure F12 shows a systematically larger share of yes votes for Program A.

Respondents are reminded before every choice that they should consider each choice task independently, assuming that particular program is the *only* one being put to a vote. Despite these exhortations, it seems that respondents are systematically more likely to choose the first program. However, Table 4 reveals that the cost attribute, the percent change in carbon emissions, and the percent share of auction revenue going to equipment bear statistically significantly different marginal (dis)utility between the first choice task and the other five. The disutility from the cost of Program A is much smaller than that for the remaining programs. For Programs B through F, this marginal utility is -0.00343, but for Program A it is (-0.00343 + 0.00153) = -0.00190. Given that this cost coefficient serves as the denominator in WTP estimates for all of the other attributes, the implication is that the marginal WTP for every program attribute, as well as TWTP for the program as a whole, is larger in absolute value for the first choice task. The marginal utility associated with

[17]The sign of this coefficient runs counter to our initial expectation. One possible explanation is that there are two types of people who are likely to take the survey: a group that is strongly in favor of cap-and-trade programs and a group that sees climate policy and especially green jobs as a threat to their well-being.

Figure 2



the share of permit revenue going to equipment are also marginally significantly different between Program A and the other programs.[18]

Table 4: Comparison of marginal utilities for homogeneous conditional logit and Program A differential

	Homogeneous	Diff't Prog. A
1=chosen alternative		
Monthly cost	-0.00308***	-0.00333***
	(0.000291)	(0.000324)
... × 1=Choice set 1: Prog A		0.00126*
		(0.000754)
Prop change in C emissions	-0.471***	-0.540***

Continued on next page

[18]The appropriate recourse in light of these results is yet to be determined. Early choices are affected by the respondent's need to learn about the tradeoffs involved, but later choices can be affected by the development of choice heuristics, or by fatigue, or by misunderstanding of the instructions to treat every choice separately. Work-in-progress associated with this dataset concerns the anchoring effects of the instructional (first) choice set in this study.

Table 4 – continued from previous page

	(0.139)	(0.153)
... × 1=Choice set 1: Prog A		0.372
		(0.374)
Prop change in carbon jobs	1.438***	1.668***
	(0.448)	(0.496)
... × 1=Choice set 1: Prog A		-1.219
		(1.182)
Prop change in green jobs	0.860*	0.996**
	(0.454)	(0.497)
... × 1=Choice set 1: Prog A		-0.827
		(1.257)
Share of permits auctioned	0.0369	0.0555
	(0.117)	(0.129)
... × 1=Choice set 1: Prog A		-0.126
		(0.316)
Share of rev. for equip.	-0.205	-0.299**
	(0.128)	(0.141)
... × 1=Choice set 1: Prog A		0.571
		(0.350)
Share of rev. to workers	0.171	0.149
	(0.127)	(0.140)
... × 1=Choice set 1: Prog A		0.147
		(0.350)
1=New regs other pollut.	0.185***	0.200***
	(0.0528)	(0.0582)
... × 1=Choice set 1: Prog A		-0.167
		(0.143)
1=Status quo alternative	-0.225*	-0.182
	(0.115)	(0.126)
... × 1=Choice set 1: Prog A		-0.344
		(0.311)

Continued on next page

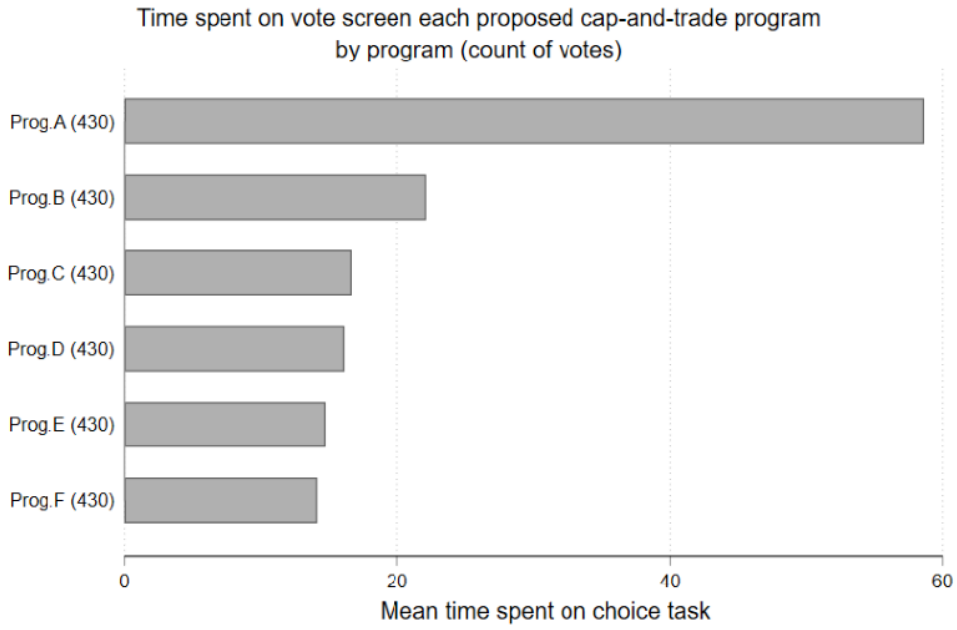
Table 4 – continued from previous page

Max. log-likelihood	-4269.76	-4234.52
No. respondents	1050	1050
No. choices	6300	6300
No. alternatives	12600	12600
SBC reduct. (dollars/ton)	47	50
MRS(cbn jobs, grn jobs) @ mix now	1.89	1.9
	(4.16, -.37)	(4.05, -.25)
MWTP(Prop change in C emissions)	-152.61	-161.97
	(-237.58, -67.64)	(-248.80, -75.13)
MWTP(Prop change in carbon jobs)	466.30	500.47
	(169.66, 762.93)	(193.89, 807.04)
MWTP(Prop change in green jobs)	278.97	298.73
	(-12.73, 570.66)	(2.23, 595.22)
MWTP(Share of permits auctioned)	11.97	16.64
	(-62.12, 86.07)	(-58.41, 91.70)
MWTP(Share of rev. for equip.)	-66.36	-89.79
	(-148.88, 16.16)	(-174.75, -4.82)
MWTP(Share of rev. to workers)	55.32	44.64
	(-26.20, 136.85)	(-38.04, 127.31)
MWTP(1=New regs other pollut.)	60.12	60.04
	(24.69, 95.53)	(23.91, 96.16)
MWTP(1=Status quo alternative)	-72.84	-54.47
	(-143.92, -1.74)	(-126.93, 17.99)
Coefficient standard errors in parentheses		
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

The bottom panel of Table 4 repeats that the homogeneous preferences specification implies a point estimate for the social benefits of carbon emissions reductions on the order of about $48/ton. However, when we estimate coefficient differentials for the first choice task, regarding Program A, but estimate the social benefits of carbon based on people's choices regarding Programs B through F, our estimate of the social benefits of carbon increases to $51/ton.

In addition to the lower disutility of cost for Program A, respondents also pay more attention on average to Program A (compared to the other programs). This is measured by time spent on the page (Figure 3) as well as the number of clicks on that page (Figure 4 and Figure 5). Part of the discrepancies for Program A in Figures 3, 4 and 5 can likely be attributed to the process by which respondents become familiar with the choice task. We have two hypotheses for the

Figure 3



differential in marginal utility from costs between Program A and B-F. One potential explanation is that respondents in favor of the idea of cap-and-trade programs want to be sure that they vote "Yes" for at least one program, and then become more selective as the choice tasks continue. An alternative, but similar, explanation is that respondents, despite amble explanation, do not realize that they will be presented with six different programs. Under the impression that Program A is the only program that they will see, they are willing to pay a higher cost for a program. In other words, they don't realize they can afford to be selective. Both of these hypotheses suggest that choices made for Programs B-F may be more representative of preferences as respondents become familiar with the choice tasks as they consider the trade-offs embodied in different program designs.

Figure 4

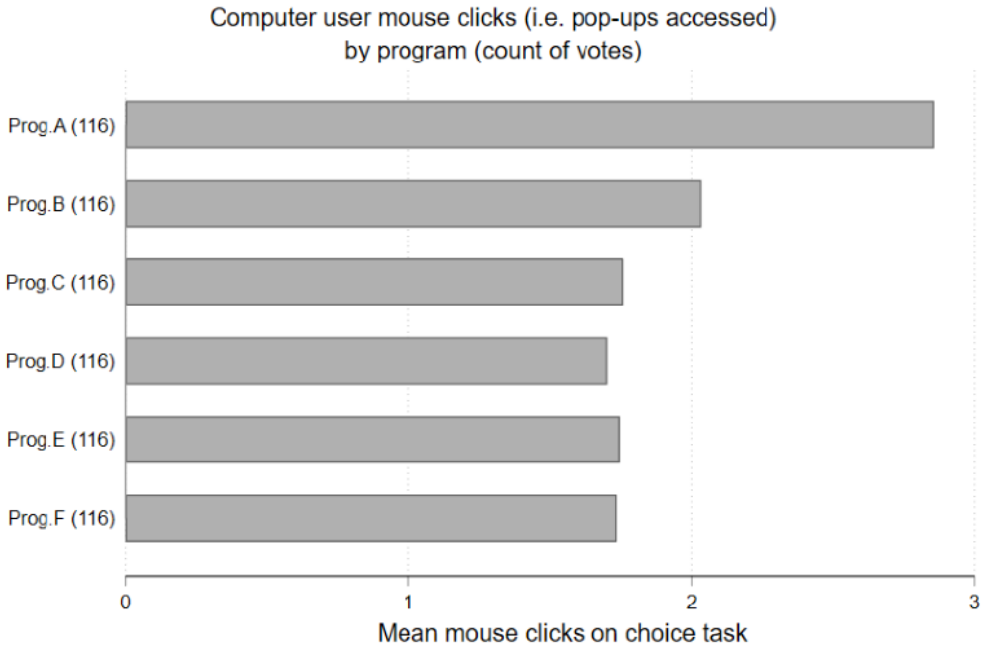
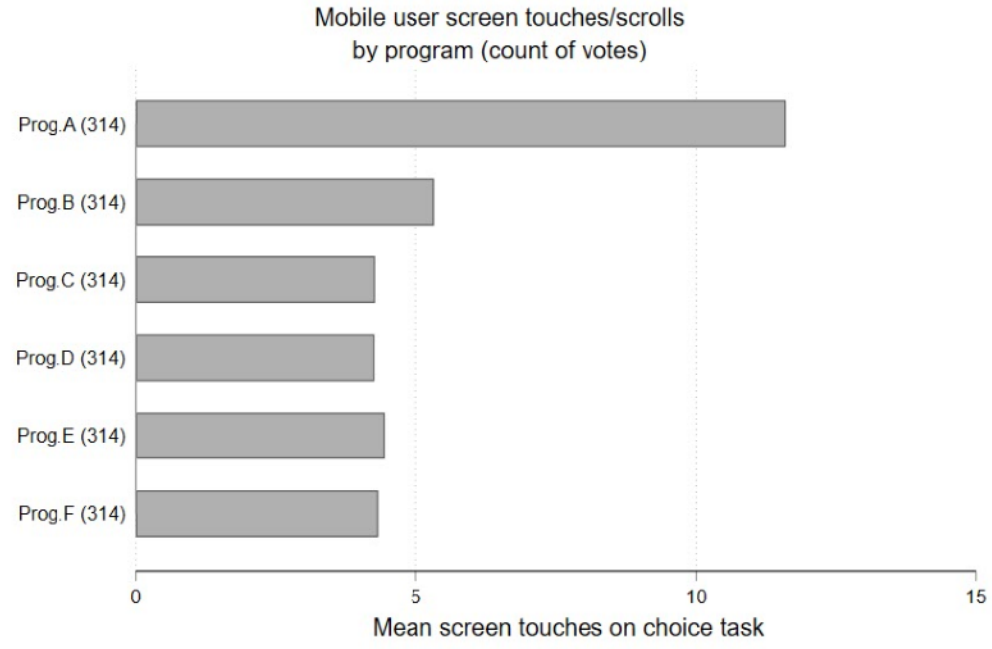


Figure 5



4.3 Program choices: Heterogeneous preferences

4.3.1 Unobserved heterogeneity: Mixed logit specifications

Heterogeneous preferences can be modeled in a variety of ways in the context of choice experiments. If the researcher has no information beyond just the attributes of the alternatives and respondent's preferred option in each choice task, the most common way to accommodate heterogeneity in preferences is to explore mixed logit models (models with random parameters, where each member of the population is assumed to have different marginal utilities for each attribute, and these marginal utilities have specific parameteric distributions. The exception is the cost variable. Benefit-cost analyses in the U.S. typically assume that everyone shares the identical marginal utility of income, which would imply a common marginal disutility of program cost. We follow the convention of constraining the coefficient on the cost variable to be a fixed, rather than a random parameter. But we let all of the other coefficients in our basic model have normal distributions, and we estimate the means and standard deviations of these parameter distributions.

Model (1) in Table 5 reproduces our homogeneous preferences estimates, for comparison. Model 2 allows each marginal utility other than that for the cost variable to be independently normally distributed. The top portion of the table, for Model (2), gives the means of these independent marginal utilities. We see that by allowing for heterogeneity in preferences, most program features increase in magnitude and in some cases significance. The mean marginal utilities for the share of permits auctioned changes sign but remains statistically insignificant. The marginal utility for the shares of auction revenues going to workers/communities becomes significant.

Table 5: Comparison of marginal utilities for homogeneous conditional logit, independent mixed logit, and correlated mixed logit

	(1) Homogeneous clogit	(2) Independant mixed logit	(3) Correlated mixed logit
main			
Monthly cost	-0.00309***	-0.00873***	-0.00966***
	(0.000290)	(0.000861)	(0.000957)
Prop change in C emissions	-0.467***	-1.626***	-1.885***
	(0.139)	(0.271)	(0.298)
Prop change in carbon jobs	1.420***	5.197***	5.595***
	(0.448)	(1.047)	(1.077)
Prop change in green jobs	1.115**	4.185***	4.255***
	(0.466)	(0.954)	(1.091)
(Prop change in green jobs) × (dm:$\hat{RP}$)	-3.147***	-6.684**	-8.826***
	(0.633)	(2.837)	(2.002)
Share of permits auctioned	0.0385	-0.0500	-0.199
	(0.117)	(0.200)	(0.247)
Share of rev. for equip.	-0.216*	-0.285	-0.348
	(0.128)	(0.233)	(0.280)
Share of rev. to workers	0.143	0.469*	0.526*
	(0.127)	(0.247)	(0.293)
1=New regs other pollut.	0.187***	0.470***	0.520***
	(0.0529)	(0.100)	(0.113)
1=Status quo alternative	-0.233**	-0.508**	-0.520**
	(0.115)	(0.251)	(0.260)
SD			
Prop change in C emissions		2.545***	
		(0.422)	
Prop change in carbon jobs		4.888*	
		(2.639)	
Prop change in green jobs		-1.879	
		(4.282)	
(Prop change in green jobs) × (dm:$\hat{RP}$)		14.06	
		(12.57)	
Share of permits auctioned		-0.187	

Continued on next page

Table 5 – continued from previous page

	(0.690)	
Share of rev. for equip.	-0.882	
	(0.821)	
Share of rev. to workers	1.895***	
	(0.482)	
1=New regs other pollut.	-1.079***	
	(0.251)	
1=Status quo alternative	3.002***	
	(0.190)	
l11		
Constant		0.640
		(1.102)
l21		
Constant		5.541
		(4.148)
l31		
Constant		-0.971
		(2.594)
l41		
Constant		-14.46***
		(3.478)
l51		
Constant		-0.193
		(0.441)
l61		
Constant		0.351
		(0.969)
l71		
Constant		-1.877**
		(0.760)
l81		
Constant		-0.0958
		(0.368)
l91		
Constant		-0.0899
		(0.648)
l22		
Constant		1.464
		(3.602)
l32		
Constant		4.804
		(4.820)
l42		
Constant		-8.423**
		(3.960)

Continued on next page

Table 5 – continued from previous page

l52	
Constant	-0.0417
	(0.654)
l62	
Constant	-0.503
	(1.148)
l72	
Constant	0.846
	(1.108)
l82	
Constant	0.139
	(0.270)
l92	
Constant	0.0174
	(0.595)
l33	
Constant	3.680
	(2.790)
l43	
Constant	17.97***
	(5.105)
l53	
Constant	1.184**
	(0.540)
l63	
Constant	0.549
	(0.989)
l73	
Constant	-0.246
	(0.588)
l83	
Constant	-0.280
	(0.261)
l93	
Constant	0.465
	(0.456)
l44	
Constant	-3.289
	(6.303)
l54	
Constant	0.919
	(0.953)
l64	
Constant	0.953
	(0.783)
l74	
Constant	-0.546
	(1.263)
l84	

Continued on next page

Table 5 – continued from previous page

Constant	-0.163
	(0.301)
l94	
Constant	-0.0291
	(0.825)
l55	
Constant	-0.313
	(0.524)
l65	
Constant	-0.686
	(0.638)
l75	
Constant	0.945
	(0.670)
l85	
Constant	-0.672***
	(0.251)
l95	
Constant	1.778***
	(0.580)
l66	
Constant	-1.150**
	(0.477)
l76	
Constant	-1.285
	(1.107)
l86	
Constant	-0.510*
	(0.287)
l96	
Constant	-0.298
	(0.445)
l77	
Constant	0.270
	(0.844)
l87	
Constant	-0.0292
	(0.252)
l97	
Constant	-1.201***
	(0.413)
l88	
Constant	-0.955***
	(0.263)
l98	
Constant	-2.313***
	(0.229)
l99	
Constant	-0.192*

Continued on next page

Table 5 – continued from previous page

			(0.104)
Max. log-likelihood	-4255.88	-3187.84	-3150.07
No. respondents	1050	1050	1050
No. choices	6300	6300	6300
No. alternatives	12600	12600	12600
SBC reduct. (dollars/ton)	47	58	60
MRS(cbn jobs, grn jobs) @ mix now	1.44	1.41	1.49
	(2.91, -.03)	(2.12, .69)	(2.42, .56)
MWTP(Prop change in C emissions)	-151.08	-186.34	-195.08
	(-236.06, -66.09)	(-244.61, -128.05)	(-259.08, -131.08)
MWTP(Prop change in carbon jobs)	459.23	595.56	579.09
	(163.36, 755.09)	(360.64, 830.46)	(335.48, 822.69)
MWTP(Prop change in green jobs)	360.74	479.62	440.41
	(60.21, 661.26)	(277.06, 682.16)	(227.86, 652.94)
MWTP(Share of permits auctioned)	12.46	-5.73	-20.56
	(-61.43, 86.35)	(-50.85, 39.39)	(-71.26, 30.14)
MWTP(Share of rev. for equip.)	-69.85	-32.68	-35.98
	(-152.47, 12.77)	(-84.86, 19.49)	(-93.24, 21.29)
MWTP(Share of rev. to workers)	46.31	53.80	54.44
	(-34.89, 127.51)	(-1.64, 109.23)	(-5.82, 114.69)
MWTP(1=New regs other pollut.)	60.39	53.90	53.83
	(24.95, 95.82)	(30.02, 77.78)	(29.22, 78.44)
MWTP(1=Status quo alternative)	-75.23	-58.25	-53.79
	(-146.13, -4.31)	(-111.53, -4.96)	(-104.36, -3.20)
Coefficient standard errors in parentheses			
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$			

Mixed logit models, however, can tell us whether there is measurable *heterogeneity* in these marginal utilities across the population. The "Parameter standard deviations" panel for Model 2 in Table 5 shows that there is statistically significant heterogeneity across the Oregon population in marginal utilities associated with the change in carbon emissions, carbon jobs, green jobs, and selection-correction term for green jobs, as well as new regulations for other types of pollution. [19]

In Model 3 in Table 5, where all these marginal utilities are allowed also to be correlated, the standard deviation in the marginal utility associated with the selection-correction term for green jobs become statistically insignificant, as does the heterogeneity in the simple status-quo effect. However, statistically significant heterogeneity emerges for the share of permits auctioned and the

[19] Negative standard deviations in mixed logit models are common. Users of Stata's mixlogit algorithm are instructed to treat negative estimates as positive.

share of auction revenue going to workers and communities.[20]

Model (3) reveals that the marginal utilities for pairs of attributes are correlated. There is a statistically significant *positive* correlation between the marginal utilities for:

- the selection-correction term for green jobs and changes in carbon emissions
- the change in green jobs and the change in carbon jobs
- the selection-correction term for green jobs and changes in green jobs
- the share of permits auctioned and the selection-correction term in green jobs
- the status quo option and new regulations on other pollutants

There is a *negative* correlation between the marginal utilities for:

- the selection term for green jobs and the change in carbon jobs
- new regulations on other pollutants and the share of revenue for equipment
- new regulations on other pollutants and the share of revenue to workers
- the status quo effect and the change in carbon emissions
- the status quo effect and the selection term for green jobs
- the status quo effect and the share of permits auctioned
- the status quo effect and the share of revenue for equipment
- the status quo effect and the share of revenue to workers

For the three models in Table 5, the implied social benefit of carbon (SBC), for Oregonians, has point estimates on the order of \$47/ton to \$63/ton. The MRS estimates for both mixed logit models suggest that on average 1.39 new green jobs would be required to make up for each lost carbon job, although this estimate is relatively noisy. For the mixed-logit specifications, Model 2 and Model 3, the marginal WTP estimates for increases in each attribute are bounded away from zero

[20]Model (3) in Table 5 generalizes Model (2) by allowing for correlations between the random parameters in the model. With eight random parameters, this generalization introduces $(8 \times 7)/2$ off-diagonal elements in the parameter correlation matrix. The model without correlations implicitly imposes and assumption of a constant scale parameter for the error term. The model including correlations simultaneously permits heteroscedasticity in the form of a choice-specific error variance.

for emissions, carbon jobs, green jobs, the share of auction revenue to workers, new regulations on other pollutants, and the status quo.

4.3.2 Latent class models

Latent class models often have just two or three classes or preferences.[21] Each respondent's personal or neighborhood characteristics are permitted to explain latent class membership (as in older multinomial logit models). One set of marginal utility parameters for program attributes (akin to conditional logit marginal utilities) is estimated for each class of preferences.

The basic program attributes used in our latent class models are identical to those used in the ordinary conditional logit model for homogeneous preferences and for the mixed logit models. Now however, we also estimate "class membership" probabilities in the course of fitting the model. Table 6 gives descriptive statistics for the individual/neighborhood characteristics in the first upcoming latent class specification.

Table 6: Descriptive statistics: Additional variables employed in latent class model by sociodemographics (Observations= number of alternatives; two alternatives per choice set, six choices per person)

	mean	sd
1=College graduate	0.429	0.495
1=Income greater than 75K	0.441	0.496
1=Identifies as non-male	0.528	0.499
1=Aged 18-34 years	0.333	0.471
1=Aged 65 years and up	0.216	0.412
1=Has no children	0.367	0.482
1=Knows ancestors beyond gg grndprts	0.402	0.490
1=Has resided in Oregon 18+ years	0.705	0.456
1=Expect reside Oregon 20+ years	0.668	0.471
Observations	12528	

[21] Latent class models can sometimes be difficult to estimate, but an exploration of latent class models is now expected in most analyses of discrete choices. In general, it is a best practice to start with parsimonious specifications and then see which additional variables can be included.

The third panel of Table 7 specifies the equation for class membership as a function of broad bins of several sociodemographic characteristics described in Table 6: educational attainment, income, gender, age, parenthood status, awareness of forebearers, and past and expected future duration of residence in Oregon. A respondent has a higher probability of membership in Class 1 if they do not identify themself as "male," if they can trace their forebearers beyond their great-great grandparents; and if they have resided on Oregon for 18 years or more.[22] A respondent is less likely to belong to Class 1 if they are a college graduate, are 18-34 years old, or if they expect to reside in Oregon for the next 20 years or more.[23]

The main difference in marginal utility parameters between the two classes of preferences is their opposite signs on the status quo effect. Class 1 tends to prefer the status quo to *any* program, regardless of the program's attributes, while Class 2 tends to prefer *any* program to the status quo, regardless of the program's attributes. Class 1 derives positive utility from *reductions* in carbon emissions, but to a slightly lesser extent than Class 2. Class 1 derives negative utility from *losses* in carbon jobs to a greater extent than Class 2. The estimates for the marginal utility of additional green jobs also differ substantially between classes. Class 1 is statistically indifferent to new green jobs, while Class 2 derives greater utility from an increase in green jobs than it does from an increase in carbon jobs. Class 2 derives a slightly significant increase in utility when a greater share of auction revenue is directed to workers, but Class 1 is indifferent. Class 1, however, derives almost twice the utility from additional regulations on other pollutants.

Table 7: Latent class by selected sociodemographics (lclogitdemographics)

	Estimate
Class1	
	Continued on next page

[22] We included our questions about forebearers and descendants to permit hypothesis testing about whether someone who feels a greater degree of connection to past and future generations may feel more obligated to support policies that will reduce climate change damages.

[23] In this specification, we constrain the coefficient on cost to be equal across the two groups. We may relax this maintained hypothesis in later revisions of this paper.

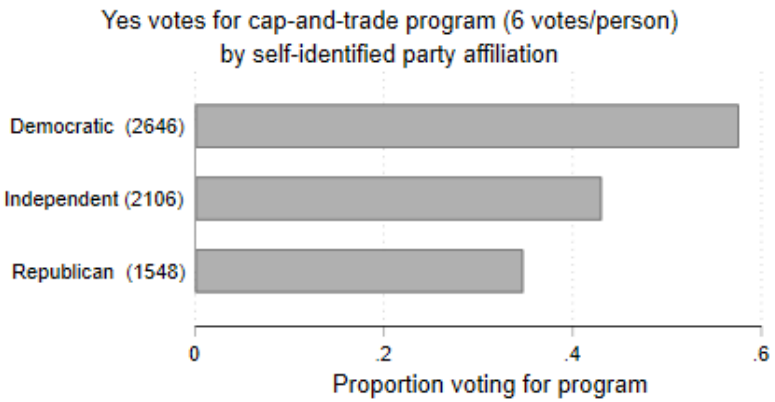
Table 7 – continued from previous page

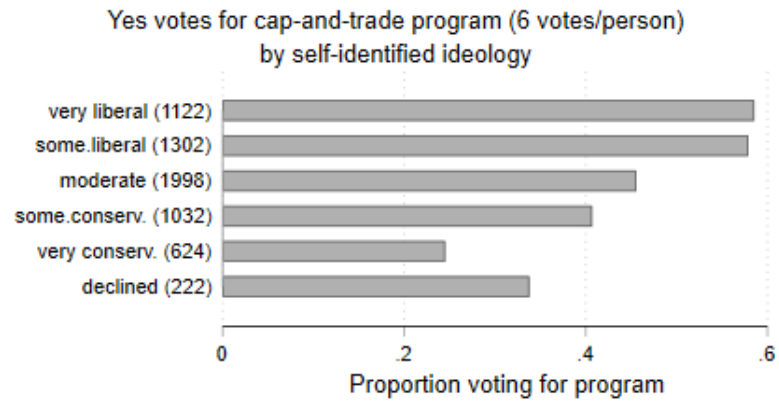
Prop change in C emissions	-1.036***	(0.379)
Prop change in carbon jobs	3.039**	(1.363)
Prop change in green jobs	0.938	(1.173)
... $\times \hat{RP}$	-2.304	(1.798)
Share of permits auctioned	-0.116	(0.319)
Share of rev. for equip.	-0.545	(0.367)
Share of rev. to workers	0.588	(0.361)
1=New regs other pollut.	0.443***	(0.148)
1=Status quo alternative	1.487***	(0.328)
Class2		
Prop change in C emissions	-1.174***	(0.237)
Prop change in carbon jobs	2.888***	(0.689)
Prop change in green jobs	3.790***	(0.906)
... $\times \hat{RP}$	1.854	(1.305)
Share of permits auctioned	0.0893	(0.193)
Share of rev. for equip.	-0.0192	(0.210)
Share of rev. to workers	0.360*	(0.216)
1=New regs other pollut.	0.262***	(0.0877)
1=Status quo alternative	-1.525***	(0.197)
Share1		
1=College graduate	-0.316**	(0.154)
1=Income greater than 75K	-0.246	(0.154)
1=Identifies as non-male	0.376***	(0.144)
1=Aged 18-34 years	-0.731***	(0.175)
1=Aged 65 years and up	0.128	(0.186)
1=Has no children	0.00654	(0.156)
1=Knows ancestors beyond gg grndprts	0.387***	(0.143)
1=Has resided in Oregon 18+ years	0.298*	(0.163)
1=Expect reside Oregon 20+ years	-0.318**	(0.156)
Constant	-0.158	(0.242)
Fix		
Monthly cost	-0.00609***	(0.000406)
Max. log-likelihood	-3288.66	
No. respondents	1042	
No. choices	6252	
No. alternatives	12504	
LC[1,2] SBC reduct. (dollars/ton)	[53, 60]	
LC[1,2] MRS(cbn jobs, grn jobs) @ mix now	[-3.67, -.86]	
LC[1,2] MWTP(Prop change in C emissions)	[-170, -193]	
LC[1,2] MWTP(Prop change in carbon jobs)	[499, 474]	
LC[1,2] MWTP(Prop change in green jobs)	[154, 623]	
LC[1,2] MWTP(Share of permits auctioned)	[-378, 305]	
LC[1,2] MWTP(Share of rev. for equip.)	[-19, 14.67]	
LC[1,2] MWTP(Share of rev. to workers)	[-89.5, -3.15]	
LC[1,2] MWTP(1=New regs other pollut.)	[96.59, 59.17]	
LC[1,2] MWTP(1=Status quo alternative)	[72.76, 43.04]	
Coefficient standard errors in parentheses		
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

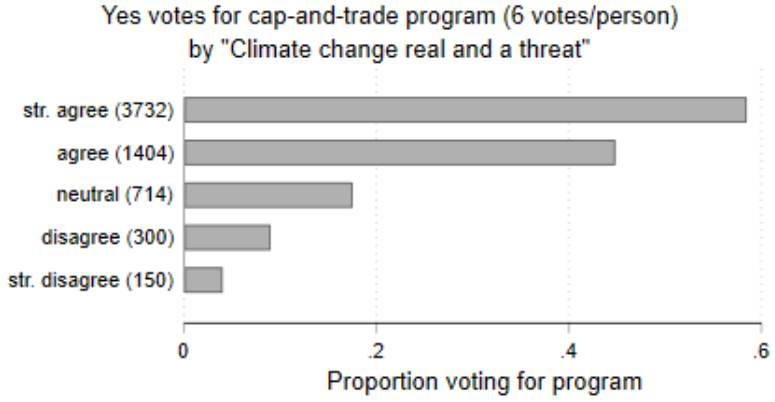
At the bottom of Table 7, only point estimates, not confidence intervals, are provided for each of the SBC and MWTP estimates. The implied social benefits from a reduction in carbon emissions is about $53/ton for latent class 1, and about $60/ton for latent class 2. Differences in the implied SBC depend only upon the marginal disutility of cost (which is constrained to be the same for both groups) and the marginal disutility of carbon emissions, which is slightly larger for class 2. Class 1 requires 3.67 new green jobs to replace each lost carbon job, whereas Class 2 requires only 0.86 new green jobs for each lost carbon job. People with class 1 preferences. The differences in the MWTP point estimates for Class 1 and Class 2 reflect the differences in their marginal utilities for each program attribute.

Given that individual respondent sociodemographic characteristics are only somewhat helpful in explaining the probability of membership in two preference classes, we consider several dimensions that can be classified as ideology or opinions. Figure 6 shows simple pairwise relationships between the proportion of "yes" votes for any cap-and-trade program, for each level of four measures of ideology/opinions. Within each set of frequencies, typically liberal viewpoints are shown first, followed by typically conservative viewpoints. The most liberal category, in each case, corresponds on average to about 60% yes votes (independent of the randomized attributes of the programs upon which these people have been asked to vote).

Figure 6: Proportion of "yes" votes on programs, by ideology/opinion categories







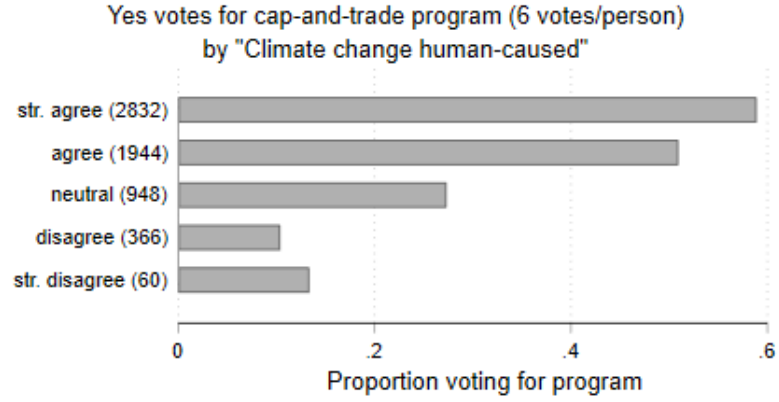


Table 8 summarizes the proportions of the sample that identify with the Democratic Party or the Republican Party (where the omitted category is "Independent or other"). The next dimension is whether their political ideology is “liberal/very liberal” or “conservative/very conservative” (relative to the omitted category of “moderate.” The next set draws from respondents’ answers on a five-point Likert scale concerning whether climate change is real and is a serious threat (the two “disagrees” categories are combined, due to low numbers). Finally, we use answers to a Likert question about whether climate change is human-caused (where again, we combine the two “disagrees” categories due to low numbers). We chose these four dimensions of political ideology or opinions about climate change because casual empiricism suggests that these factors have been extremely important with respect to Oregon’s recent experience with legislation concerning potential carbon cap-and-trade programs.

Table 8: Descriptive statistics: Additional variables employed in latent class model by ideology and opinions about climate change (Observations= number of alternatives; two alternatives per choice set, six choices per person)

	mean	sd
1=chosen alternative	0.500	0.500
Monthly cost	97.653	121.348
Prop change in C emissions	-0.228	0.279
Prop change in carbon jobs	-0.056	0.072
Prop change in green jobs	0.055	0.071
(Prop change in green jobs) $\times$ (dm:$\hat{RP}$)	0.004	0.031
Share of permits auctioned	0.229	0.281
Share of rev. for equip.	0.152	0.214
Share of rev. to workers	0.153	0.215
1=New regs other pollut.	0.247	0.432
1=Status quo alternative	0.500	0.500
1=Identifies as Democrat	0.420	0.494
1=Identifies as Republican	0.246	0.431
1=Ideology:Strongly liberal	0.178	0.383
1=Ideology:Somewhat liberal	0.207	0.405
1=Ideology:Somewhat conservative	0.164	0.370
1=Ideology:Strongly conservative	0.099	0.299
1=Str.agree clim.change threat	0.592	0.491
1=Agree clim.change a threat	0.223	0.416
1=Disagree clim.change a threat	0.048	0.213

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Table 8 – continued from previous page

1=Str.disagree clim.change a threat	0.024	0.152
1=Str.agree clim.change human-caused	0.450	0.497
1=Agree clim.change human-caused	0.309	0.462
1=Disagree clim.change human-caused	0.068	0.251
Observations	12600	

Models (1) through (4) in Table 9 first explore the distinct roles of each different set of ideological or attitudinal variables. The third panel of the table gives the determinants of membership in Class 1. Each set of variables, entered separately, has a very statistically significant effect in determining the probability of membership in each of two latent classes of preferences. In model (5), we include all four sets of variables in the same specification, to determine whether one type of variable dominates when we control for the others. The most statistically significant of the four sets of factors is whether the respondent agrees or strongly agrees that climate change is real, human-caused and is a significant threat. The negative coefficients on these indicators imply that these respondents are more likely to belong to Class 2.

Table 9: Comparison of marginal utilities and MWTP for different latent class specifications with preferences differentiated by partisanship, ideology, and opinions about climate change

	(1) Political party identif.	(2) Political ideology	(3) Climate change is serious	(4) Climate change human-caused	(5) All dimens. simultan-eously
Class1					
Monthly cost	-0.00483***	-0.00489***	-0.00500***	-0.00497***	-0.00499***
	(0.000421)	(0.000415)	(0.000395)	(0.000401)	(0.000394)
Prop change in C emissions	-0.914***	-0.907***	-0.906***	-0.919***	-0.905***
	(0.210)	(0.206)	(0.195)	(0.199)	(0.195)
Prop change in carbon jobs	2.739***	2.651***	2.600***	2.649***	2.603***
	(0.625)	(0.616)	(0.591)	(0.597)	(0.589)
Prop change in green jobs	3.320***	3.274***	3.024***	3.129***	3.024***
	(0.777)	(0.767)	(0.710)	(0.727)	(0.707)
Share of permits auctioned	-0.0120	-0.00216	0.0168	0.00471	0.00801
	(0.175)	(0.171)	(0.163)	(0.165)	(0.162)
Share of rev. for equip.	-0.0724	-0.0676	-0.113	-0.0749	-0.104
	(0.188)	(0.184)	(0.177)	(0.179)	(0.176)
Share of rev. to workers	0.320*	0.301	0.291	0.313*	0.296*
	(0.192)	(0.188)	(0.179)	(0.181)	(0.178)
1=New regs other pollut.	0.276***	0.269***	0.268***	0.265***	0.263***
	(0.0789)	(0.0774)	(0.0736)	(0.0748)	(0.0733)
1=Status quo alternative	-1.315***	-1.291***	-1.260***	-1.263***	-1.259***
	(0.176)	(0.171)	(0.161)	(0.163)	(0.160)
(Prop change in green jobs) × (dm:$\hat{RP}$)	0.200	0.927	0.365	0.417	0.488
	(1.557)	(1.249)	(1.122)	(1.185)	(1.159)
Class2					
Monthly cost	-0.0145***	-0.0149***	-0.0164***	-0.0162***	-0.0166***
	(0.00172)	(0.00191)	(0.00217)	(0.00207)	(0.00220)
Prop change in C emissions	-1.573***	-1.475***	-1.550**	-1.568***	-1.531**
	(0.496)	(0.527)	(0.636)	(0.591)	(0.640)
Prop change in carbon jobs	3.616**	3.021	2.694	3.220	2.548
	(1.787)	(1.872)	(2.140)	(2.047)	(2.146)
Prop change in green jobs	1.018	0.813	0.633	0.757	0.689

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Table 9 – continued from previous page

	(1.523)	(1.672)	(1.983)	(1.833)	(2.013)
Share of permits auctioned	0.332	0.306	0.372	0.305	0.341
	(0.410)	(0.432)	(0.510)	(0.477)	(0.514)
Share of rev. for equip.	-0.464	-0.500	-0.230	-0.481	-0.313
	(0.471)	(0.509)	(0.652)	(0.581)	(0.644)
Share of rev. to workers	0.718	0.792	1.087*	0.848	1.044*
	(0.460)	(0.485)	(0.585)	(0.538)	(0.584)
1=New regs other pollut.	0.471**	0.457**	0.471*	0.476**	0.457*
	(0.193)	(0.208)	(0.255)	(0.235)	(0.255)
1=Status quo alternative	1.233***	1.328***	1.798***	1.457***	1.756***
	(0.418)	(0.457)	(0.577)	(0.515)	(0.568)
(Prop change in green jobs) × (dm:$\hat{RP}$)	-2.710	-0.547	0.251	-0.324	0.660
	(2.983)	(2.653)	(2.890)	(2.805)	(2.953)
Share1					
1=Identifies as Democrat	0.970***				0.209
	(0.168)				(0.213)
1=Identifies as Republican	-0.493***				0.428*
	(0.177)				(0.253)
1=Ideology:Strongly liberal		0.957***			0.165
		(0.222)			(0.275)
1=Ideology:Somewhat liberal		0.874***			0.370
		(0.216)			(0.253)
1=Ideology:Somewhat conservative		-0.344*			-0.117
		(0.196)			(0.258)
1=Ideology:Strongly conservative		-1.167***			-0.380
		(0.249)			(0.341)
1=Str.agree clim.change threat			2.697***		1.910***
			(0.256)		(0.336)
1=Agree clim.change a threat			1.677***		1.201***
			(0.268)		(0.301)
1=Disagree clim.change a threat			-1.139**		-0.567
			(0.575)		(0.663)
1=Str.disagree clim.change a threat			-2.432		-2.211
			(1.763)		(1.542)

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Table 9 – continued from previous page

1=Str.agree clim.change human-caused				2.226***	0.788***
				(0.211)	(0.293)
1=Agree clim.change human-caused				1.634***	0.600**
				(0.211)	(0.257)
1=Disagree clim.change human-caused				-1.193***	-0.707
				(0.414)	(0.502)
Constant	0.190	0.344***	-1.250***	-0.826***	-1.427***
	(0.131)	(0.131)	(0.231)	(0.172)	(0.286)
Max. log-likelihood	-3281.61	-3276.18	-3194.51	-3217.57	-3183.80
No. respondents	1050	1050	1050	1050	1050
No. choices	6300	6300	6300	6300	6300
No. alternatives	12600	12600	12600	12600	12600
LC1: SBC reduct. (dollars/ton)	59	57	56	57	56
LC1: MRS(cbn jobs, grn jobs) @ mix now	.93	.92	.97	.96	.97
	(1.53, .34)	(1.5, .33)	(1.59, .36)	(1.56, .36)	(1.59, .36)
LC1: MWTP(Prop change in C emissions)	-189.23	-185.48	-181.33	-184.79	-181.33
	(-269.16, -109.29)	(-263.13, -107.83)	(-253.41, -109.25)	(-258.54, -111.03)	(-253.28, -109.37)
LC1: MWTP(Prop change in carbon jobs)	566.86	542.10	520.35	532.42	521.19
	(298.00, 835.71)	(281.14, 803.05)	(276.88, 763.81)	(284.83, 780.01)	(278.49, 763.88)
LC1: MWTP(Prop change in green jobs)	687.13	669.70	605.15	628.96	605.61
	(348.28, 1025.97)	(339.43, 999.96)	(309.89, 900.39)	(323.88, 934.04)	(311.36, 899.85)
LC1: MWTP(Share of permits auctioned)	-2.48	-0.44	3.37	0.95	1.60
	(-73.50, 68.54)	(-68.90, 68.02)	(-60.29, 67.03)	(-64.11, 66.01)	(-62.04, 65.25)
LC1: MWTP(Share of rev. for equip.)	-14.99	-13.82	-22.64	-15.06	-20.81
	(-91.20, 61.23)	(-87.64, 59.99)	(-92.07, 46.78)	(-85.73, 55.60)	(-90.10, 48.48)
LC1: MWTP(Share of rev. to workers)	66.29	61.55	58.22	63.02	59.22
	(-11.95, 144.53)	(-14.07, 137.16)	(-12.12, 128.56)	(-8.87, 134.90)	(-11.06, 129.49)
LC1: MWTP(1=New regs other pollut.)	57.07	55.01	53.57	53.17	52.63
	(23.45, 90.67)	(22.53, 87.49)	(23.43, 83.70)	(22.39, 83.95)	(22.62, 82.63)
LC1: MWTP(1=Status quo alternative)	-272.07	-264.07	-252.24	-253.79	-252.18
	(-348.98, -195.14)	(-337.24, -190.89)	(-318.77, -185.70)	(-321.71, -185.87)	(-318.48, -185.87)
LC2: SBC_2 reduct. (dollars/ton)	34.00	31.00	29.00	30.00	29.00
LC2: MRS(cbn jobs, grn jobs) @ mix now	4.02	4.21	4.82	4.82	4.19
	(16.55, -8.5)	(21.97, -13.55)	(35.56, -25.92)	(28.66, -19.03)	(29.35, -20.97)
LC2: MWTP(Prop change in C emissions)	-108.46	-99.20	-94.31	-96.68	-92.36
	(-178.11, -38.80)	(-170.54, -27.84)	(-170.08, -18.53)	(-169.14, -24.21)	(-167.90, -16.81)
LC2: MWTP(Prop change in carbon jobs)	249.37	203.09	163.94	198.53	153.69
	(3.35, 495.38)	(-49.12, 455.30)	(-93.68, 421.56)	(-53.20, 450.26)	(-102.11, 409.49)
LC2: MWTP(Prop change in green jobs)	70.18	54.63	38.52	46.68	41.57
	(-136.96, 277.32)	(-167.61, 276.88)	(-198.95, 275.98)	(-175.93, 269.30)	(-197.35, 280.50)
LC2: MWTP(Share of permits auctioned)	22.88	20.58	22.64	18.80	20.55
	(-31.93, 77.69)	(-35.82, 76.97)	(-37.78, 83.07)	(-38.35, 75.95)	(-39.74, 80.85)
LC2: MWTP(Share of rev. for equip.)	-31.97	-33.59	-14.02	-29.64	-18.91
	(-96.40, 32.45)	(-101.78, 34.59)	(-92.20, 64.15)	(-100.57, 41.29)	(-95.52, 57.71)

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Table 9 – continued from previous page

LC2: MWTP(Share of rev. to workers)	49.55	53.25	66.16	52.30	62.97
	(-12.76, 111.85)	(-11.00, 117.50)	(-3.94, 136.27)	(-12.88, 117.48)	(-6.38, 132.31)
LC2: MWTP(1=New regs other pollut.)	32.51	30.75	28.65	29.33	27.59
	(5.42, 59.59)	(2.24, 59.25)	(-2.55, 59.85)	(.28, 58.36)	(-3.35, 58.54)
LC2: MWTP(1=Status quo alternative)	85.01	89.32	109.38	89.85	105.94
	(22.47, 147.54)	(22.82, 155.81)	(32.61, 186.13)	(21.08, 158.60)	(30.72, 181.16)

Coefficient standard errors in parentheses
$^{*}\ p < 0.05, ^{**}\ p < 0.01, ^{***}\ p < 0.001$

In terms of the Social Benefits associated with a one-ton decrease in carbon emissions (SB C), the first line in the lower portion of Table 9 shows point estimates for Class 1 and Class 2.[24] The most-general specification, Model 5, suggests that the SBC is about $45/ton for preference Class 1, and about $54/ton for preference Class 2.[25]

4.4 Program choices: Heterogeneity and benefits transfer

Our survey sample was limited to the state of Oregon. Oregon is sometimes perceived to be a very liberal state, but there is great variation in sociodemographics and political ideologies across urbanized and rural counties in the state. We can estimate a choice model with observed heterogeneity as a function of county-level characteristics for each respondent, allowing the best predictive county characteristics within the Oregon sample to be selected by LASSO methods. If the variability across Oregon counties is sufficient, compared to the variability across all counties in the lower-48 U.S. states, it may be safe to transfer a model fitted for Oregon counties to all counties in other states.

[24] Interval estimates for these values are not readily available.

[25] However, forcing the marginal utility of net income (i.e., the coefficient on the cost variable) to be the same across the two classes tends to reduce the difference between these SBC estimates. Later versions of this paper may relax this restriction on the cost coefficient.

Table 10: Descriptive statistics: Lasso-selected variables that capture important county-level heterogeneity in population characteristics for model transfer between Oregon counties and all other counties in the lower-48 U.S. states.

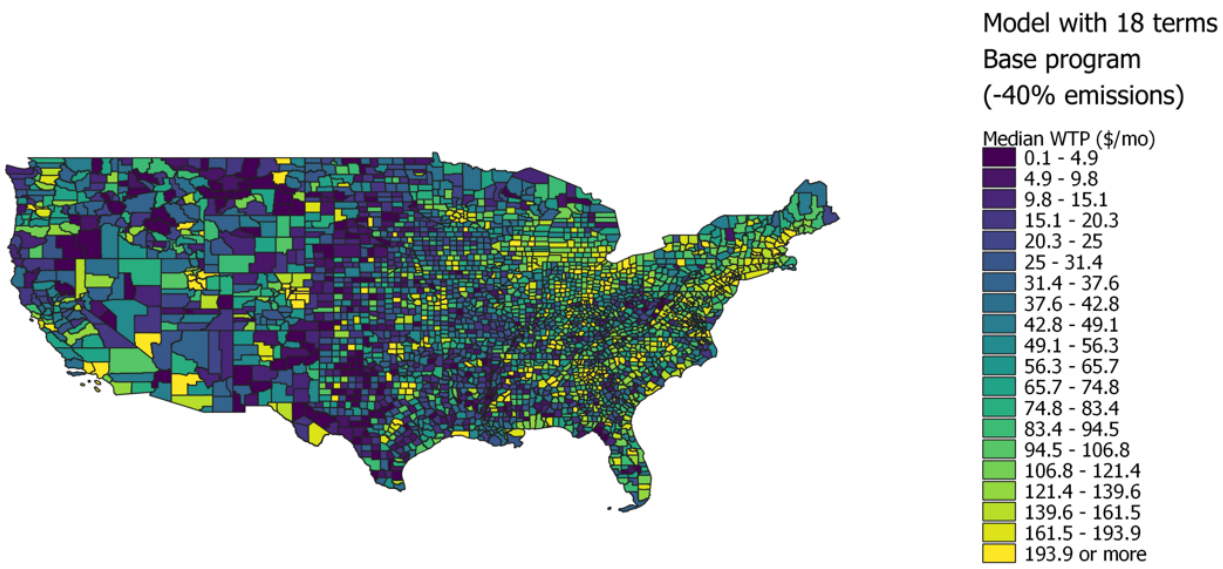
	(1) Est. sample county data (unwgtd)	**(2) Oregon county data**	**(3) National county data**
No. Cnty flood disasters Jan'16-Aug'21	0.0971	0.250	0.497
	(0.338)	(0.500)	(0.774)
Cnty pr:2016 voted Democr.	0.504	0.351	0.315
	(0.146)	(0.143)	(0.152)
Cnty pr:Age=Over 74 years	0.0668	0.0881	0.0803
	(0.0170)	(0.0276)	(0.0233)
Cnty pr:Income=65Kto75K	0.0375	0.0328	0.0311
	(0.00562)	(0.00627)	(0.0103)
Cnty pr:Indus=Information	0.0171	0.0138	0.0133
	(0.00520)	(0.00587)	(0.00799)
Cnty pr:Indus=Public administration	0.0457	0.0663	0.0545
	(0.0176)	(0.0280)	(0.0297)
Cnty pr:Commute=25 to 29 min	0.0630	0.0418	0.0521
	(0.0164)	(0.0201)	(0.0236)
Observations	12600	36	3108

Table 11: LASSO estimates: Specification with heterogeneity in respondent preferences according to county-level heterogeneity only

	Estimate	
1=chosen alternative		
Monthly cost	-0.00315***	(0.000280)
Prop change in C emissions	-0.493***	(0.139)
Prop change in carbon jobs	1.465***	(0.434)
Prop change in green jobs	0.902**	(0.448)
Share of permits auctioned	0.159	(0.120)
Share of rev. for equip.	-0.187	(0.126)
Share of rev. to workers	0.128	(0.125)
1=New regs other pollut.	0.191***	(0.0518)
1=Any program	-0.335	(0.447)
(Prop change in C emissions) × (No. Cnty flood disasters Jan'16-Aug'21)	0.288	(0.369)
(Share of permits auctioned) × (No. Cnty flood disasters Jan'16-Aug'21)	-0.577	(0.356)
(1=Any program) × (Cnty pr:2016 voted Democr.)	-0.0312	(0.390)
(1=Any program) × (Cnty pr:Age=Over 74 years)	-2.726	(2.731)
(1=Any program) × (Cnty pr:Income=65Kto75K)	2.395	(7.256)
(1=Any program) × (Cnty pr:Indus=Information)	15.14*	(8.474)
(1=Any program) × (Cnty pr:Indus=Public administration)	-1.224	(2.128)
(1=Any program) × (Cnty pr:Commute=25 to 29 min)	7.399**	(3.114)
(1=Any program) × (No. Cnty flood disasters Jan'16-Aug'21)	-0.0521	(0.246)
Max. log-likelihood	-4204.61	
No. respondents	12007	
No. choices	6300	
No. alternatives	12600	
SBC reduct. (dollars/ton)	0	
MRS(cbn jobs, grn jobs) @ mix now	1.84	
	(-.25, 3.92)	
MWTP(Prop change in C emissions)	-156	
	(-240, -73)	
MWTP(Prop change in carbon jobs)	464	
	(184, 745)	
MWTP(Prop change in green jobs)	286	
	(3.98, 568)	
MWTP(Share of permits auctioned)	50	
	(-23, 123)	
MWTP(Share of rev. for equip.)	-59	
	(-138, 20)	
MWTP(Share of rev. to workers)	41	
	(-37, 118)	
MWTP(1=New regs other pollut.)	61	
	(27, 94)	
MWTP(1=Any program)	-106	
	(-385, 173)	

Coefficient standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 7: WTP for basic cap-and-trade program (carbon emissions reductions and no other special features)



To accomplish this crude benefits transfer exercise, we need to assume that our fitted parameters, employed with county-level characteristics for any other county in the U.S. can predict an approximate willingness to pay for a cap-and-trade program with specific characteristics for a representative household in that county.

When the parameter estimates in Table 11 are assumed to apply to a representative household in each of the 3108 counties in the lower-48 states of the U.S., we can show the spatial variation in predicted median WTP estimates in each county. Figure 7

5 Conclusions

For all of our models with a central tendency for marginal utilities (i.e., homogeneous clogit; independent mixed logit; and correlated mixed logit), the preference parameters are statistically significant for (a) cost per month, (b) carbon emission reductions (c) carbon-intensive jobs (d) green jobs (e) additional regulations and (f) the status quo (except for the independent mixed logit).

In our mixed logit models, the mean marginal utility for new regulations on other pollutants is also significant. One caveat relating to these results is that our sample-selection correction method, upon which these results are based, is currently an ad hoc approach based on individual deviations from the mean survey response propensity in among eligible respondents. There is evidence that preferences differ to some extent between the respondent sample and the general population.

Our estimate of average MWTP for a 1.0 proportional change in carbon emissions by 2050 is between about $150 and $200, but proportional changes that large were not included in our study. A recent proposal by the state of Oregon suggests reducing emissions by 45% relative to 1990 levels by 2035 and by 80% relative to 1990 levels by 2050. Graphics in our survey for the time trend in emissions for Oregon suggests that 1990 levels were about 57 million metric tons of carbon dioxide equivalent, and that 2021 levels at the time of the survey were about 61 million metric tons. Our survey described the emissions reduction target as "the percent reduction of total annual carbon emissions in Oregon by the year 2050, relative to Oregon's current carbon emissions. The suggested 2050 policy target then suggests reducing total emissions to just 11.4 tons. This 80% emissions reduction was the largest proportional reduction in our randomized choice experiment designs (where we asked respondents to consider reductions between 10% and 80%. But a reduction from the current 61 million tons to just 11.4 tons would be a about an 81% reduction, or a "Prop change in C emissions" of -0.81. For our fixed coefficients logit specification, the MWTP estimate implies an average willingness to pay, per month, of $153 * .81 = $124 to achieve the state's goal of roughly an 80% reduction by 2050. By a similar calculation, however, our correlated mixed logit model implies an average willingness to pay, per month, of about $166 . A rough interval estimate would be about $120 to about $212 .

Our preliminary findings support that, in addition to the obvious cost and benefits of a carbon reduction policy (cost and emissions reductions), a cap-and-trade program's effect on jobs is of great importance to the public. A consistent significant and negative sign on the "Status quo" coefficient indicates that, on average, the public is supportive of a carbon cap-and-trade policy,

regardless of its specific attributes. These two results, taken together, suggest that successful implementation of a carbon program in Oregon is likely to be highly dependent on designing a policy that navigates the contentious "just transition" debate.

In our models with heterogeneous preferences, the presence of additional regulations to limit emissions of other pollutants is generally a statistically significant determinant of support for carbon cap-and-trade programs. This result suggests the likely importance of additional protections for local residents who live around facilities that may buy large numbers of carbon permits if a cap-and-trade program is implemented.

Our estimates for the Social Benefits of Carbon (SBC) emissions reductions represent a useful complementary measure of the extent to which society may value these emissions reductions. The customary benefits measure is, instead, an avoided-cost measure: the Social Cost of Carbon. The Social Cost of Carbon (SCC), or marginal avoided impact of greenhouse gas, has received a considerable amount of attention. Nevertheless, there is no consensus on the true size of the SCC. Depending on the researcher, agency, administration, or country, the estimate of SCC varies widely. Under the Obama administration the SCC has estimated at $50 per tonne (in 2020 US dollars) of CO_2, with a range of $15-$75, while the Trump administration revalued the SCC at $1-$7 per tonne (Wagner et al. (2021)). Subsequently, the Biden administration has established an interim central value of $51/ton, and a range between $14 and $152/ton. It is not surprising that the official SCC is highly dependent on the presiding administration, considering the strong partisan differences in WTP for carbon emissions reductions identified in this study and other research. However, estimates for the SCC are also vary markedly within the field of economics. This uncertainty is due in large part to the fact that the question of how to properly measure the SCC is still up for debate (Pindyck (2019)). Nevertheless, improving our estimation of the SCC is imperative to designing appropriate climate change policies (Aldy et al. (2021)).

Our Social *Benefit* of Carbon (reduction), or SBC, measures the overall social willingness to pay for a one-tonne reduction in carbon emissions via a cap-and-trade program where increased

costs will be borne by individual households. Our estimate for our homogeneous clogit is only $47/ton , but for our more-general mixed logit models, the estimate is $63 , consistent with the Obama and Biden administration.[26] However, our latent class model estimates reveals that different political and ideological groups have systematically different SBC estimates.

In comparison to the SCC values laid out by past and current administrations, our SBC estimates tend to be reasonably similar. This suggests reasonable convergent validity for our estimates. This convergent validity is important because the Social Cost of Carbon (SCC) is a fundamentally different way to measure the benefits of carbon emissions reductions, based on avoided damages, compared to our Social Benefits measure, which is based on individual willingness-to-pay for carbon reductions.

The consistency between the SCC and SBC measures suggests that the SBC may be well-suited as an alternative way to measure the effects of carbon emissions on social welfare. This stated-preference approach has the potential to improve benefit-cost analyses of public programs to reduce carbon emissions, and affords an option to consider in more detail the distributional consequences of these policies to reduce carbon emissions.

Based on our study, respondents do not universally have strong preferences for the percent of permits auctioned or the uses of the auction revenue, although our mixed logit model with correlated marginal utilities suggest there is significant heterogeneity across the population in preferences for the share of permits auctioned and the share of revenue allocated to workers and communities.

Future explorations of models allowing for attribute interactions, however, are also a possible extension of our work. Another possible explanation for the apparent lack of importance of cap-and-trade program design features such as the percent of permits auctioned, and the uses of auction revenue, could be that our survey was overly complex for the average respondent. Statistically insignificant marginal utility estimates may be a result of inattention to these features on the part

[26]The Trump administration's valuation of less than $10/ton is largely ignored as a legitimate estimate of the SCC.

of a sufficient number of respondents. Further analysis of a relationship between respondents' measured and self-reported attention to different program features may help clear up what is going on with these less robustly estimated marginal utilities.

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A Online Appendix: Expanded Discussion of Literature

A.1 Context

While the United States has yet to adopt a federal carbon cap-and-trade program, regional carbon cap-and-trade programs have been adopted (Schmalensee and Stavins 2017). Federal inaction may necessitate that regional coalitions and states to implement policies (Fullerton and Karney 2018b; Peterson and Rose, 2006). Recently, Oregon attempted twice to adopt a carbon cap-and-trade program. In June of 2019, Oregon's eleven Republican senators fled the state, preventing the passage of HB-2020, Oregon's carbon "cap-and-trade" bill. In spring of 2020, SB-1530, the proposed Oregon cap-and-trade program that was modified to be more palatable to rural Oregonians. Despite the modifications, like its predecessor, SB-1530 was again boycotted by Republicans and defeated. Despite substantial support for a carbon tax amongst economists (Metcalf 2009) Oregon has been unable to pass legislation for a carbon cap-and-trade program. Oregon's attempts and (current) failure to create such a program highlights the complicated and contentious political, environmental, and social intersection concerning environmental regulation. Successful passage of a carbon cap-and-trade in Oregon relies on understanding preferences for a number of key program attributes.

A.2 Cap-and-Trade Attributes

Careful consideration was given in the selection of the carbon cap-and-trade program attributes we chose to include in our survey. [27] In the end we chose nice total attributes to include in the survey, which is clearly not an exhaustive list. Instead the attributes featured were selected based on the importance to policy makers as well as the public. Motivation for the inclusion of each feature will

[27] The attributes included are: the level of carbon emission reduction, the program's impact on carbon-industry and green-industry jobs, the financial cost of the program to households, the program's permit allocation system, the use of permit auction revenue, and the program's inclusion of additional regulations. To see the survey please see the appendix.

be briefly touched on, with the exception of emission reduction which we believe is self-evident.

A.2.1 Jobs

Perhaps the biggest political adversary to carbon cap-and-trade programs and other environmental regulations has been their potential adverse effect on the economy—namely eliminating jobs in certain industries (Coglianese et al. 2013). Paramount to successful implementation of regulatory policy is ensuring that workers and communities are protected in the transition to a greener economy (Look et al, 2021). However, despite the political fervor there has been relatively little evidence of significant job loss accompanying carbon pricing. [28] There have been several studies that found a significant negative impact of environmental regulation on jobs, but in these cases the authors still argued that the benefits of the regulations (e.g. the Clean Air Act) greatly outweighed the costs.[29] A common trend for studies that observed job loss (e.g. Yamazaki 2017; Hafstead and William 2018) was that the job loss occurred in regulated sectors and was often accompanied by new jobs in clean industries. However, it should be stressed that it is difficult to compare jobs and even in instances where jobs lost are nullified by jobs gained there are still significant welfare impacts (Reed, 2013; Sovacool et al, 2021). [30] Whether substantiated or not, concerns about displaced workers remains a key obstacle to public acceptance of carbon emission regulations.

A.2.2 Costs

Cap-and-trade programs are largely popular because of their promise of efficiency. However, the system's inattention to distributional impacts have been a source of considerable concern.[31]. There

[28] [Berman and Brui, 2001], [Deschenes, 2012], [Gray et al, 2014], [Liu, Tan and Zhang, 2021], [Morgenstern, Pizer, and Shih 2002], [Sheriff, Ferris and Shadbegian, 2019], and [Yamazaki, 2017]

[29] [Bartik, 2013], [Greenstone, 2002], [Reed, 2013]

[30] Some have questioned the accuracy of research done on regulations' impact on employment(Belova et al, 2015; Hafstead and Williams, 2019). For example, modeling assumptions common to previous research could lead to biased results (Hafstead, Williams and Chen 2018; Hafstead and Williams, 2018).

[31] (Buchs et al, 2011; Deryugina, Fullerton and Pizer, 2019; Dorband et al 2019; Farber, 2012; Feger and Radulescu, 2020; Fullerton and Muehlegger, 2019; Goudler et al, 2019; Pizer and Sexton, 2019; Shammin and Bullard, 2009; Wang et al, 2016; Williams et al, 2015)

are a number of ways in which distributional inequities can manifest in cap-and-trade programs Fullerton (2011). The most obvious avenue is cap-and-trade programs' upward pressure on prices for carbon-intensive products. If the burden of these higher prices falls on lower income households than the policy is considered regressive. This burden could be a result of lower income households consuming more carbon-intensive products (e.g. electric cars remain expensive) than higher income households or lower income households spending a larger portion of their income on carbon-intensive products (e.g. electricity bills). There is substantial evidence that carbon pricing policies are regressive [32]. However, there is also evidence of progressive carbon pricing policies. [33] [34] In any case, properly addressing the issue of a regressive carbon pricing scheme is challenging because of the distributional effects vary widely across communities and contexts [35]. Conditional on the need for climate policy it is possible that market mechanisms, while regressive, could be less regressive than other approaches (Borenstein and Davis, 2016).

A.2.3 Permit Allocation

Permit allocation has proven itself to be one of the key design features cap-and-trade programs.[36] Emission permits are allocated either based on historical output, through a government led auction, or a combination of the two (Fischer and Fox, 2007). The benefit of basing permit allocation on historical output is primary attributed to improving political feasibility and reducing the economic burden on firms. However, there is considerable criticism of this allocation system. ([Huber 2013],

[32](Bento, 2013; Buchs Barsely and Duwe, 2013; Burtraw Sweeney and Walls 2009; da Silva et al, 2016; Grainger and Kolstad, 2010; Kolstad, 2014; Jorgenson et al 2010; Mathur and Morris, 2014; Moz-Christofoletti and Pereda, 2021; Wier et al, 2005)

[33]Ohlendorf et al (2020) point out that even in the case of a progressive policy higher consumer prices still raises the risk of poverty for low-income households.

[34](Beck et al 2015; Cronin Fullerton and Sexton 2019; Dorband et al 2019; Rausch et al 2010).

[35](Rausch, Metcalf, and Reily, 2011; Ohlendorf et al 2020; Fullerton Heutel and Metcalf 2012; Pashardes Pashourtidou and Zachariadis, 2014; Fischer and Pizer 2019; Dorband et al 2019; Pizer, Sanchirico and Batz, 2010; Jorgenson et al, 2010; Pizer and Sexton 2019; Burtraw Sweeney and Walls 2009)

[36]Price collars and permit banking are also important considerations of the permit system ([Fell et al, 2012], [Fuss et al, 2018], [Metcalf, 2009], [Murray, Newell, and Pizer, 2009], [Hasegawa and Salant, 2015], [Burtraw et al, 2005], and [Metcalf, 2009])

[Vesterdal and Svendsen, 2004] and [Mackensive, Hanley and Kornienko, 2008]). While politically less palatable, permit auctioning is argued to be the welfare improving option ([Cramton and Kerr, 2002], [Betz et al, 2010], [Belifiori, 2017], and [Farber, 2012])

A.2.4 Permit auction revenue use

Auctioning emission permits will lead to a new source of revenue for the government. This revenue could be recycled to ameliorate the distributional issues. [37] Three particular uses are modeled in this study: subsidizing emission-reducing equipment for firms and households, financing adversely affected workers and communities transition, and reducing state taxes. Research has found that revenue recycling and providing the public with tangible public benefits could significantly improve support for carbon pricing (Amdur, Rabe and Borick 2014; Beiser-McGrath and Bernauer 2019; Raymond, 2019). One caveat to this is that Sallee (2019) argues that using revenue recycling cannot achieve a Pareto improvement.

A.2.5 Additional Regulations

Climate Change's impacts epitomize the issues of the environmental justice movement.[38] However, despite being a climate change mitigation policy, carbon cap-and-trade programs also raise environmental justice concerns ([Farber, 2012], [Fowlie, Walker, and Wooley, 2020], [Kaswan, 2008]). The central concern is that a market-based system will inevitably lead to a disproportionate accumulation pollution (hotspots) in marginalized communities, while the benefits of the program are enjoyed by higher-income and empowered communities (Fowlie and Muller 2019). Research has turned up little evidence to corroborate this concern ([Anderson, Kissel, and Mach 2018], [Corburn 2001], [Farber, 2012], [Fowlie Holland and Mansur, 2012], and [Fowlie, Walker,

[37](Boyce 2018; Buchs Barsely and Duwe, 2013; Metcalf 2008; Dinan and Rogers 2002; Wang et al 2016; Bento 2013; Goulder et al 2018; Farber 2012; Williams et al 2015; Parry et al 2010; Feger and Radulescu 2020; Grainger and Kolstad 2010; Moz-Christofoletti and Pereda 2021; Aubert and Chiroleu-Assouline 2019; Pizer and Sexton 2019)

[38]Mohai Pellow and Roberts (2009) give an excellent overview of Environmental Justice and Banzhaf Ma and Timmins (2019) provide another good overview more specific for economists.

and Wooley 2020]. Hernandez-Cortes and Meng (2020) used a dispersion model and found that under California's carbon cap-and-trade program environmental equity has actually improved.[39] One hypothesis is that the dirtiest places are also the cheapest to clean up ([Currie Voorheis and Walker 2020]). On the other hand, Grainger and Ruangmas (2018), contrary to Hernandez-Cortes and Meng (2020), used a dispersion model to evidence low income communities were exposed to more pollution. Chan and Morrow (2019) found that under the Regional Greehouse Gas Initiative in the northeast United Sates, electricity generation has shifted to areas with higher marginal damages of SO_2. Some argue that carbon cap-and-trade programs are not the tool to address other pollutants and should only be relied on to address carbon emissions (e.g. Fowlie, Walker, and Wooley, 2020; Dulaney et al, 2017). Others contend that despite the challenges properly designed cap-and-trade programs can mitigate, like other distributional issues, concerns the programs pose to environmental justice (e.g. Farber 2012; Kaswan, 2008).

A.3 Political Obstacles

Notwithstanding the considerable economic challenges of designing an optimal carbon cap-and-trade program, perhaps the biggest impediment to policy passage in the United States is political obstacles (Goulder and Parry, 2008; Jenkins, 2014; Klenert et al, 2018). And at the end of the day, a policy's economic implications are irrelevant if the policy is not passed by lawmakers. Indeed, economic analysis of environmental regulations frequently has little bearing on political popularity (Gillingham and Stock, 2018). In part, this is due to compromised government integrity (Baranzini et al 2017; Convery and Redmond, 2013). However, the primary reason carbon cap-and-trade programs and other carbon pricing policies remain largely politically unfeasible is due to the public's lack of support (Levi Flachsland and Jakob, 2020).

Public support for a policy is highly dependent on the narrative surrounding the policy as well

[39] Shapiro and Walker (2021) similarly mirror the results that offsets do not seem to be creating hotspots in California in regards to race or class.

as the framing of the policy (Allo and Loureiro, 2014; Carattini, Carvalho, and Fankhauser, 2018; Bilandzic Kalch and Soentgen (2017) Bushell et al, 2017; Dickinson et al, 2013; Terzi, 2020). A considerable amount of effort on the part of corporations has gone into fostering opposition to climate change related policies through misinformation campaigns and (Egan and Mullin 2017, Farrell 2016, Westervelt 2018-present). Additionally conservative regulation-opposed politicians have used public concerns about the economy to establish an anti-environmental regulation narrative (Coglianese et al. 2013; Egan and Mullin 2017). The effects of these campaigns can be seen in research that finds the more people understand the impacts of climate change the more they are willing to participate in or pay for mitigation measures (Bord O'Connor and Fisher, 2000; Videras et al 2012, [Spence et al 2011] Scannel and Gifford (2013) (Bain et al, 2012).

In the United States, political party affiliation is often the primary determinant in attitudes about climate change and mitigation policies. A review of climate change opinion surveys in the United States found that not only is partisanship the paramount driver in support for policy, but that the gap between the Republicans and Democrats has become even more pronounced in recent years (Egan and Mullin 2017). This assesment has been corroborated using revealed preference work as well. For example, Anderson Marinescu and Shor (2019) used voting data from two failed carbon tax bills in Washington State and found that political party affiliation was by far the biggest indicator of support or opposition to the policies, with political ideology accounting for 91% of the variation in vote shares across precincts.

B Online Appendix: Structure of the Survey

B.1 Demographic Questions for Screening

The first section of the survey collects five basic pieces of information about the respondent: place of residence (state), age, gender, race, and income. A sixth question asks the respondent to report their Oregon zip code. Their response is cross-referenced against an exhaustive list of Oregon's residential zip codes. What we call "Demographic Questions for Screening," serves multiple essential purposes.

First, in order to measure heterogeneous willingness to pay (WTP) measures across demographics it is essential that we in fact know what are those demographics.

Second, we would like our 1000 observations to be as representative of Oregon, at least on those five categories, as possible. If the respondent answers the six questions (e.g. *White male age 25-34 who makes $20,000 - $24,999 a year and lives in the zip code 97219*) and we observe that we already have "enough" respondents fitting that description, then we excuse the respondent from the rest of the survey.

Finally, the preliminary demographic section allows for sample selection correction. Before any information alluding to the content of the survey is revealed (i.e. that the survey is asking about WTP for a carbon cap-and-trade program), the respondent must answer those five basic questions. If the respondent chooses "Prefer not to say" for any of the categories then they are excused from the survey. If the respondent answers the demographic questions and we deem them eligible for the survey (see the second point above) then we introduce the topic of the survey. At this point, some respondents will drop out of the survey. However, because we have already gathered the demographic information about these dropouts we are able to observe what relationship, if any, exists between willingness to take the survey and the aforementioned demographic characteristics. In other words, we are able to observe if sample selection is occurring and correct for it.[40]

[40] See **Appendix ??** for explanation of the selection correction procedure.

B.2 Intro Questions

After completing the initial demographic information, the respondent is sent to the "Basic Information and Consent" page. It is at this point that the topic of the survey is revealed. The respondent is asked to consent to taking the survey. A followup question asks the respondent to confirm that they will provide "thoughtful and honest answers" as recommended by Johnston et al (2017). A "No" to either of these questions results in termination of the survey.

B.3 Background Information

The next section of the survey provides the respondents with some basic information that is relevant to carbon cap-and-trade (CAT) programs. We begin with a brief explanation of climate change, carbon emissions, and the relationship between the two. We then explain the motivation of understanding Oregonians' preferences concerning a CAT program. Namely, that Oregon legislators have attempted to pass a CAT in Oregon but have failed to do so in large part because specifics of the program were not agreeable. At this point we briefly explain the mechanics of a CAT. The respondent is then prompted with "How familiar are you with carbon cap and trade programs?" The respondent receives more information about how a CAT works if they answer "I should probably review the basics" or "Not familiar at all." The respondent skips this further explanation if they answer "Quite familiar." After the explaining the broad strokes of CAT programs, the survey elucidates which companies will likely be targeted in Oregon. While we cannot know what form policy will take in reality, it is important that the respondents have a similar idea of who is regulated while answering the survey. Because the hypothetical CAT programs our survey asks respondents to make choices about include specific rules about permits[41] we provide a cursory explanation of permits that complements the earlier explanation of carbon cap-and-trade programs. The respondents are able to pursue a more detailed explanation of permits if they feel inclined. The more

[41] See **Choice Scenarios** below.

detailed explanation does not include unique information, but rather provides a fuller explanation that might be more accessible should the cursory explanation leave respondents confused. The next two pages of the survey describe respectively penitential benefits (global and local) and costs (to households, to businesses, and concerns about equity). The final page of this section asks the respondent which county they live in. Using that response we are able to scale the values of the choice tasks to the county level the individual respondent lives in.

B.4 Tutorial on Program Attributes

The next section of the survey's purpose is to prepare respondents for the choice tasks. Each choice task presents a hypothetical program in the form of a table. Due to the complexity of the table it is appropriate to send some time explaining all the moving pieces of the choice task.[42] The table is codified into five "Feature Groups": *Results*, *Carbon Permits, rules*, *Auction Revenue Uses*, *Additional Regulations*, and *Cost to your household*. Each group has between 1 and 3 different features for a total of nine program features for respondents to consider. The nine program features are discussed below. The tutorial walks respondents through each feature of the table. A brief explanation of the feature is provided as well as a graphic that helps explain and provides relief from too much text. In addition to the explanation in the tutorial, the respondents are instructed that throughout the choice tasks a abbreviated description of any specific feature can be called up by clicking on that feature in the table. The values used in the tutorial section are the same values used in the first choice task. This is done to minimize mental effort on the respondent's behalf and to help connect the tutorial with the choice task section. Before the feature-by-feature portion of the tutorial begins, respondents are instructed that the every program displayed in the choice task will begin January 1, 2023. Consequently, the various effects of the program will also begin to accrue January 1, 2023.

[42] Pretesting found that thorough explanation was often necessary to convey the parameters of the hypothetical situation we were asking respondents to consider.

Results

The first feature group, *Results*, has three attributes: Carbon emission reduction, Carbon industry jobs lost, and Green industry jobs gained. The first feature, carbon emission reduction, refers to the percent reduction of total annual carbon emissions in Oregon by the year 2050 (relative to current emission levels). By clicking on a link, respondents are able to observe current emission levels in Oregon, which provides context to the reduction goal.

The next feature is *carbon industry jobs lost*. The value presented in the table is not a percent of jobs lost, but rather a sum (e.g. 2,000 jobs). This sum is based in part on the county that the respondent indicated they lived in earlier in the survey.[43] The respondents are instructed that they should imagine this job loss would occur over the next 30 years–consistent with the carbon emission reduction by 2050. Respondents are able to see how many current[44] carbon industry jobs are in the respondent's own county of residence. Respondents are also shown the total number of carbon industry jobs in Oregon.A link is included that clarifies what the survey means by "carbon industries."

Green industry jobs gained follows the same format as carbon industry jobs lost with the obvious exception that values are based off of green industry jobs, as defined by the BLS.

Carbon Permits, rules

Carbon Permits, rules has only one feature: Share of permits auctioned. This value indicates the percent of the total cap set by the cap-and-trade program that is auctioned. The respondent is reminded that the rest of the permits are allocated for free. The survey does not specify the allocation process, but examples are provided for respondents who are curious earlier in the survey. Respondents have already been provided with information about permits earlier in the survey, but it is important that respondents clearly understand the costs and benefits of this feature. In the

[43] We take the current level of carbon industry jobs in a county (e.g. 40,000) and then scale that number by a randomly generated percent (e.g. 5%) and present that number (e.g. 2000) as the number of carbon industry jobs lost.

[44] Calculations use data from 2019 for the Bureau of Labor Statistics

pretest, initially testers were often unclear about how this feature worked. The survey includes a detailed visualization of the permit rule system to aid in the explanation.

Auction Revenue Uses

The next feature group is *Auction revenue uses*. One of the primary issues to political feasibility of cap-and-trade programs is concern over some groups (e.g. coal miners or low-income households) being economically devastated by shrinking industries or higher costs of goods. A popular, in theory, way to address this heterogeneous burden is by using the funds from the auctioned permits to target groups or sectors in need of assistance. After consideration, this survey asks respondents to consider three possible ways to spend the auction funds: *fund new equipment*, *support communities/workers*, and *Oregon tax relief*. There are a multitude of other ways this money could be spent, but we found these categories to be a good balance of both encompassing most of the ways as well as specific enough for respondents to be able to consider clearly. The values presented are in percent terms (summing to %100 across the three uses). Because no specific dollar value is given in terms of total money raised by the auction, respondents similarly do not see a specific amount of money being allocated to these three uses.

Fund new equipment refers to revenue spent to partially or entirely subsidize the purchase of emission reducing equipment for firms or households. In practice, the more general label for spending of this nature might be referred to as "funding green projects." However, that label is fairly vague and we believe that being more specific would result in more thoughtful responses.

Support communities/workers refers to revenue spent on communities or workers in certain industries that bear a relatively heavier burden of the costs of the cap-and-trade program. Often referred to as a *Just Transition*, an essential component of a politically feasible program includes a safety plan for those hurt by the program. Some examples are given, for instance "communities with a lot of carbon-intensive jobs." However, no specific group is explicitly stated as receiving these funds. Furthermore, the vehicle in which the funds are delivered are also left open-ended.

Oregon tax relief refers to revenue spent on reducing the Oregon state taxes. A considerable amount of literature explores the various intricacies using taxes to counteract the costs of carbon pricing. However, in the survey we keep the idea simple to reduce mental effort on the behalf of the respondent. In short, the higher the value this feature takes on the lower "taxes" will be for Oregonians.

Additional Regulations

Additional Regulations has only one feature *limit other pollutants*. This feature is included ad hoc to address environmental justice concerns about unintended hot spots of carbon emission co-pollutants. Under a standard cap-and-trade program, it is possible that certain firms will actually *increase* emissions and thus increase co-pollutants (e.g. NO_x or $PM_{2.5}$). The *limit other pollutants* feature takes on two values, "YES" and "NO." Respondents are instructed of the potential issue of unintended co-pollutant hot spots under a carbon cap-and-trade program and then this feature indicates whether some form of "additional regulation" would be part of the program. The details of the regulation are left vague, and in practice there are many ways to address the co-pollutant issue (e.g. pollution standard, trading ratio or zonal trading). However, we believe this approach to be a good compromise of an accessible idea for respondents that addresses a key issue in carbon cap-and-trade programs.

Cost to your household

The final feature of the table is the cost to households in *Dollars per month*. *Dollars per month* is explained as the "average monthly costs *your household* would bear if the program is adopted." We use the per month unit of time because energy bills, as well as consumption budgets, are frequently considered on a monthly scale. For many households these will be the primary sources of program costs. The respondents are instructed that these costs are unavoidable. A change in energy use or not working in a carbon-intensive industry does not absolve the respondent's household from incurring the cost.

B.5 Choice Scenarios

Each respondent is asked to perform six choice tasks (Program A through Program F). In each choice task they are presented with a hypothetical program in the form of a table (with the features mentioned above) and asked if they would prefer the program or no program. Each program is identical in display and content with the exception of the values that each feature takes on. To reduce mental effort on behalf of the respondent, Program A uses the values displayed in the program attribute tutorial. The choice is presented as a "vote." The idea being, it is quite conceivable that a cap-and-trade program could be on a future ballot in Oregon so the survey does its best to replicate that scenario. This is one way in which the survey addresses the cheap talk issue that is common in contingent valuation methodology.

In a preamble to the first program (Program A) the respondents receive a few additional instructions. First, they are told that the labels of the programs (A through F) are arbitrary and have no relation to the quality of the program. The preamble also clearly states that in for any given program the respondent should only consider this program and no program at all. In other words, we do not want respondents voting against, for instance Program C, because they prefer Program B or some other program that they have conjured up in their head. This point is belabored by making the voting choices for each program "Program *X* to begin January 1, 2023" and "No program at all." The respondents are instructed that voting against a program is a valid choice and that they should act freely since the researchers will not learn their identity. In an additional effort to address cheap talk respondents are instructed that, "In hypothetical choices such as these, people sometimes do not think carefully enough about what they would have to give up to be able to pay the monthly cost of the program. **Please consider what your household would have to sacrifice, if the proposed cap-and-trade program were adopted.**". Finally, respondents are reminded that they are able to review explanations for a program feature by clicking on it in the table.

The survey is designed such that the entire program table is visible on a screen–this includes cell-phone screens. We presume that many respondents will use cell-phones to take the survey and

in order to consider all the features of a program the respondent should be able to see them all at the same time. Below each program table the respondent is prompted with, "If Program *X* were the only program to be put to a vote, I would vote for:" followed by the two aforementioned choices.

After the respondent votes on Program A they are taken to different pages depending on their choice. If the respondent votes for Program A they are sent to the next choice task. If the respondent votes for no program they are asked to indicate from a menu of options all the reasons they voted against the program:

- *Too much emission reduction*
- *Too little emission reduction*
- *The economic impacts were too costly*
- *Did not approve of the auction revenue use*
- *Too many permits were auctioned*
- *Too few permits were auctioned*
- *Did not approve of the Additional Regulations on other pollutants*
- *The benefits of Oregon or the World do not justify ANY cost*
- *Program A did not seem believable*
- *Some other reason*

We are able to deduce from the respondents choices here whether they have valid economic reasons for voting no, or whether their no vote signals scenario rejection. [45]

From this page, people who voted no on Program A are then asked if they would vote for any carbon cap-and-trade program. More specifically they are asked to choose from three options: "I did not like **Program A**, but there might be some type of program, at some cost low enough for me, for which I could possibly vote 'Yes'", "Carbon cap-and-trade programs are a BAD idea. The

[45] An example of a valid reason would be "The economic impacts were too costly. An example of an invalid reason would be "Too little emission reduction." We consider this an invalid reason, because the alternative to Program A is no emission reduction. So this answer indicates that the respondent is not operating in the framework of the hypothetical scenario.

government should not interfere with the free market. **I would vote "No" for ANY carbon cap-and-trade program**!" and "Something needs to be done about carbon emissions, but **a carbon cap-and-trade program is not the solution.**" If the respondent indicates that there is a program they could conceivably vote for they are sent to the Program B choice task. If at this point the respondent indicates they would not vote for any carbon cap-and-trade program they are skipped through the choice tasks to the next section of the survey–this saves the respondent unnecessary effort. If the respondent indicates that something needs to be done about carbon emissions, but the solution is not cap-and-trade they are sent to a further clarifying page.

If a respondent votes against Program A and indicates that carbon cap-and-trade programs are not the appropriate policy response they are asked if they would prefer a carbon cap-and-trade program to no policy at all. If at this point they indicate that they would prefer a cap-and-trade program to nothing at all they are sent to the Program B choice task. If they are staunchly opposed to cap-and-trade programs they are skipped through the choice tasks. Respondents who end up at this page are asked what policy they would prefer to a cap-and-trade program. This is asked after completing the choices tasks or after being skipped through the choice tasks as determined by their answers.

After completing the choice tasks, respondents are asked to indicate which of the program features were most important to them. For respondents who made it through all choice tasks but voted for no in all six choice tasks, they are asked to explain the reasons they did so. They choose from a menu of options:

- *I am not convinced that climate change is actually happening*
- *Even if climate change is actually happening, I don't believe that anything we do (or don't do) will make any real difference*
- *I don't think Oregon produces enough carbon emissions to matter. Instead, states and countries with more heavy industries should be required to cut back*
- *I would be hurt by the effect of the program on my livelihood or the cost of things I buy*
- *I would be hurt by the effect of the program on the cost of transportation*

- *These choice tasks were just too difficult for me to process*
- *Some other reason (Please specify)*

In this way we are able to gain a better understanding of what features are important to them, despite having no "choices."

B.6 Follow-up Questions

In the final section of the survey the respondent is asked a serious of additional socio-demographic questions. Some of these questions would be quite informative if asked to ask in initial demographic question section. For instance, political ideology and political party affiliation are likely determinants in a respondent's propensity to dropout of the survey. However, due to IRB restrictions this is not possible.

Years in Oregon

Two questions are asked concerning respondents' residence in Oregon. First we ask respondents "*How many years have you lived in Oregon*" (with a sliding scale from 0 - 100), and then we follow up with "*How many more years do you expect to keep living in Oregon?*" (with a sliding scale from 0 - 100). These questions are included for two separate purposes. The first is to test the hypothesis: Are people who feel more connected to a geographic area (in this case, Oregon) more likely to support long term environmental policy (in this case, carbon cap-and-trade) in that area? The second purpose of this particular pair of questions is to screen out inattentive/careless respondents and bots. Both can potentially be detected by illogical uses of the sliders–especially when cross-referenced against the age question asked at the beginning of the survey. For instance, bots are often programmed to max out sliders. In this case answering 100 years to both years lived so far and future years lived in Oregon will raise a flag.[46]

[46] A very detailed assessment of invalid responses in an online survey panel was provided by Robert Johnston in a session entitled "Contemporary Guidance for Stated Preference Studies: An Update (roundtable)" at the 2021 Annual Conference of the Society for Benefit-Cost Analysis.

General Socio-demographic Questions

We include a series of additional basic socio-demographic questions. The questions are multiple/single choice, with the inclusion of "Prefer not to say" for each question, unless stated otherwise. We force a response to the questions but a respondent's choice of "Prefer not to say" does not end the survey for them at this point. The questions in the order that they appear are:

- *What is your ethnicity?*. Choices include: "Hispanic," "Non-Hispanic," or "Other."
- *Which industries provide a significant amount of your household's income?*. We provide a menu of standard NAICS categories with specifically relevant subsectors broken out separately (e.g. Wood Product Manufacturing and Forestry/Logging are separate categories).
- *Politically, do you consider yourself to be:*. Choices range from "Strongly conservative" to "Strongly liberal."
- *What political party do you most strongly identify with?*. Choices include: "Republican," "Democrat," and "Independent."
- *What is your highest level of education?*. Choices include: "Less than high school," "High school graduate," "Some college," "Bachelor's degree," "Master's degree," "Doctoral degree," and "Trade or technical school."
- *Which best describes your current employment status?*. Choices include: "Self-employed or small business owner," "Employee, working full-time," "Employee, working part-time," "Not employed, looking for work," "Not employed, NOT looking for work," "Retired," "Disabled, not able to work," "Full-time student," "Student with part-time work," and "Other."

Attitudes about Climate Change

Respondents are asked a serious of questions pertaining to their attitudes about climate change. Recall that in the background information section of the survey climate change was briefly discussed. The survey takes the stance that climate change is real, which can be, unfortunately, read as a political stance by some Americans. It is likely that people willing to participate in the survey will need to have some basic acceptance that climate change is real. However, it is informative to have a more nuanced understanding of respondents' attitudes.

Respondents are prompted with, *Climate change is real, and is a serious threat to humanity*. Response options include: "Strongly agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree." If the respondent selects "Strongly disagree" they are skipped past the remainder of the climate change questions.

If they choose any other option respondents are prompted with, *Climate change is the result of human activity*. Response options include: "Strongly agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree." If the respondent selects "Strongly disagree" or "Disagree" they are skipped past the remainder of the climate change questions.

Finally, respondents are asked, *Who is most responsible for slowing or preventing climate change? (Select all that apply)*.Response options include: "Local governments," "The Federal government," "Households," "Companies," "People who are wealthier," "People who are responsible for more emissions," "Other" and "Everyone equally."

Generational Questions

Following the climate change attitude portion of the survey, respondents are then asked two generational questions. First they are asked, *Do you have any of the following? (Check all that apply)* with response options of: "Children," "Grandchildren," "Great-grandchildren," "Other descendants (please specify)," "None of the above," and "Don't know / not sure." They are then asked, *How many generations back can you trace at least some of your ancestors? (Check the greatest number)* with response options ranging from "1 generation (i.e. just your parent(s))" to

"7 or more generations." The hypothesis is that people who see themselves as being remembered as well as they remember their ancestors might be more concerned about climate change and what they do about it now. While the questions perhaps appear non sequitur being too direct in testing this hypothesis would potentially lead to social desirability bias.[47]

Energy Use Questions

Respondent's are asked two questions concerning fuel-type. First respondents are asked, *What is the primary fuel you use to heat your dwelling?*. Response options include: "Natural gas," "Electricity from a conventional power plant," "Electricity from solar panels or wind power," "Electricity (unsure about source)," "Wood or wood pellets," "Passive solar (heated water)," "Other (please specify)," "I don't heat my dwelling," and "Don't know / not sure." Respondents are also asked to indicate *What are your most common forms of transportation? (Check as many as apply)*. Response options include: "Personal vehicle (gasoline or diesel)," "Personal vehicle (hybrid)," "Personal vehicle (electric)," "Public transportation (bus or train)," "Taxi or ride-sharing (e.g., Uber or Lyft)," "Bicycle," "Walking," and "Other (please specify)."

It is likely that a large portion of the average costs to households resulting from a carbon cap-and-trade program will come through the form of higher energy prices. While we have already managed to glean information about respondents' attitudes concerning higher energy costs it is informative to be able to connect a respondent's attitude about higher costs and their actual energy use. While in the choice task we instruct respondents to assume costs are unavoidable, it is likely that higher energy costs would be more salient for those that use natural gas to heat their homes or always commute via a personal vehicle.[48] Energy-type use also helps identify which individuals are willing (and able) to make personal efforts to mitigate climate change. Identifying this

[47]Respondents answer how they would like to be seen rather than how they actually feel. While an online survey format helps mitigate this, a loaded question like, "Do you care about future generations?" could lead to untruthful responses.

[48]It should also be noted that higher energy costs are also more salient for low-income households, because a larger portion of their income goes towards energy use. Recall, income level is one of the demographic pieces of information that is required in order to be eligible for the survey.

preference is informative in our WTP analysis.

Feedback Questions

We give respondents three separate prompts to provide feedback on the survey. The feedback, in addition to informing future studies, also aids in our data collection.

The first feedback prompt is concerned with research team bias. There are two versions (version A and version B) of the prompt page that are randomly assigned to individual respondents. Both version A and B of the prompt page read, *It seemed like the research team wanted me to:*. The difference in the versions is that the order in which the menu of response choices is inverted fro version B. The response choices, in the order that they appear in version A, include: "**definitely vote AGAINST** a carbon cap-and-trade program," "**probably vote AGAINST** a carbon cap-and-trade program," "vote **according to my own beliefs**," "**probably vote FOR** a carbon cap-and-trade program," and "**definitely vote FOR** a carbon cap-and-trade program." To reiterate, version B has the same choices but an inverted order. The randomized inversion of the response choices is to test for response order bias from the respondents. An ideal survey would result in all respondents choosing "vote **according to my own beliefs**." However, non-systematic even distributions "**probably vote AGAINST** a carbon cap-and-trade program," "vote **according to my own beliefs**," and "**probably vote FOR** a carbon cap-and-trade program" are also acceptable. It is possible that due to the politically charged nature of climate change and related policies, that simply asking about attitudes toward a carbon cap=and-trade program will lead the respondent to assume the research team is biased in favor of a program.

The second feedback prompt asks the respondent to rate the survey using a five star rating system on four categories: "Understandable," "Relevant to you," "Interesting," and "Informative." In addition to providing useful feedback to future studies, this prompt also serves two additional purposes. First, low scores, especially for "Understandable," give us an idea about the quality of a particular respondent's submission. If a respondent only gives the survey 1 out of 5 stars for

"Understandable" then we know that the choice tasks were likely not performed with full comprehension. Second, this star system provides another chance to draw attention to respondents who are speeding through the survey or bots.

Finally, respondents are given an open-ended prompt for feedback. The primary goal of this prompt is to detect respondents who are speeding through the survey or bots. Bots in particular will often enter gibberish or nonsensical answers. Of course, it always encouraging to read thoughtful comments from respondents.

C Online Appendix: Selection Model

C.1 Selection Correction Methodology

We employ an ad hoc correction for sample selection. We use a probit model, with our full sample of 1630 eligible respondents, to explain whether or not each eligible respondents submits a completed survey. The fitted probit "index" (the linear combination of estimated probit parameters and explanatory variables) can be interpreted as a latent "propensity to complete the survey." We calculate the fitted completion propensity for every eligible respondent and calculate the mean response propensity across all of these eligible respondents. The de-meaned response propensity will be zero among the set of 1630 eligible respondents.

If the set of respondents who complete the survey are all equally as likely to provide a full set of responses as the pool of eligible respondents, then we would expect the mean response propensity among those who complete the survey also to be zero. As reported in the body of the paper, the average person contributing a completed survey has a greater response propensity than the average in the eligible pool. If we assume that preferences can differ systematically according to response propensities, we can use the fitted response propensity to shift each marginal utility parameter in the program choice model. We can then simulate what the preference parameters would have been, had every person in the eligible pool been equally likely to complete a survey, with a response propensity equal to the average response propensity in the eligible pool. Specifically, we simulate the preference parameters that would obtain if the demeaned response propensity for each person in the sample of completed responses had been zero.

Unlike a conventional Heckman two-step correction method, this ad hoc procedure relies upon observable characteristics of the eligible pool (or their neighborhoods) to explain response propensities. There is no assumption of a truncated bivariate normal error distribution for the response/non-response model and the outcome model.

C.2 Responders and Non-responders

C.3 Variables Used for Selection Correction

We use all of our available data from the few screening questions (gender, age, race, and income bracket) as well as all of the available geo-coded data linked to each eligible respondent by their zip code, as potential regressors for our selection model. We wish to allow the levels of these variables, as well as their interaction terms, to explain response propensities. However, this is far too large a list of variables, given that we have only 1630 eligible respondents and 1050 completed survey questionnaires.

C.4 LASSO

To winnow the universe of explanatory variables and their pairwise interactions, we resort to LASSO methods, as available in R. We conduct our LASSO estimation using the 'glmnet' package[49]. This enables us to reduce the number of explanatory variables for our probit model. For a detailed explanation of how our estimation was done see **??**.

Complete, the dependent variable for the LASSO equation, is a binary indicator variable that takes on the value of 0 if the respondent does not complete the survey or if they complete the survey in less than 7.5 minutes.[50] Our response rate, $\frac{complete\ surveys}{total\ surveys}$, is 64%.

Table C1: Parameter estimates for selection model (regressors selected by LASSO)

	Estimate	
Outcome: 1=Got to end of survey		
(1=Gender:Not male) × (1=Race:Black)	-0.502**	(0.211)
(1=Gender:Not male) × (1=Started survey on Fri)	-0.354**	(0.149)
(1=Own age:18 to 24) × (1=Gender:Male)	-0.318**	(0.154)

Continued on next page

[49]Friedman et al. 2021

[50]The average completion time in the soft launch of the survey was 15 minutes. Anyone who completed the survey in less than half of the average completion time (i.e. 7.5 minutes) was determined a "speeder" and their response was considered invalid on the grounds that they were not providing thoughtful responses.

Table C1 – continued from previous page

(1=Own age:18 to 24) × (ZCTA pr:Asian)	-0.0380***	(0.0131)
(1=Own age:25 to 34) × (1=Gender:Not male)	-0.0280	(0.115)
(1=Own age:25 to 34) × (1=Started survey on Sun)	-0.133	(0.181)
(1=Own age:25 to 34) × (1=Started survey on Thu)	-0.189	(0.213)
(1=Own age:25 to 34) × (ZCTA pr:Black)	-0.0135	(0.0252)
(1=Own age:35 to 44) × (1=Started survey on Fri)	0.0902	(0.229)
(1=Own age:55 to 64) × (1=Started survey on Thu)	0.113	(0.306)
(1=Own age:55 to 64) × (1=Started survey on Wed)	-1.010***	(0.361)
(1=Own age:55 to 64) × (Dist. nearest wildfire 2020)	-0.524	(0.388)
(1=Own age:55 to 64) × (ZCTA pr:Other race)	0.0440	(0.0361)
(1=Own age:65 and up) × (1=Started survey on Wed)	-0.631***	(0.242)
(1=Own age:75 and up) × (Sq. miles; nearest wildfire 2020)	-0.00164	(0.00110)
(1=Own hhld inc:100-125K) × (1=Own age:25 to 34)	-0.342*	(0.207)
(1=Own hhld inc:150-175K) × (1=Started survey on Fri)	0.0138	(0.449)
(1=Own hhld inc:150-175K) × (1=Started survey on Mon)	0.422	(0.747)
(1=Own hhld inc:150-175K) × (1=Started survey on Sat)	-0.596	(0.909)
(1=Own hhld inc:175-200K) × (1=Started survey on Wed)	-0.286	(0.780)
(1=Own hhld inc:220K up) × (1=Own age:65 and up)	-0.204	(0.361)
(1=Own hhld inc:30-50K) × (1=Own age:35 to 44)	-0.0979	(0.246)
(1=Own hhld inc:30-50K) × (1=Started survey on Sat)	0.0588	(0.211)
(1=Own hhld inc:30-50K) × (1=Started survey on Thu)	0.0933	(0.289)
(1=Own hhld inc:30-50K) × (ZCTA pr:Indus:Profsci.)	-0.0118	(0.0103)
(1=Own hhld inc:50-75K) × (1=Started survey on Wed)	0.443	(0.280)
(1=Own hhld inc:75-100K) × (1=Own age:45 to 54)	0.149	(0.240)
(1=Own hhld inc:75-100K) × (ZCTA pr:Below poverty line)	-1.129*	(0.603)
(1=Own hhld inc:lt 20K) × (1=Started survey on Wed)	-0.412*	(0.214)
(1=Race:White) × (1=Used a mobile device)	-0.0247	(0.0868)
(1=Started survey on Mon) × (ZCTA pr:Indus:Arts/ent.)	-0.00482	(0.0154)
(1=Started survey on Mon) × (ZCTA pr:Indus:Publ. adm.)	-0.00749	(0.0110)
(County pr: Internet w/o subsc.) × (CDC SVI cnty-Hsg type, transp.)	-3.052	(4.030)
(Dist. nearest wildfire 2010-19) × (County pr: No internet)	0.0000111	(0.0000265)
(Dist. nearest wildfire 2010-19) × (County pr: Satellite internet)	0.0000324	(0.0000335)
(Dist. nearest wildfire 2020) × (County pr: Dial-up internet)	51.65	(74.24)
(ZCTA pr:Black) × (1=Started survey on Fri)	0.0207	(0.0351)
(ZCTA pr:Black) × (ZCTA pr:Live in rural area)	0.683***	(0.238)
(ZCTA pr:Inc gt 1.5 pov. level) × (ZCTA pr:Income 35 to 50K)	1.861	(4.859)
(ZCTA pr:Income 35 to 50K) × (ZCTA pr:Internet access)	-0.0205	(0.0514)
(ZCTA pr:Income 35 to 50K) × (ZCTA pr:Two or more races)	0.0268	(0.159)
(ZCTA pr:Indus:Transp.) × (County pr: Other internet)	0.708	(0.891)
(ZCTA pr:Indus:Wholes.) × (1=Used a mobile device)	-0.106***	(0.0268)
Constant	0.563**	(0.221)
Max. log-likelihood	-1002.23	
No. respondents	1630	

Continued on next page

Table C1 – continued from previous page

t standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

D Online Appendix: One Instance of the Survey (Screenshots)

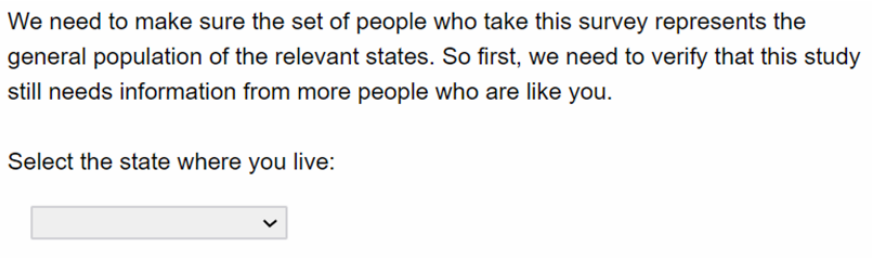
D.1 State of residence

The screening questions on the first 8 pages of this survey of Qualtrics panelists are completed before the page that contains the Consent to Participate in the actual survey. The Consent page is where the respondent first learns about the topic of the survey. This ordering is crucial to any ability to model systematic response/non-response (attrition from the random sample of Qualtrics panelists). Qualtrics prefers that respondents who are ineligible because quotas have already been met should be apprised of this fact before they get too far into a survey for which their answers are not needed. We require that potential respondents, still naïve about the topic of the survey, should at least be willing to supply their state of residence (always Oregon for this study) their age, gender, race, and household income bracket. These are the quota criteria for inclusion.

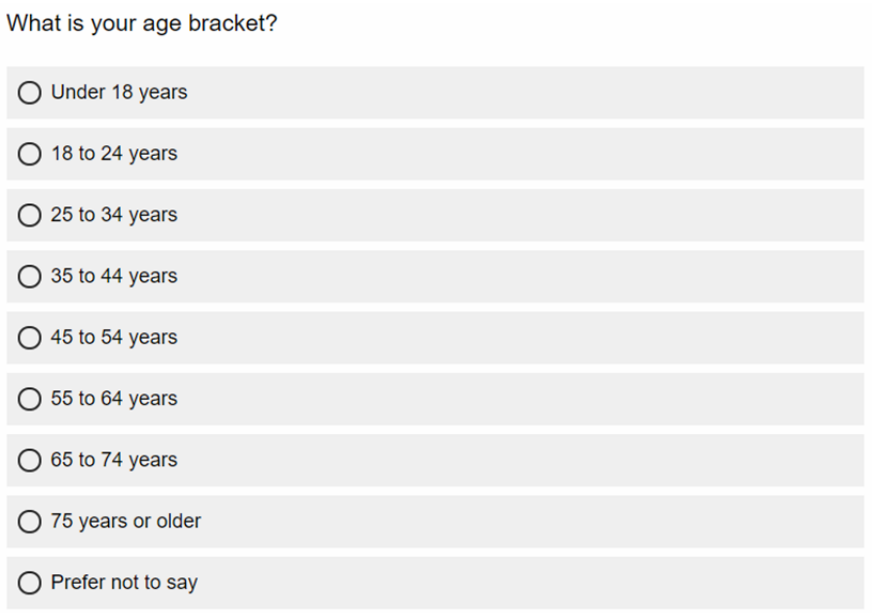
However, we also require that they enter their ZIP code at the end of the screening section. Our overall target sample (1000) is not large enough to warrant quotas by ZIP code within Oregon, but we need this information to permit us to link every one of these screened and eligible respondents to external auxiliary data that can be geocoded to ZIP codes. For this climate-related study, these external data sources include Census ZCTA data, NOAA climate division data, 2020 Presidential election data by county, state legislative district voting data for Oregon for 2016, along with spatial data on the recent history of wildfires and drought levels. These neighborhood/county characteristics can be used as proxies for the salience of climate change problems to people who live in the same area as the eligible respondent. The partisan reactions to Oregon's actual proposed carbon cap-and-trade programs in recent years suggests that political ideologies in the respondent's neighborhood may make programs to reduce carbon emissions either very attractive or readily dismissed. For the latter group, we expect a lower likelihood of continuing with the survey to completion, after the topic of the survey is revealed.

Qualtrics can target Oregon in issuing survey invitations. However, to prevent non-Oregonians

from pretending to be from Oregon, we first check to see whether respondents choose "Oregon" when given an opportunity to choose their state. (If they don't choose Oregon, they are given one opportunity to choose again, and are terminated if they don't choose "Oregon" at least on the second try. The follow-up double-check page is not shown here.)



D.2 Age



D.3 Gender

What is your gender?

- ◯ Male
- ◯ Female
- ◯ Non-binary
- ◯ Prefer not to say

D.4 Race

What is your race?

- ◯ White
- ◯ Black or African-American
- ◯ Asian
- ◯ American Indian or Alaska Native
- ◯ Native Hawaiian or Pacific Islander
- ◯ Some other race

- ◯ Prefer not to say

D.5 Household income

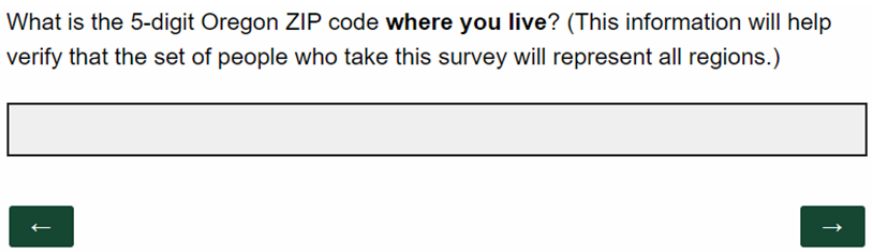
In 2020, approximately what was your total annual household income, using these standard income brackets?

Click this blue text for a pop-up that explains who counts as your household. Click the X in the upper right to close the pop-up, or just click anywhere on the screen outside the pop-up.

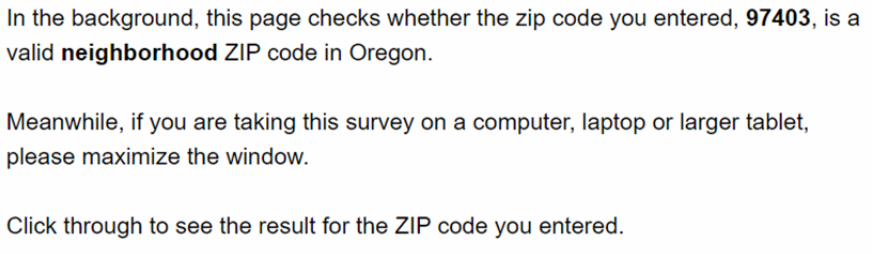
- ◯ Less than $20,000
- ◯ $20,000 to $24,999
- ◯ $25,000 to $29,999
- ◯ $30,000 to $49,999
- ◯ $50,000 to $74,999
- ◯ $75,000 to $99,999
- ◯ $100,000 to $124,999
- ◯ $125,000 to $149,999
- ◯ $150,000 to 174,999
- ◯ $175,000 to $199,999
- ◯ $200,000 or more
- ◯ Prefer not to say

D.6 ZIP code

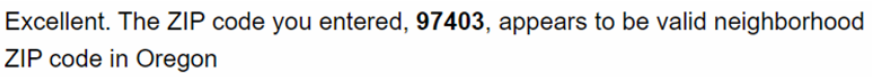
We validate the respondent's zip code entry by checking it against a list of "standard" Oregon ZIP codes—namely ZIP codes that are not for post-office boxes and are not "unique" (typically for government agencies or other large institutions that have their own internal mail systems). Unique ZIP codes are more likely to be workplaces.



D.7 Check ZIP code



D.8 Confirm standard ZIP code



D.9 Consent to Participate

This page is where respondents first learn the topic of the survey. We expect that upon learning that the survey will be about carbon cap-and-trade programs to deal with climate change, some share of respondents to lose interest, while others will find the topic especially salient. The questions asked prior to this page allow us to assemble ZIP-code-level, county-level or other geo-coded variables that can help us identify the respondent's community and how its characteristics may be systematically different than the neighborhoods of other potential respondents who either do, or do not, continue to complete the entire survey.

Basic Information & Consent

Excellent. You have qualified for this study. Now we need to tell you a bit more about the study and get your formal consent to take part.

Study Procedures: Oregon's government has been considering a **carbon cap-and-trade** program in the state. If you are a resident of Oregon, and you decide to participate in this research study, you will be asked to complete a **roughly 15-minute survey** about whether and how Oregon should set up a program like this. (The survey may take longer if you haven't heard much about carbon cap-and-trade and you choose to study more of the optional background information we provide.)

We will first explain a bit about carbon cap-and-trade programs and how such a program might work in Oregon. Next, we will **show you some different versions of programs**. Each time, you will be asked to consider the program and to **vote yes or no**. We will then gather some information that will help us understand how preferences for these programs differ across groups of people.

Questions About this Survey? This survey project is funded by the Department of Economics at the University of Oregon. If you have questions or concerns about this survey, or about the study that will use the data it collects, please contact the research team: Professor Trudy Ann Cameron, (cameron@uoregon.edu), or project manager Garrett Stanford, Ph.D. candidate (gos@uoregon.edu), both at the Department of Economics, University of Oregon, Eugene, OR, 97403-1285.

Questions About the Protection of Research Subjects? The University of Oregon's Research Compliance Services can be reached at researchcompliance@uoregon.edu, or at 541-346-2510.

Participation in this Study is Voluntary. Refusal to participate will involve no penalty or loss of any benefits to which the subject is otherwise entitled, and the subject may discontinue participation at any time.

Are you eligible and willing to be a participant in this study? By clicking Yes, you certify that you are an Oregon resident at least 18 years or older, and you consent to have the information you provide used in this study.

- ◯ Yes
- ◯ No

D.10 Oath

We care about the quality of our data. Do you commit to thoughtfully provide your best answers to each question in this survey?

- ◯ I will provide thoughtful and honest answers
- ◯ I will not provide thoughtful and honest answers
- ◯ I can't promise either way

D.11 Introduction to climate change

Climate Change:

2017 Eagle Creek wildfire near Cascade Locks, OR (AP photo: Genna Martin)

Almost all climate scientists now agree that greenhouse gases resulting from human activities are causing Earth's climate to change. They also say that climate change has already begun to cause a variety of problems around the world, including droughts, extreme weather, and wildfires.

However, some people remain unconvinced. Some have doubts about whether climate change is really happening. Others agree that the climate seems to be changing, but they question whether humans are responsible.

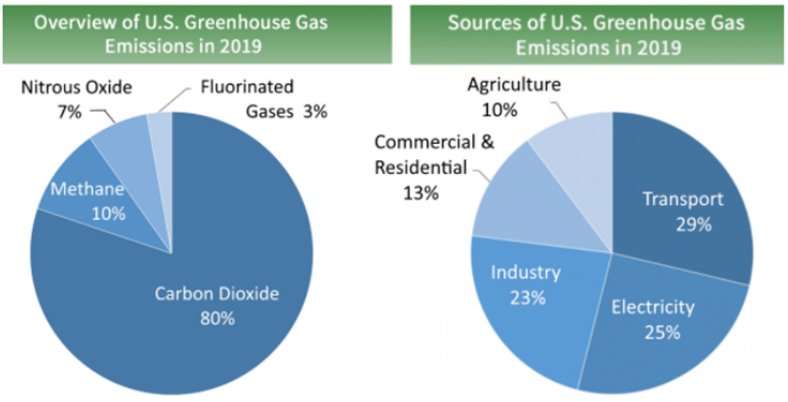
(https://www.cnn.com/2021/06/10/us/klamath-oregon-drought-water-war/index.html; photo: Gregg Canes, CNN)

D.12 Introduction to carbon emissions

Carbon Emissions:

The most common greenhouse gas that humans create is **carbon dioxide**. These carbon gas emissions are made when we burn fossil fuels. These fuels power cars, trucks and jets. They include the natural gas that heats our homes, and the coal that some power plants burn to make electricity. Carbon emissions also come from factories and industrial plants.

The following pie charts shows the types and sources of greenhouse gases in the U.S., for 2019, according to the Environmental Protection Agency (EPA):



D.13 Introduction to controversy of cap-and-trade in Oregon

Controversy

Climate activists demonstrate in favor of cap-and-trade bill at Oregon Capitol (Dirk VanderHart photo/OPB)

Loggers and truckers rallying against cap-and-trade bill at Oregon Capitol (Marilyn Deutsch photo @marilyndeutsch)

Twice in recent years, Oregon legislators have considered beginning **carbon cap-and-trade programs.** However, the legislators could not agree on the specifics of the programs. This survey is designed to reveal how different Oregonians feel about a wide variety of possible cap-and-trade programs.

A **carbon cap-and-trade program** is a way to reduce carbon emissions from factories, power plants, and other major sources.

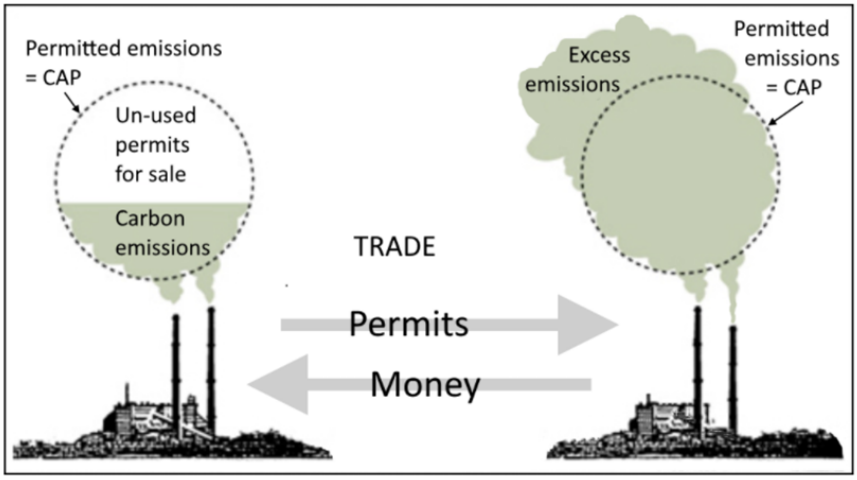
In a cap-and-trade system, the government gives each polluting company some number of permits for carbon emissions. A company's pollution must be less than or equal to the number of permits it has. Each company can decide if they would like to use all their permits themselves, to cover their own carbon emissions, or **trade (sell)** some of their permits to other companies. The company *selling* the permit will get money from the company that *buys* the permit.

How familiar are you with carbon cap and trade programs?

- ◯ Quite familiar
- ◯ I should probably review the basics
- ◯ Not familiar at all

D.14 Introduction to cap-and-trade programs

Cap and Trade



Adapted from image by Ann Carlson, LegalPlanet (UCLA Law), 11/16/11

Here's how a carbon cap-and-trade program works.

- **STEP 1:** The government decides on an overall “cap” on carbon emissions. The cap limits how many total carbon emissions will be allowed across all businesses (companies).
- **STEP 2:** The government gives out permits to businesses. Businesses are allowed to release only the amount of carbon emissions covered by the number of permits they own. The total number of permits given out is equal to the cap decided in Step 1.
- **STEP 3:** Permit holders are allowed to trade! This means businesses will buy and sell permits.
- Over time, steps 1 through 3 are repeated. At intervals, the overall cap is made smaller and smaller so that total carbon emissions become less and less.

Carbon cap-and-trade programs are attractive because they reduce carbon emissions while minimizing the overall burden on businesses. Companies that have a hard time reducing their carbon emissions can buy extra permits from other businesses who can more cheaply reduce their carbon emissions.

Remember: You can click on most **blue text** for explanations!

Now back to the survey!

D.15 Introduction to program coverage

Which companies are regulated by carbon cap-and-trade?

If Oregon adopts a carbon cap-and-trade program, it must decide which types of companies will be regulated (i.e., which companies will be required to have carbon permits for their carbon emissions). In general, companies that pollute more and create more carbon emissions will be part of the program.

(clockwise from left: utilityproducts.com; oregonlive.com; wsj.com)

It is hard to know exactly which companies will be regulated. However, likely candidates include (but may not be limited to):

- Power plants
- Manufacturing plants
- Transportation companies (airlines, truck lines, train lines etc.)
- Timber and logging companies
- Oil and natural gas companies

D.16

It is hard to know exactly which companies will be regulated. However, likely candidates include (but may not be limited to):

- Power plants
- Manufacturing plants
- Transportation companies (airlines, truck lines, train lines etc.)
- Timber and logging companies
- Oil and natural gas companies

Thus there are **three** main considerations for permits:

- Share of total permits that will be sold at auction (where the rest will be free).
- If some permits are given away for free, how are these free permits divided up?
- What is done with the money from permit auctions

◯ Learn more about carbon permit auctions

◯ Continue with survey

D.17 Introduction to permit auctions

How many permits will be sold?

When it comes to deciding how many of the total permits the government auctions (sells to companies) it is a balancing act. The **most important thing** to remember is that, in general, **more permits auctioned means more emission reduction and more costs to businesses**. On the flip side, less permits auctioned means less emission reduction and fewer costs to businesses.

Let's think about why this is the case.

1. First, let's consider the situation when all permits are given to companies for free. In this situation, a company will only have to spend money on permits if it wants to buy additional permits from other companies. So in some sense a company can still create emissions for free (as long as it doesn't exceed the permits it was given).
2. Now let's consider the situation when all permits are auctioned to companies. In this situation, a company will have to pay for all of its permits. If a company wants to produce three tones of carbon emissions it must buy three permits from the government or other companies. No more free emissions!

There is a lot of evidence from existing carbon cap-and-trade programs that the more permits that are auctioned the greater the amount of emissions are reduced. However, naturally companies are usually opposed to the government auctioning permits.

In practice, the situations where ALL permits are auctioned or ALL permits are free rarely occur. If you would like to know how free permits can be divided up and what can be done with the money from auctioned permits click "Learn more" below.

◯ Learn more

◯ Back to survey

D.18 Introduction to grandfathering process

How are free permits distributed?

In the case when the government has decided to give permits away for free how many permits companies receive can be complicated and politically tense. It is important to remember that only companies that are regulated (subject to the cap-and-trade program) will receive permits.

There are many ways that the free permits can be distributed. Below are three potential ways:

1. Each company recives an equal share of the permits. For, example, if 10 permits are given away for free and there are 5 companies then each company gets two permits for free.
2. Companies that have traditionally created more carbon emissions recieve **more** permits. This is called "Grandfathering" and is designed to reduce costs on businesses while still reducing emissions.
3. Companies that have traditionally created more carbon emissions recieve **less** permits. This is called " Reverse Grandfathering" and is designed to put more pressure on the higher polluting plants.

If you would like to know what can be done with the money from auctioned permits click "Learn more" below.

◯ Learn more

◯ Back to survey

D.19 Introduction to revenue distribution

What can be done with permit auction money?

If some carbon emissions permits are auctioned (sold) to companies by the state, then the revenue raised could be used in at least three different ways:

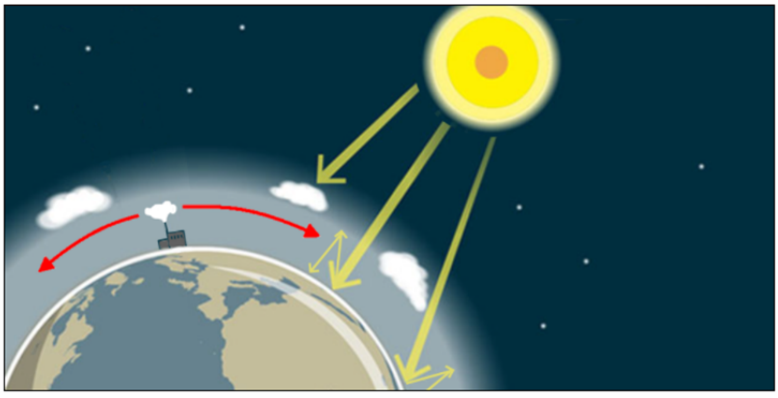
1. To pay for new equipment that will reduce carbon emissions (Details)
2. To support communities and/or workers while they adapt to the cap-and-trade program (Details)
3. To add to Oregon's General Fund, allowing some existing Oregon taxes to be reduced (Details)

D.20 Introduction to benefits of carbon emissions reductions

Benefits of carbon reductions

Global benefits (climate change):

Carbon emissions produced anywhere will spread around the entire globe. So if Oregon reduces its carbon emissions, the **whole world benefits** from less carbon in the atmosphere.



(Image adapted from a British Geological Survey diagram)

The diagram above shows just one factory, in just one location on the globe. The factory's carbon emissions rise into the atmosphere and eventually spread all around the earth (**the red arrows**). Carbon emissions from sources in Oregon do the same thing. When the atmosphere has more carbon dioxide, it holds in more of the sun's heat (**the yellow arrows**).

Regional benefits (other pollutants):

The photo below shows a day in Portland, Oregon, with poor air quality. Sometimes, air pollution in Oregon is due to wildfires burning somewhere in the region. Other times, air pollution comes from factories and vehicles.

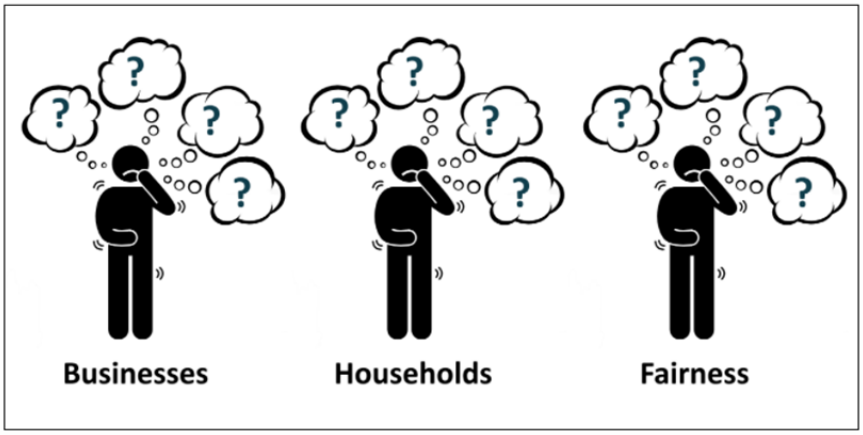
(Photo: Mason Walker, Portland Business Journal blog, 2016)

Depending on how the cap-and-trade program is designed, some benefits could be **received by Oregonians only**. Some types of cap-and-trade programs can:

- Also reduce other pollutants that result from the burning of fossil fuels. Burning fossil fuels can harm air quality, as in the picture above. The benefits of reduced air pollution would be felt by communities living close to polluters.
- Provide opportunities for farmers, ranchers, and forest owners to raise new revenue.
- Improve Oregon's chances to get a head-start on growing new types of industries (and jobs) in the green sector.

D.21 Introduction to possible distributional concerns

Possible concerns



(Adapted from graphic by Gan Khoon Lay)

Alongside the benefits of a carbon cap-and-trade program, some challenges will result from the extra cost of doing business when carbon permits are required.

Challenges for businesses: higher operating costs

Challenges for households: more expensive products

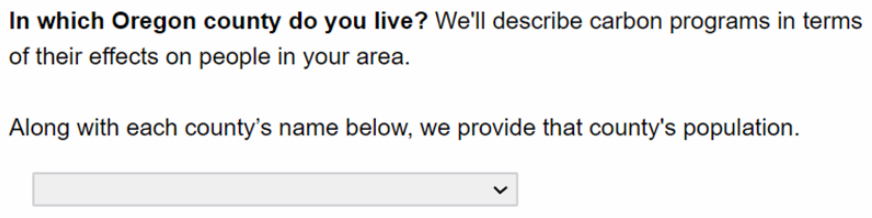
Equity and fairness concerns: unfair burden

These challenges can be lessened by careful program design but they exist nonetheless! Which of these challenges *especially* concern you? (check any that apply)

- ☐ The burdens on businesses
- ☐ The burdens on households
- ☐ Equity and fairness
- ☐ None of the above

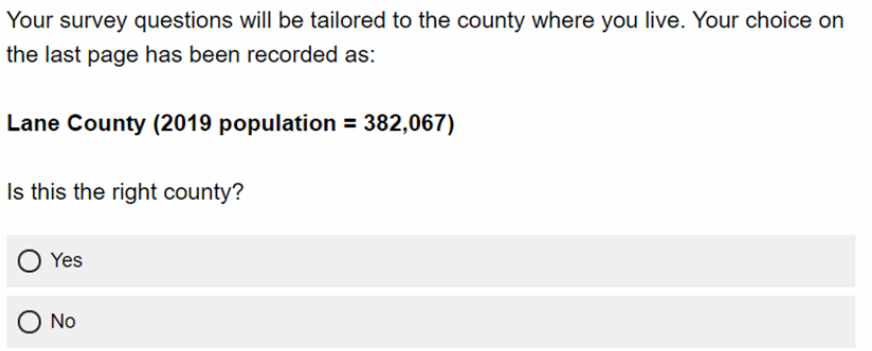
D.22 Oregon county of residence

The respondent selects an Oregon county from the drop-down list provided.



D.23 Confirm county of residence

If this confirmation page shows that the respondent checked the wrong county, they get to choose again, after which we just have to assume that they have the right county. This page runs some javascript in the background to associate a variety of county variables with the respondent's own county, and these variables are quoted later in the survey as the effects of each proposed cap-and-trade program are described in quantitative terms.



D.24 FIX WORD Introduce program summary tables

Policy summaries

Soon, we will ask you to consider some possible carbon cap-and-trade programs for Oregon.

One at a time, we will describe each of six possible programs using compact tables like the one below.

- On the left in blue are the features of the program. Click on the blue text in the table at any time for explanations!
- On the right will be the value for each feature

For **every program** you are shown, it would take a while to get things set up. You should assume that **each program would begin January, 1, 2023.** In other words, permits will be required for carbon emissions starting January 1, 2023. This means all of the costs and benefits will also begin to accumulate as of January, 1, 2023.

This is just an example. **You don't need to do anything yet!**

Program:	A
Results by 2050:	
Carbon emissions reduction	70%
Carbon industry jobs lost	18,200
Green industry jobs gained	13,000
Carbon permits, rules:	
Share of permits auctioned	70%
Auction revenue uses:	
Fund new equipment	40%
Support communities/workers	60%
Oregon tax relief	0%
Additional regulations:	
Limit other pollutants	NO
Cost to your household:	
Dollars per month	$405
Click blue text for details	**A**

First, we will use the next few screens to explain how to interpret each group of features. Remember, you can click on any feature name for a pop-up window with more information.

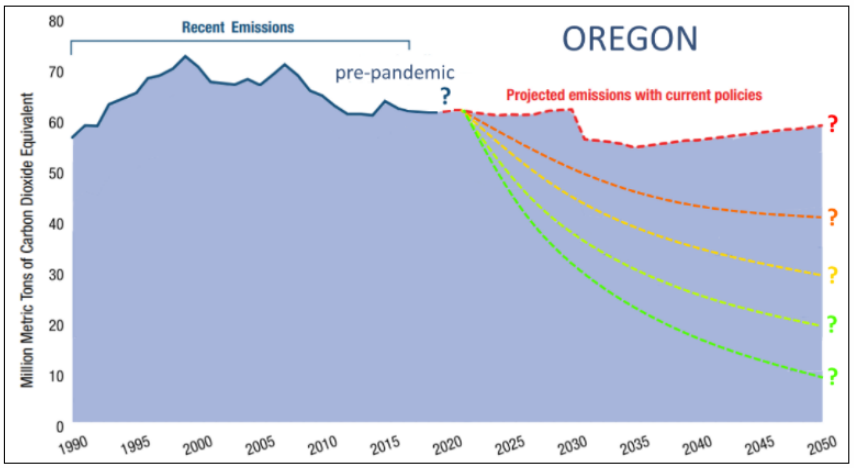
D.25 Explain Feature Group 1

FEATURE GROUP 1: Results

The first three rows in the table will give the general environmental and economic effects of the program. Next to each box is the value that will appear for your Program A.

- - - - - - - -

Carbon emissions reduction?



(Adapted from Oregon Department of Energy/Energy in Oregon/Greenhouse Gas Emissions Data)

The row of the table with information about the carbon emissions reduction for the cap-and-trade program will look like this:

Carbon emissions reduction	70%

This is the percent reduction of total *annual* carbon emissions in Oregon by the year 2050, relative to Oregon's current carbon emissions.

- - - - - - - -

Carbon industry jobs lost?

(The Oregonian, Motoya Nakamura photo)

Lane County had about 79,500 jobs in carbon industries in 2019. Oregon as a whole had about 970,021 carbon industry jobs in 2019.

The row of the table with information about carbon industry jobs will look like this:

Carbon industry jobs lost	18,200

These are the jobs lost in carbon-intensive industries **in Lane County** in the next 30 years as the economy adapts to the cap-and-trade program. Nobody knows for certain how many carbon industry jobs will be lost, but the values shown are based on the latest economic research.

- - - - - - - -

Green industry jobs gained?

(The Oregonian, Benjamin Brink photo)

Lane County had about 86,300 jobs in green industries in 2019. Oregon as a whole had about 1,098,486 green industry jobs in 2019.

The row of the table with information about green industry jobs will look like this:

Green industry jobs gained	13,000

These are the jobs gained in green industries **in Lane County** in the next 30 years as companies and households work out ways to reduce their carbon emissions. Nobody knows for certain how many green industry jobs will be gained, but the values shown are based on the latest economic research.

Review full summary table

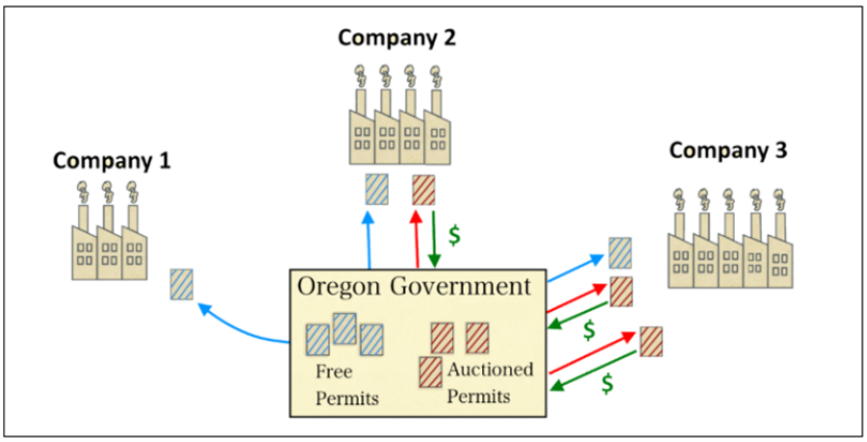
D.26 Explain Feature Group 2

FEATURE GROUP 2: Carbon permits, rules

Companies will try harder to reduce their carbon emissions if they have to pay for permits.

Selling some carbon permits at auction also **raises revenue** that can be used to help companies and workers adapt to a lower-carbon world.

Share of permits auctioned?



The row of the table indicates the percent of total available carbon permits that will be sold to companies at auction:

Share of permits auctioned	70%

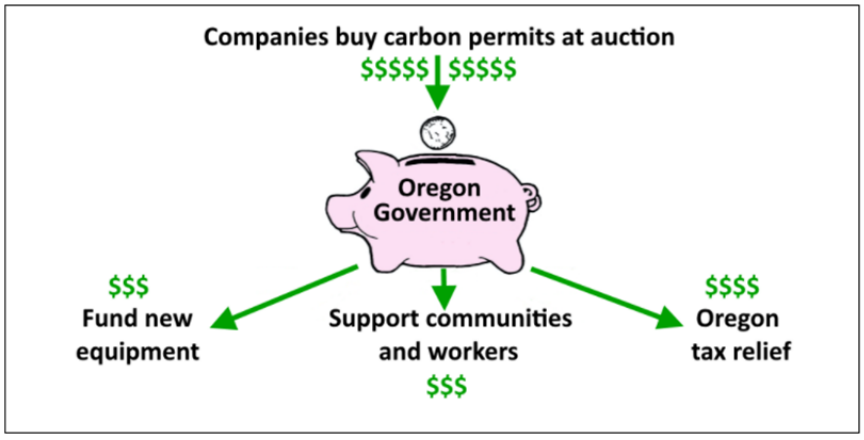
In this case 70% of total available carbon permits will be sold. The rest will be given to participating companies for free, according to a formula based on their past carbon emissions. If companies are unable or unwilling to buy permits, they must get by with only their free permits.

Review full summary table

D.27 Explain Feature Group 3

FEATURE GROUP 3: Auction revenue uses

How will permit auction revenue be spent?



Three rows in each table describe how money from the carbon permit auction would be spent.

Fund new equipment?

Share of permit auction revenue that will be used to help households and companies to buy emission reducing equipment. Such equipment might include an energy efficient washing machine for a family, or more energy efficient machinery for a factory.

- - - - - - - -

Support communities/workers?

Share of revenue that will be used to support communities/workers that bear a relatively heavier burden due to the program's costs. This might include communities with a lot of carbon-intensive jobs, or groups/communities that spend a large proportion of their income on energy for heating or transportation.

- - - - - - - -

Oregon tax relief?

Share that will go into Oregon's state tax fund. More revenue from permit auctions would allow Oregon to reduce the burden of other existing state taxes paid by Oregon residents.

Review full summary table

D.28 Explain Feature Group 4

FEATURE 4: Additional Regulations

(Adapted from "Beware of Air" image at nrdc.org)

A cap-and-trade program will reduce **overall** carbon emissions. Many companies will emit less carbon, but permit trading may allow some companies to emit *more*.

Companies that end up producing more carbon emissions may also produce greater amounts of other pollutants.

To protect surrounding communities, a cap-and-trade program may come with additional regulations on these other pollutants.

Limit other pollutants	NO

A **YES** for this feature means that there will be regulations to limit other pollutants to safe levels. A **NO** means that this program includes no additional safeguards against increases in other pollutants.

Review full summary table

D.29 Explain Feature Group 5

FEATURE 5: Cost to your household

(Images, by row: dynamicslr.com; spacecoastdaily.com; oregonbusiness.com; ecotextile.com)

The last row of the summary table for each cap-and-trade program will give your MONTHLY cost of the program.

Dollars per month	$405

These are the unavoidable average monthly costs that *your household* would bear if the program is adopted. These higher costs might result *directly or indirectly* from higher energy prices or from the loss of jobs in carbon-intensive industries.

NOTE: It is possible you *may* see a program or two with VERY high costs in your version of this survey. We don't expect many people to vote for these costly programs.

Review full summary table

D.30 Program A choice

Program A

This screen is your FIRST chance to vote on a program. You will be asked about six different programs. Their arbitrary labels A through F have nothing to do with the quality of each program.

- Each time you vote, ignore any other programs we may have described elsewhere
- Imagine that the option being offered for each vote is the ONLY one available

In any one vote:

- If the program being offered is **better than no program at all**, you should vote "Yes" for the program
- If the monthly cost of the program would be *just too high* for your household or your community—given what it would accomplish and how it would work—you should feel free to vote "No"

Please consider all the features of Program A below, and **vote as if this were a real and secret ballot**. Your actual vote on a secret ballot might be different from the way you would vote if you had to raise your hand in public, and that is OK. We need to know what would happen for a real secret ballot in Oregon. Remember that the research team will not be able to connect your choices to you as an individual.

Remember that **job losses and job gains listed are for Lane County only**.

In hypothetical choices such as these, people sometimes do not think carefully enough about what they would have to give up to be able to pay the monthly cost of the program. **Please consider what your household would have to sacrifice, if the proposed cap-and-trade program were adopted.**

Be sure to consider all the features of a program. If you need to review the explanation for a feature, click on its name (any blue text), then **vote at the bottom of this screen.**

Program:	A
Results by 2050:	
Carbon emissions reduction	70%
Carbon industry jobs lost	18,200
Green industry jobs gained	13,000
Carbon permits, rules:	
Share of permits auctioned	70%
Auction revenue uses:	
Fund new equipment	40%
Support communities/workers	60%
Oregon tax relief	0%
Additional regulations:	
Limit other pollutants	NO
Cost to your household:	
Dollars per month	$405
Click blue text for details	**A**

If Program A were the only program to be put to a vote, I would vote for:

- ◯ Program A to begin January, 1, 2023
- ◯ No program at all

D.31 Follow-up to "No" vote: Reasons for vote

Please indicate why you would vote "No program at all" on Program A. Check as many reasons as apply.

- ☐ Too much emission reduction
- ☐ Too little emission reduction
- ☐ The economic impacts were too costly
- ☐ Did not approve of the auction revenue use
- ☐ Too many permits were auctioned
- ☐ Too few permits were auctioned
- ☐ Did not approve of the Additional Regulations on other pollutants
- ☐ The benefits of Oregon or the World do not justify ANY cost
- ☐ Program A did not seem believable
- ☐ Some other reason

D.32 Follow-up to "No" vote: Will you always vote no?

A cap-and-trade program is not everyone's preferred way to reduce overall carbon emissions. In this survey, we are assuming that the **only alternative** to a cap-and-trade program is **no carbon emission reduction policy.**

- ○ **I would still vote "No" for ANY carbon cap-and-trade program**!
- ○ A cap-and-trade program **could be** better than no policy, even though I would rather have some other program for carbon reduction.

D.33 Program B choice

Program B

Now assume that Program A had never been proposed, and instead, that Program B was the only carbon cap-and-trade program under consideration. **Here is your second vote.** Assume that **only Program B is now available**.

Again, vote as if this were a real and secret ballot. If Program B (with its different set of features) would leave you worse off than having no program at all for carbon reduction, you should vote for "No Program".

Program:	B
Results by 2050:	
Carbon emissions reduction	60%
Carbon industry jobs lost	11,200
Green industry jobs gained	5,200
Carbon permits, rules:	
Share of permits auctioned	30%
Auction revenue uses:	
Fund new equipment	60%
Support communities/workers	0%
Oregon tax relief	40%
Additional regulations:	
Limit other pollutants	YES
Cost to your household:	
Dollars per month	$270
Click blue text for details	**B**

If Program B were the only program to be put to a vote, I would vote for:

- ◯ Program B to begin January, 1, 2023
- ◯ No program at all

D.34 Program C choice

Program C

Now suppose that **neither** Program A nor Program B has been proposed or discussed. Instead, the ballot gives you a choice between **Program C** and **No Program**.

Program:	C
Results by 2050:	
Carbon emissions reduction	30%
Carbon industry jobs lost	5,600
Green industry jobs gained	13,800
Carbon permits, rules:	
Share of permits auctioned	10%
Auction revenue uses:	
Fund new equipment	10%
Support communities/workers	30%
Oregon tax relief	60%
Additional regulations:	
Limit other pollutants	NO
Cost to your household:	
Dollars per month	$ 80
Click blue text for details	**C**

If Program C were the only program to be put to a vote, I would vote for:

- ◯ Program C to begin January, 1, 2023
- ◯ No program at all

D.35 Program D choice

Program D

Now erase Programs A, B, and C from your mind. If you were asked to choose instead between just Program D and No Program, how would you vote?

Program:	D
Results by 2050:	
Carbon emissions reduction	60%
Carbon industry jobs lost	11,200
Green industry jobs gained	13,800
Carbon permits, rules:	
Share of permits auctioned	20%
Auction revenue uses:	
Fund new equipment	40%
Support communities/workers	10%
Oregon tax relief	50%
Additional regulations:	
Limit other pollutants	YES
Cost to your household:	
Dollars per month	$180
Click blue text for details	**D**

If Program D were the only program to be put to a vote, I would vote for:

- ◯ Program D to begin January, 1, 2023
- ◯ No program at all

D.36 Program E choice

Program E

As before, your task on this screen is to decide if you would rather have Program E or no program at all. Assume that Program E, rather than any of the programs on earlier screens, has ended up on the ballot. How would you vote?

Program:	E
Results by 2050:	
Carbon emissions reduction	80%
Carbon industry jobs lost	12,800
Green industry jobs gained	19,000
Carbon permits, rules:	
Share of permits auctioned	80%
Auction revenue uses:	
Fund new equipment	20%
Support communities/workers	0%
Oregon tax relief	80%
Additional regulations:	
Limit other pollutants	YES
Cost to your household:	
Dollars per month	$325
Click blue text for details	**E**

If Program E were the only program to be put to a vote, I would vote for:

- ◯ Program E to begin January, 1, 2023
- ◯ No program at all

D.37 Program F choice

Program F

Program F is the final cap-and-trade program we will ask you to consider. Suppose that NONE of the previously offered programs are available. As always, you should feel free to vote "Yes" or "No" on this program, based on whether or not you expect it to make you better off.

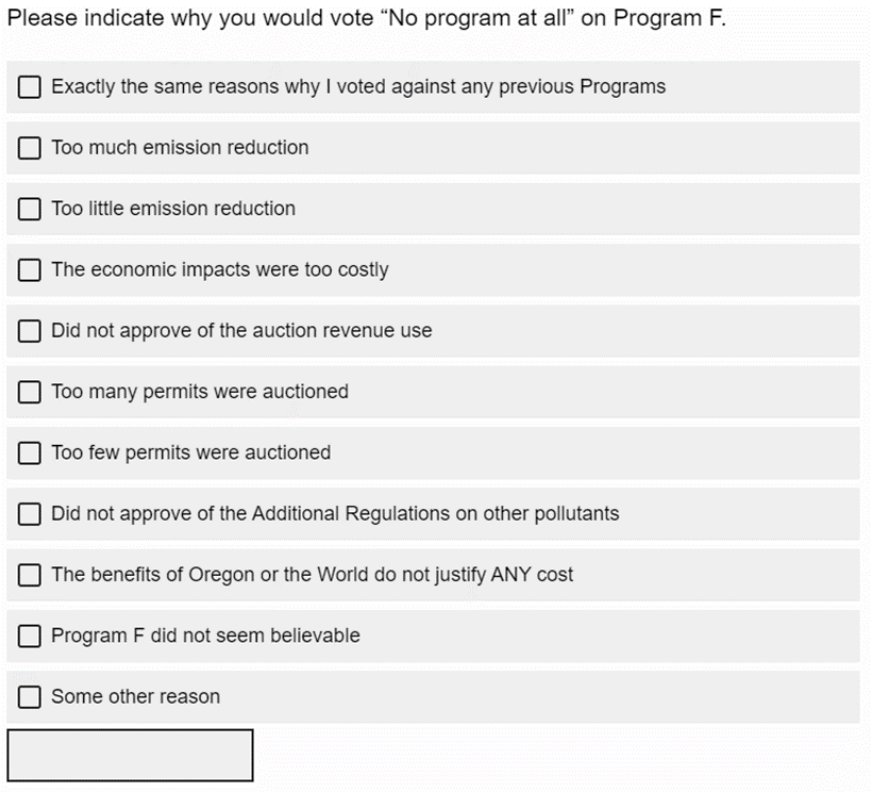
Program:	F
Results by 2050:	
Carbon emissions reduction	10%
Carbon industry jobs lost	4,800
Green industry jobs gained	5,200
Carbon permits, rules:	
Share of permits auctioned	40%
Auction revenue uses:	
Fund new equipment	60%
Support communities/workers	30%
Oregon tax relief	10%
Additional regulations:	
Limit other pollutants	NO
Cost to your household:	
Dollars per month	$ 75
Click blue text for details	**F**

If Program F were the only program to be put to a vote, I would vote for:

- ◯ Program F to begin January, 1, 2023
- ◯ No program at all

D.38 Follow-up to "No" vote

For any of Program A through Program F, if the respondent votes "No" on that program, the survey follows up with the list shown on this page, of potential reasons for voting against these programs. We opted to show this follow-up question only in association with Program F, to avoid repeating the identical screenshot every time.



D.39 Preferences for policies other than cap-and-trade

You indicated earlier that you would prefer another type of policy to cap-and-trade when it comes to addressing carbon emissions. What type of policy would you prefer? (Check all that apply)

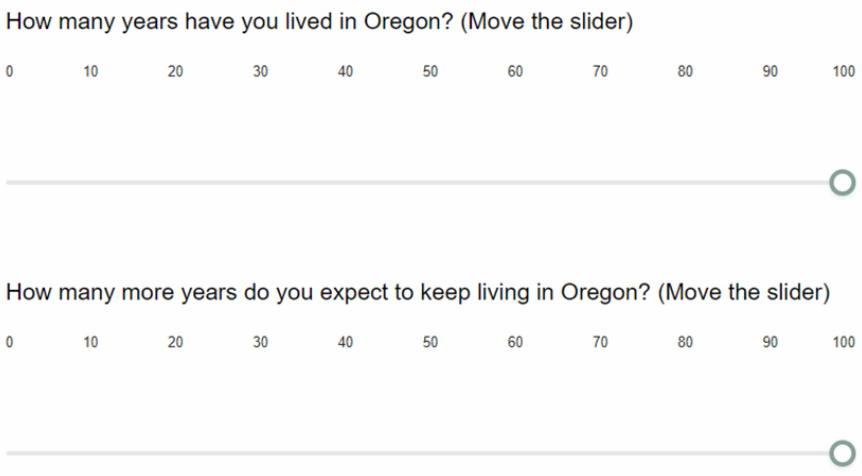
- ☐ A tax on carbon emissions
- ☐ Carbon emissions standards (i.e., rules for maximum carbon emissions)
- ☐ Technology standards (i.e., rules about carbon-reducing technologies that must be installed)
- ☐ A subsidy for carbon emissions reductions (i.e. the government offers money if carbon-emissions are reduced)
- ☐ Not sure / Don't know
- ☐ Other (Please specify)

D.40 Most important attributes

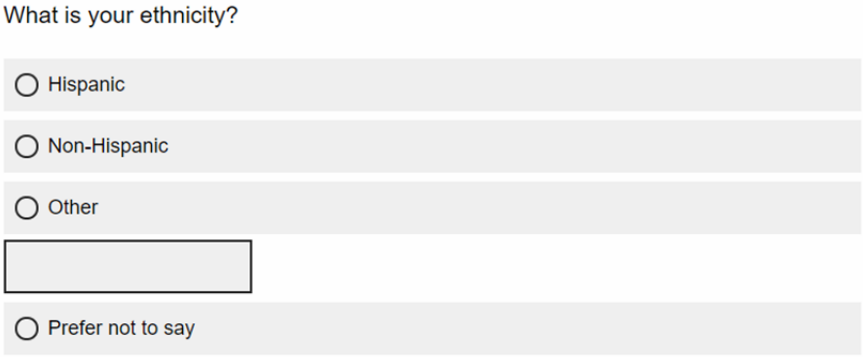
Think back over all of your program choices. Which program features did you find were **the most important to you**? Select as many as apply.

- ☐ Carbon emissions reduction by 2050
- ☐ Carbon industry jobs lost
- ☐ Green industry jobs gained
- ☐ Share of carbon permits auctioned
- ☐ Use of auction revenue to fund new equipment
- ☐ Use of auction revenue to support communities/workers
- ☐ Use of auction revenue for Oregon tax relief
- ☐ Additional regulations to limit other pollutants
- ☐ Cost of the program to your household
- ☐ None of these features were important to me

D.41 Attachment to Oregon



D.42 Ethnicity



D.43 Sectors providing household income

Which of these industries provides a significant amount of your household's income, either **directly** (through wages and/or business income) or **indirectly** (through pension and/or investment income)? (choose all that apply)

- [ ] My household depends on income from investments that are broadly diversified across most of these industries
- [ ] Accommodation and Food Services
- [ ] Administrative and Support and Waste Management and Remediation Services
- [ ] Agriculture, Fishing and Hunting
- [ ] Arts, Entertainment, and Recreation
- [ ] Construction
- [ ] Educational Services
- [ ] Finance and Insurance
- [ ] Forestry and Logging
- [ ] Health Care and Social Assistance
- [ ] Information
- [ ] Management of Companies and Enterprises
- [ ] Mining, Quarrying, and Oil and Gas Extraction
- [ ] Other Manufacturing
- [ ] Other Services, except Public Administration
- [ ] Professional, Scientific, and Technical Services
- [ ] Public Administration
- [ ] Real Estate and Rental and Leasing
- [ ] Retail Trade
- [ ] Truck Transportation
- [ ] Utilities

D.44 Political ideology

Politically, do you consider yourself to be:

- ◯ Strongly conservative
- ◯ Somewhat conservative
- ◯ Moderate
- ◯ Somewhat liberal
- ◯ Strongly liberal
- ◯ Prefer not to say

D.45 Political party identification

Which political party do you most strongly identify with?

- ◯ Republican
- ◯ Democrat
- ◯ Independent

D.46 Educational Attainment

What is your highest level of education?

- ◯ Less than high school
- ◯ High school graduate
- ◯ Some college
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ Doctoral degree
- ◯ Trade or technical school
- ◯ Prefer not to say

D.47 Employment status

Which best describes your current employment status?

- ◯ Self-employed or small business owner
- ◯ Employee, working full-time
- ◯ Employee, working part-time
- ◯ Not employed, looking for work
- ◯ Not employed, NOT looking for work
- ◯ Retired
- ◯ Disabled, not able to work
- ◯ Full-time student
- ◯ Student with part-time work
- ◯ Other
- ◯ Prefer not to say

D.48 Attitude: climate change real and serious

"Climate change is real, and is a serious threat to humanity."

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

D.49 Attitude: climate change human-caused

"Climate change is the result of human activity."

- ○ Strongly Agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

D.50 Attitude: responsibility to fix climate

Who is most responsible for slowing or preventing climate change? (Select all that apply)

- ☐ Local governments
- ☐ The Federal government
- ☐ Households
- ☐ Companies
- ☐ People who are wealthier
- ☐ People who are responsible for more emissions
- ☐ Other
- ☐ Everyone equally
- ☐ No one in particular
- ☐ Don't know / not sure

D.51 Inter-generational concern: descendants

Do you have any of the following? (Check all that apply)

- ☐ Children
- ☐ Grandchildren
- ☐ Great-grandchildren
- ☐ Other descendants (please specify)
- ☐ None of the above
- ☐ Don't know / not sure

D.52 Inter-generational concern: ancestors

How many generations back can you trace at least some of your ancestors? (Check the greatest number)

- ○ 1 generation (i.e., just your parent(s))
- ○ 2 generations (i.e. your grandparent(s))
- ○ 3 generations (i.e., your great-grandparent(s))
- ○ 4 generations
- ○ 5 generations
- ○ 6 generations
- ○ 7 or more generations
- ○ Don't know / not sure

D.53 Primary heating fuel used

What is the primary fuel you use to heat your dwelling?

- ◯ Natural gas
- ◯ Electricity from a conventional power plant
- ◯ Electricity from solar panels or wind power
- ◯ Electricity (unsure about source)
- ◯ Wood or wood pellets
- ◯ Passive solar (heated water)
- ◯ Other (please specify)

[ ]

- ◯ I don't heat my dwelling
- ◯ Don't know / not sure

D.54 Usual forms of transportation

What are your most common forms of transportation? (Check as many as apply)

- ☐ Personal vehicle (gasoline or diesel)
- ☐ Personal vehicle (hybrid fuel)
- ☐ Personal vehicle (electric)
- ☐ Public transportation (bus or train)
- ☐ Taxi or ride-sharing (e.g., Uber or Lyft)
- ☐ Bicycle
- ☐ Walking
- ☐ Other (Please specify)

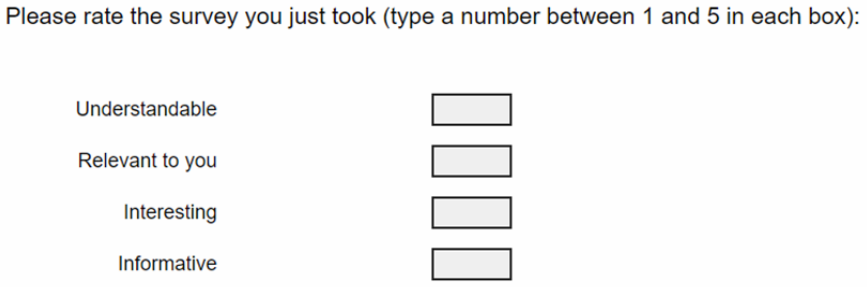
[ ]

- ☐ Prefer not to say

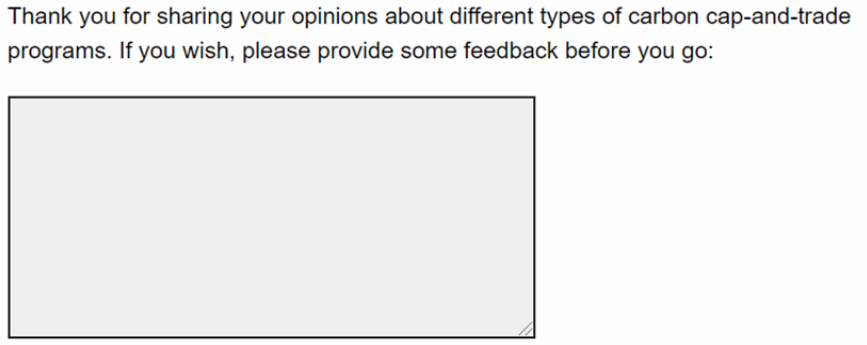
D.55 Perception of researcher bias

This question about research bias was randomly presented in one of two orders for the answers. Half of respondents saw a list that put "definitely vote FOR a carbon cap-and-trad program" at the top. The other half saw the same list, but in reverse order. This is intended to minimize any systematic order effects if the order is not included as an explanatory variable.

D.56 Attitude: Respondent's experience with survey



D.57 Feedback text message



E Online Appendix: Choice Experiment Randomizations

Unique Choice Tasks

Each choice task table (e.g. Program A) is populated with values randomly generated according to a set of parameters. There is no correlation in values between any of the individual surveys or across any of the six choice tasks within each survey. With 1000 respondents and 6 choice tasks per respondent there are a total of 6000 independently generated choice task tables.

Value Generation Parameters

We populate the choice task tables (hypothetical carbon cap-and-trade programs) with values from a structured randomized data generation process. This process emphasizes both realistic hypothetical carbon cap-and-trade programs and a distribution of values with enough granularity and orthogonality to allow for precise estimation. All 6,000 programs in the survey (6 programs per respondent times 1000 respondents) are independently generated. There are nine program features and each of these nine features is included in every program. Individual features are determined according to their own specific process. Some of the processes are interdependent, but a degree of random noise of independence is present in each process to avoid too much collinearity across variables. The only attribute values that are specific to Oregon in the choice tasks are the *carbon jobs lost* and *carbon jobs gained*, and these values can be fairly easily modified for other geographic locations. The processes can be seen below.

1. **Carbon Reduction Values:**

   Carbon reduction values are independently drawn with replacement from a uniform distribution: 10, 20, 30, 40, 50, 60, 70, 80. We believe that this distribution gives us enough granularity for estimation while also allowing respondents to easily understand the amount of carbon reduction a program will accomplish. These values are presented as percent reductions achieved by 2050 relative to current emission levels.

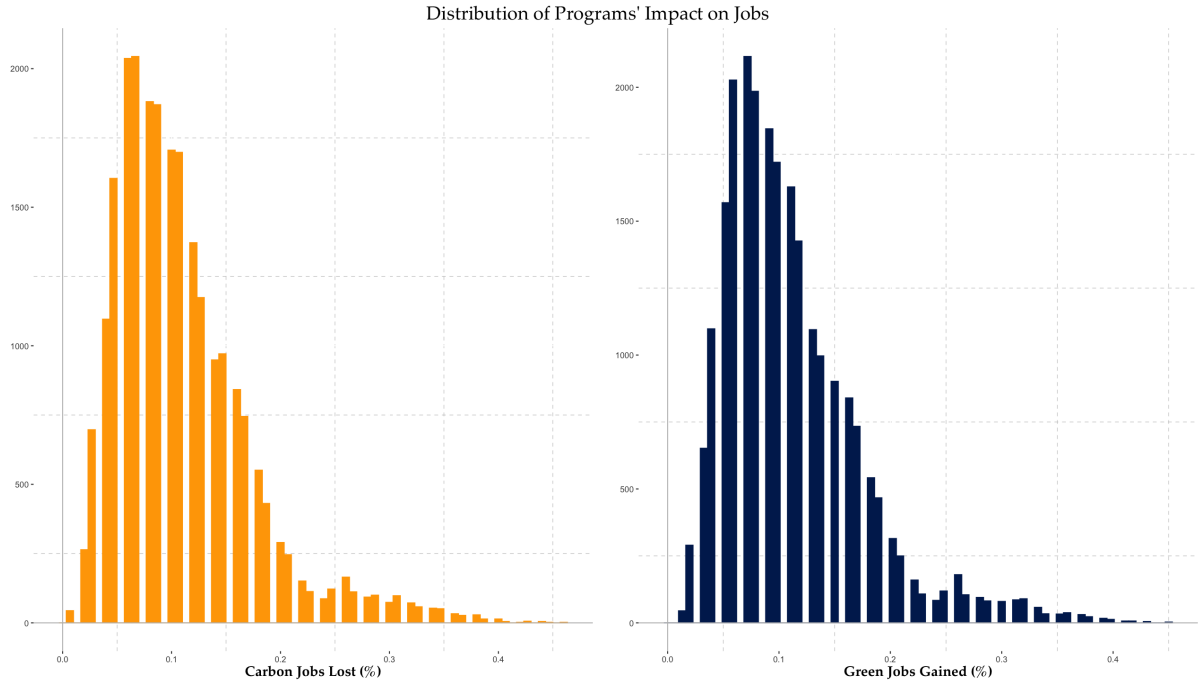
2. **Jobs Values**

   Carbon Jobs Lost and Green Jobs Gained were independently drawn from the following distribution:

$$\begin{aligned} \textit{Value} &\in \{0.01,\ 0.02,\ 0.03,\ 0.04,\ 0.05,\ 0.06,\ 0.08,\ 0.10,\ 0.15,\ 0.25,\ 0.30\} \\ \textit{Probability} &\in \{0.02,\ 0.10,\ 0.11,\ 0.13,\ 0.20,\ 0.15,\ 0.11,\ 0.09,\ 0.05,\ 0.03,\ 0.01\} \end{aligned}$$

   Where *value* indicates the value drawn from the distribution and *probability* indicates the value of drawing the corresponding value. For example, there is a 13% chance of drawing 0.04. The draws for both types of job (carbon and green) were drawn independently and

with replacement. These values are generated to reflect percent of jobs lost (gained) as the result of a cap-and-trade program. These values are then uploaded into the survey. However, the values that populate the choice task tables that respondents see are modified. The values that actually populate the tables are the product of these randomly generated values and the current level of jobs in the county in which the respondent resides. For instance, if for a respondent i Program A's *green jobs gained* draw took on the value of 0.06 and *respondent i* indicated they lived in Multnomah County (327,000 current green jobs) then the value *respondent i* would see in the Program A table for *green jobs gained* would be $0.06 * 327,000 = 19,620$ jobs. For *respondent i* Program B's *green jobs gained* draw took on the value of 0.01 then the value *respondent i* would see in the Program B table for *green jobs gained* would be $0.01 * 327,000 = 3,270$ jobs. Below is the distribution of generated values used in the survey with $N = 10,000$.



3. **Share of Permits Auctioned Values:**

The share of permits auctioned are independently drawn with replacement from a uniform distribution: 10, 20, 30, 40, 50, 60, 70, 80. These values are presented as the percent of total permits in the cap-and-trade program that would be auctioned, with the remainder being given away to firms at no cost. In some cap-and-trade programs the percent of permits auctioned will increase overtime. However, including this dynamic process in the survey is likely to overwhelm respondents so we simplified the process by suggesting the percent of permits auctioned is static throughout the existence of the program. The lower bound of 10% was chosen so that the revenue auction uses are always relevant. The upper bound

of 80% was chosen to reflect the reality of how cap-and-trade programs have played out so far. For instance, there is precedent in the Small Business Regulatory Enforcement Fairness Act (SBREFA) that some of the permits must be allocated free of charge, so as not to cause excessive financial burden.

4. **Permit Auction Revenue Uses:**

   There are three potential uses for auction revenues: purchase or subsidize cleaner equipment for households and firms, support workers and communities that are disproportionately burdened by program costs, and reduced Oregon taxes.

   (a) Clean equipment: values are drawn independently from uniform distribution: $equipment_i \in \{0, 10, 20, 30, 40, 50, 60, 70\}$.

   (b) Support for workers and communities: values are drawn independently from uniform distribution: $support_i \in \{0, 10, 20, 30, 40, 50, 60, 70\}$.

   (c) Tax Reduction: the values for tax reduction are determined by the values for the preceding two revenue use values. Tax value for instance i is calculated by $100 - equipment_i - support_i$. If this value is negative for a generated program that program is filtered out of the randomizations pool. The process guarantees that the three auction revenue uses sum to 100 as well as non-negative values for the tax feature. Because the equipment values and support values both have a mean of value of 35 the tax values have a mean of 30. We are willing to accept this slight imbalance to guarantee respondents see clean round numbers in the program tables.

5. **Additional Regulations On Other Pollutants Values:**

   Additional regulation on other pollutants can take on two values: "YES" and "NO." These values are drawn independently with a 50% chance of either value being realized. The values are completely orthogonal to all other values in a program.

6. **Cost Values:**

   Cost values are generated according to the following formula:

$$cost_i = K * \Big[55 + \beta_i * benefit_i + \alpha_i * auctioned_i - \gamma_{1i} * equipment_i - \gamma_{2i} * support_i - \gamma_{3i} * taxes_i + H_i\Big]$$

$\beta \in \{0.25,\ 0.5,\ 1,\ 2,\ 3\}$

$\alpha \in \{0,\ 1,\ 2\}$

$\gamma_1 \in \{0,\ 0.25,\ 0.5,\ 0.75\}$

$\gamma_2 \in \{0,\ 0.25,\ 0.5,\ 0.85\}$

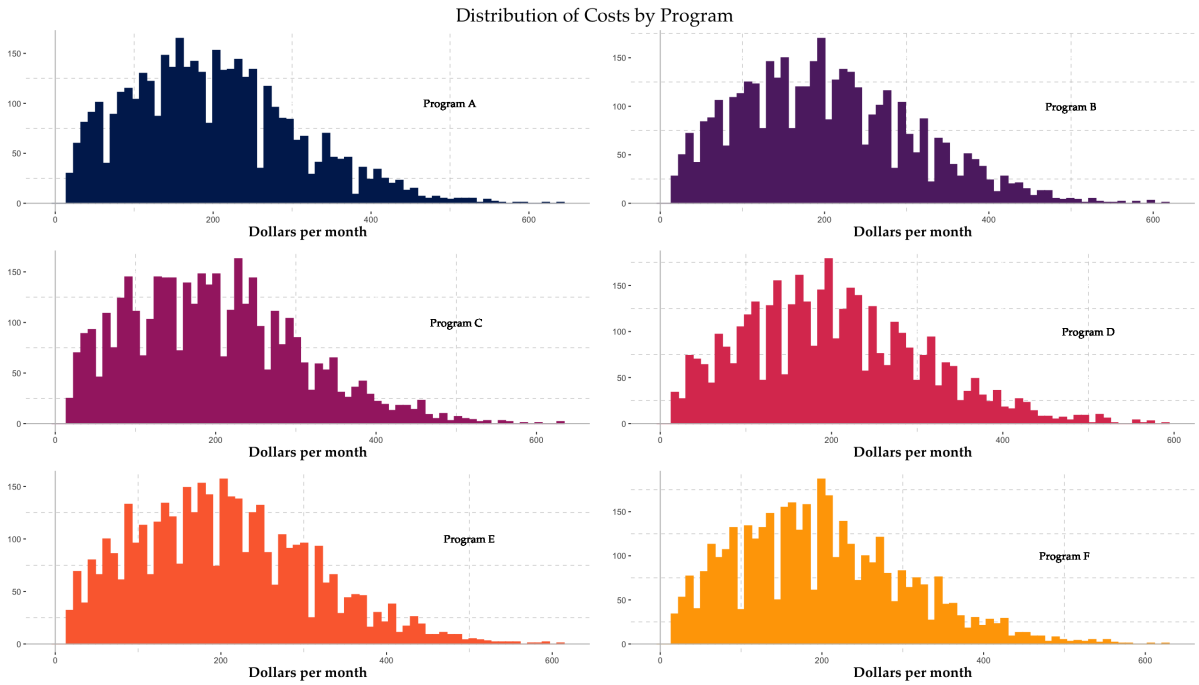
$\gamma_3 \in \{0,\ 0.25,\ 0.5,\ 0.85\}$

$H \in \{-50, 150, 20\}$

$K = 1.08$

Values for cost of the program were expressed in $ per month. As indicated by the subscripts $cost_i$ is generated specific to the other relevant values for $program_i$ and these values are scaled by values randomly generated for each $program_i$. In other words, all 11 variables are regenerated for each program randomization. Logically, the higher the target emission reduction ($benefit$) the higher the cost of the program so β takes on a positive value. α also takes on a positive value under the rationale that if permits are auctioned it will increase production costs for firms. This will raise consumer prices as well as lead to more job loss in carbon-intensive industries. All of the permit auction revenue use variables (buying new equipment, support for communities and workers, and reducing taxes) would likely lead to directly or indirectly to lower costs to individuals. The term H enters the equation as a random shock to cost as a way to increase orthogonality across programs. K was used to scale the cost variable up so that respondents were voting affirmative on programs approximately half of the time. We set a price floor of $20 for every program so that if the data generation process resulted in any cost $>$ $20 it was filtered from the randomizations pool.

Below is the distribution of generated values used in the survey with $N = 10,000$.

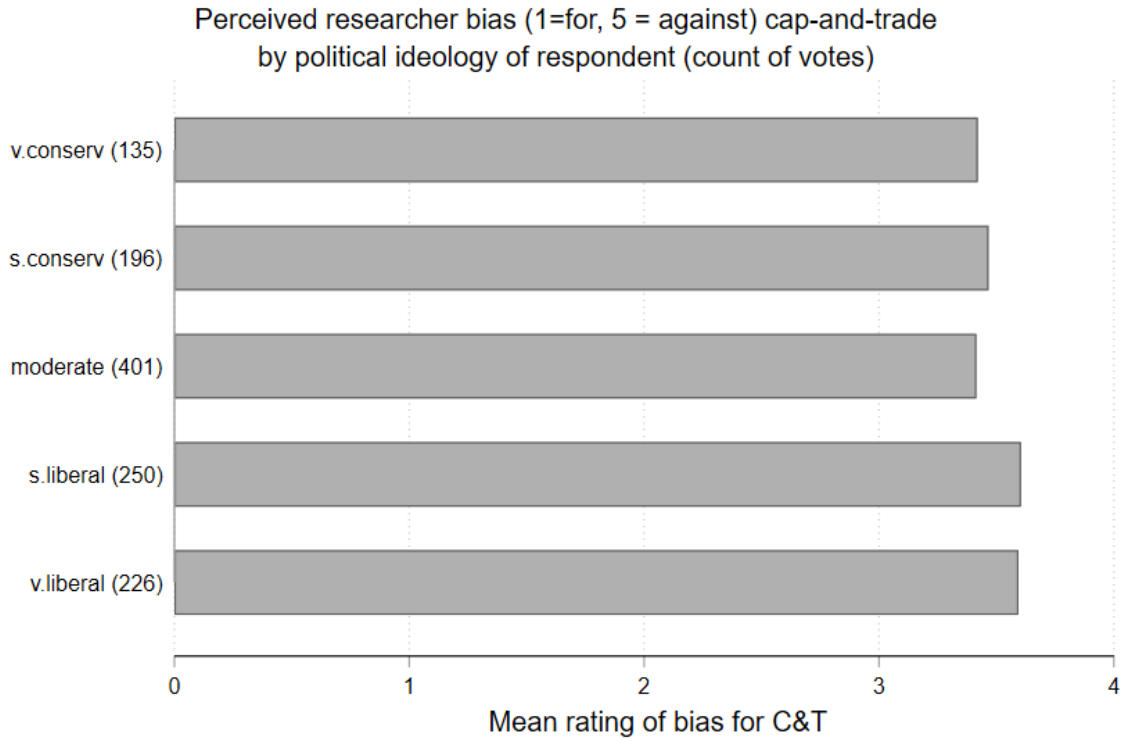

Distribution of Costs by Program
Program A
Program B
Program C
Program D
Program E
Program F
Dollars per month
0
50
100
150
200
400
600

F Online Appendix: Descriptive Statistics for Some Basic Variable Relationships

Given the randomizations of the attributes of the cap-and-trade programs offered to different respondents, it is informative to look at the joint distributions among a variety of respondent characteristics and some key relationships between these and the way they interact with the survey.

F.1 Relationships among respondent characteristics and attitudes

Figure F1



F.2 Share of "YES" votes for program by category of respondent

Figure F2: categories are shifted

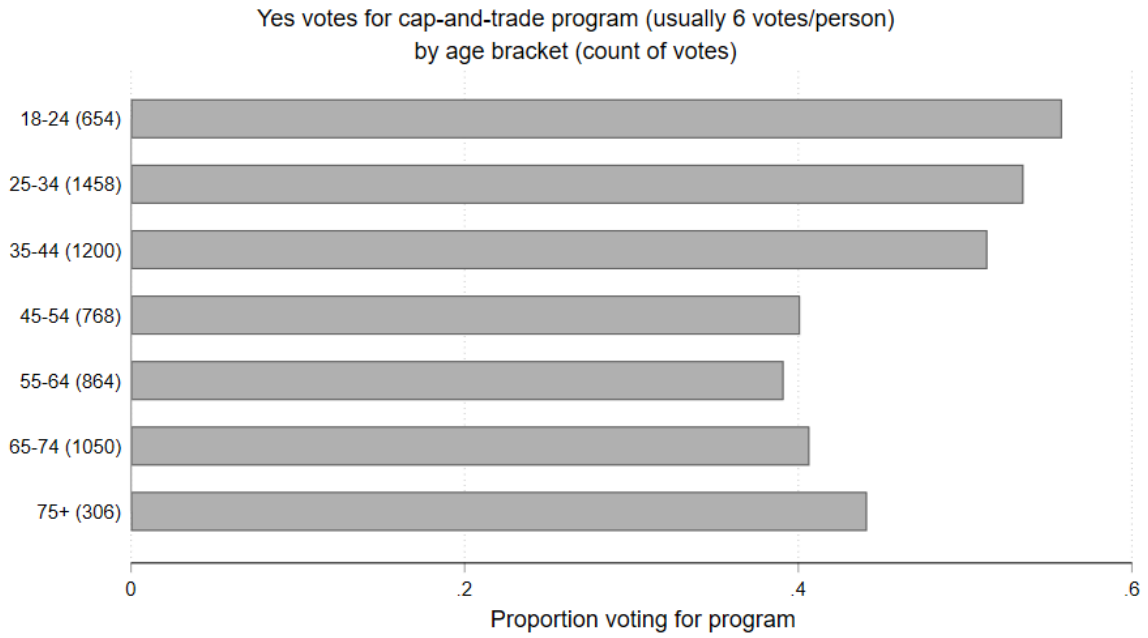


Figure F3

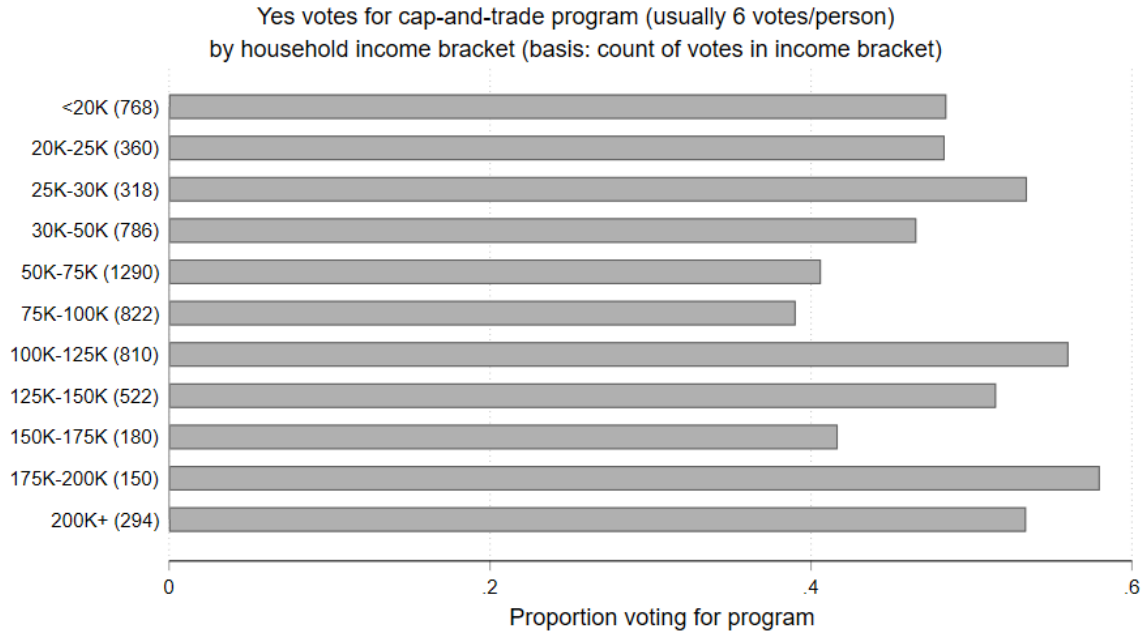


Figure F4

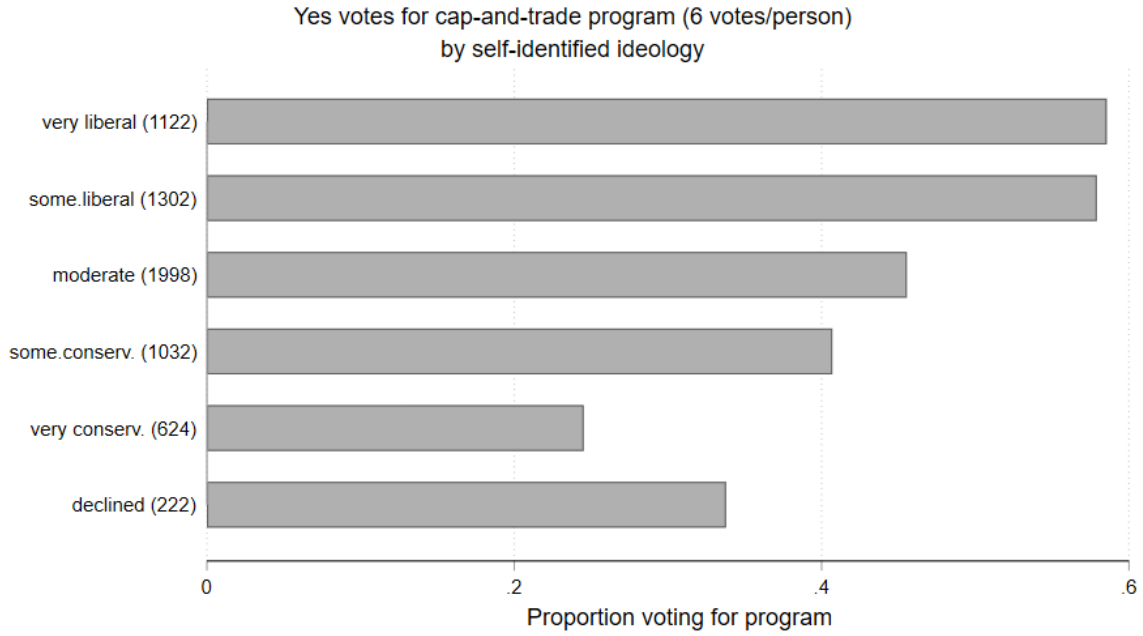


Figure F5

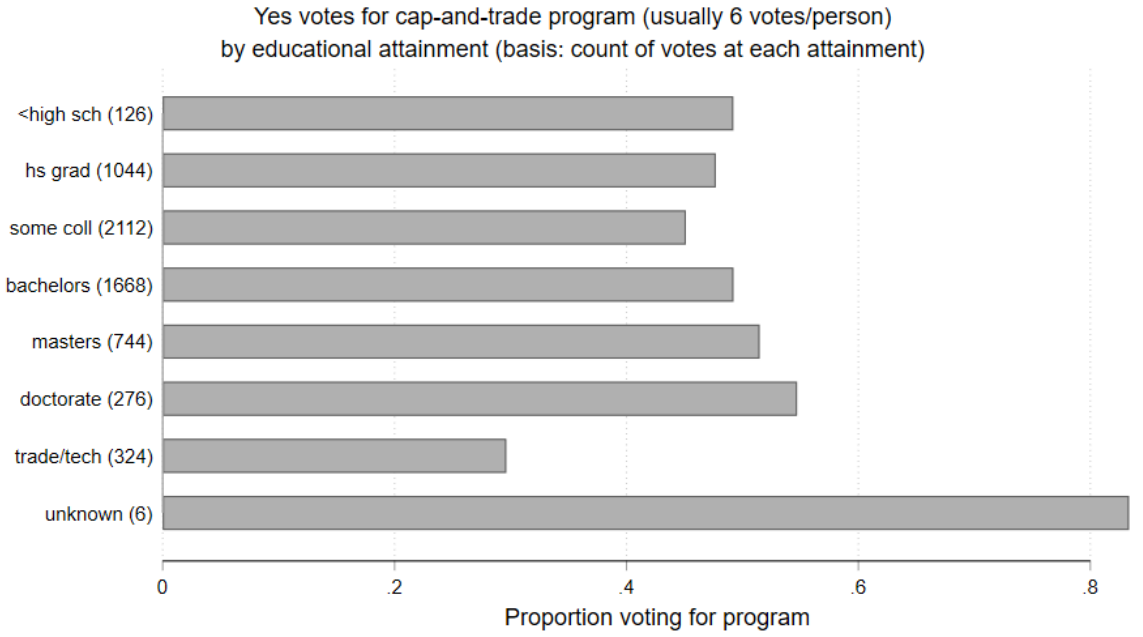


Figure F6

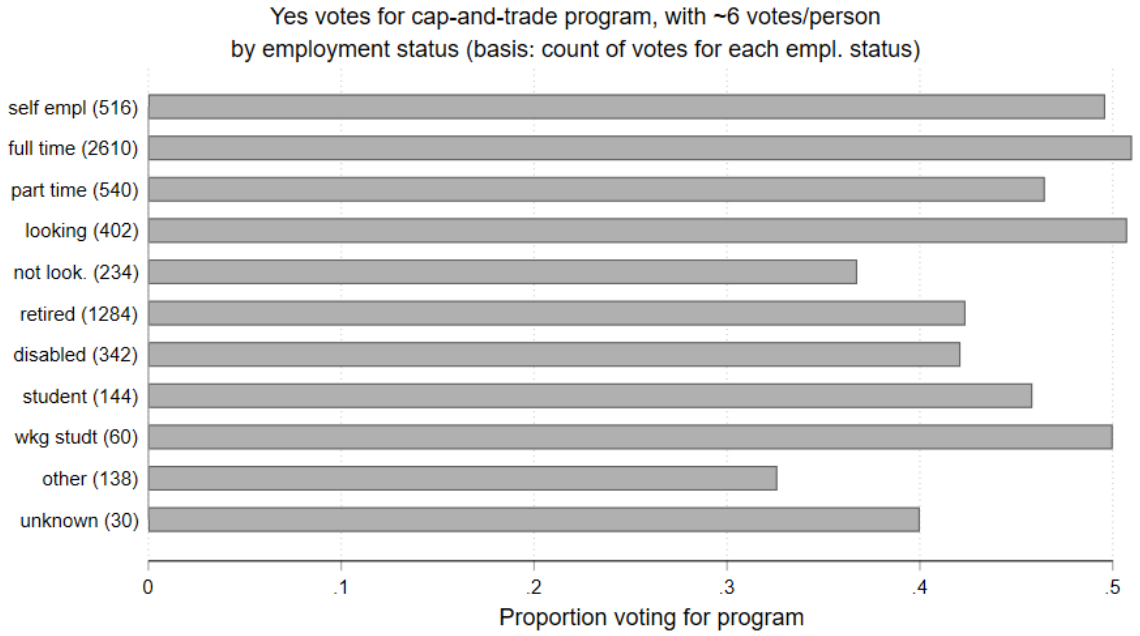


Figure F7

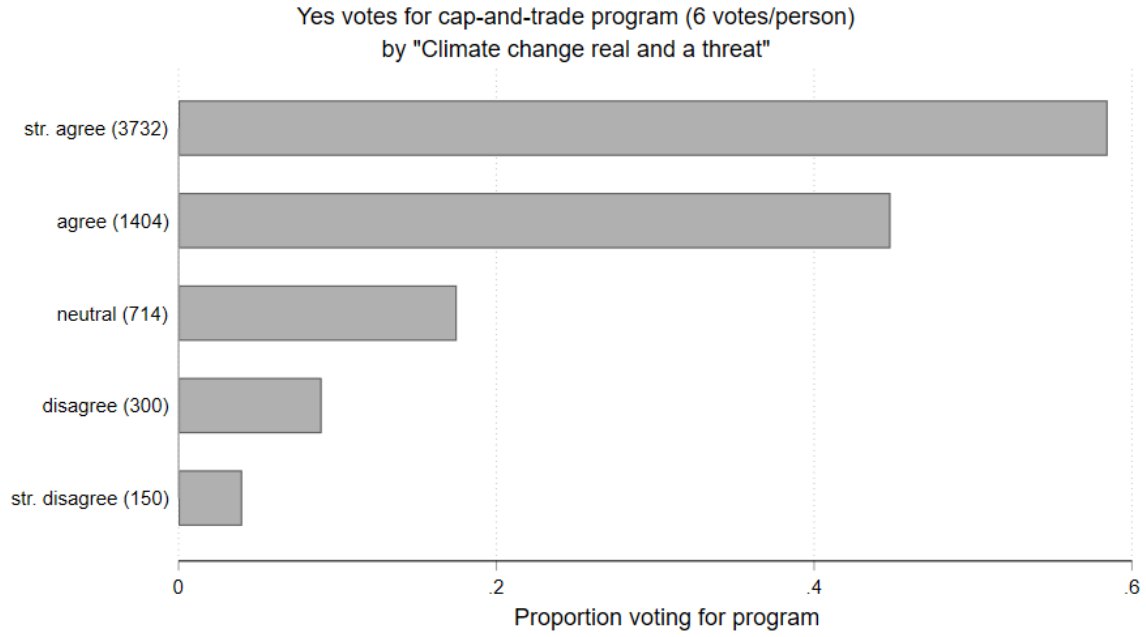


Figure F8

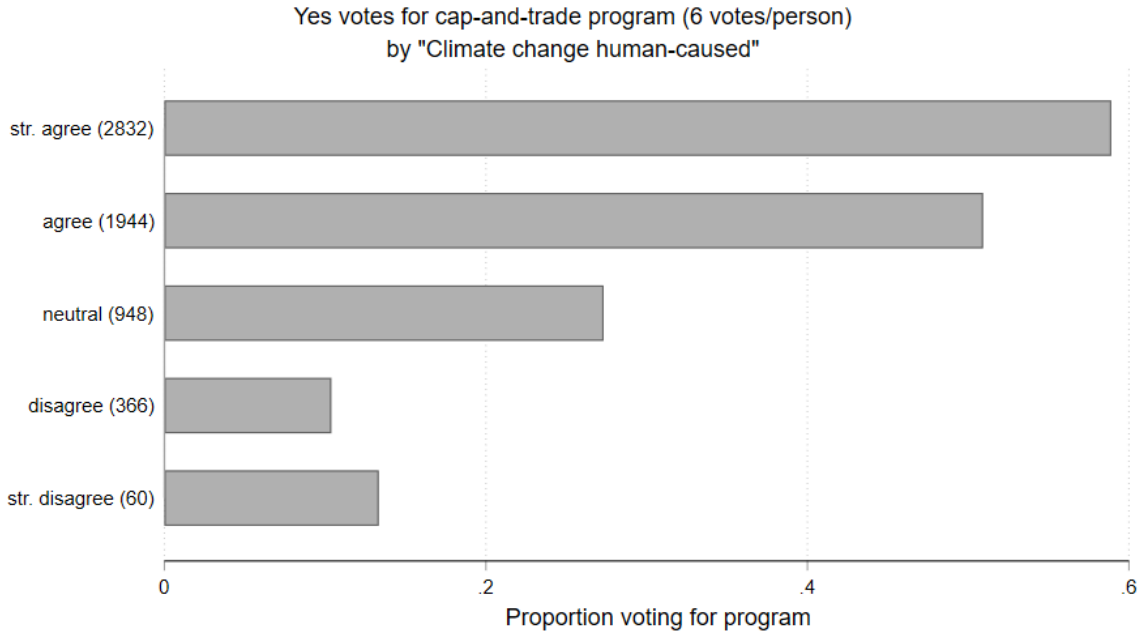


Figure F9

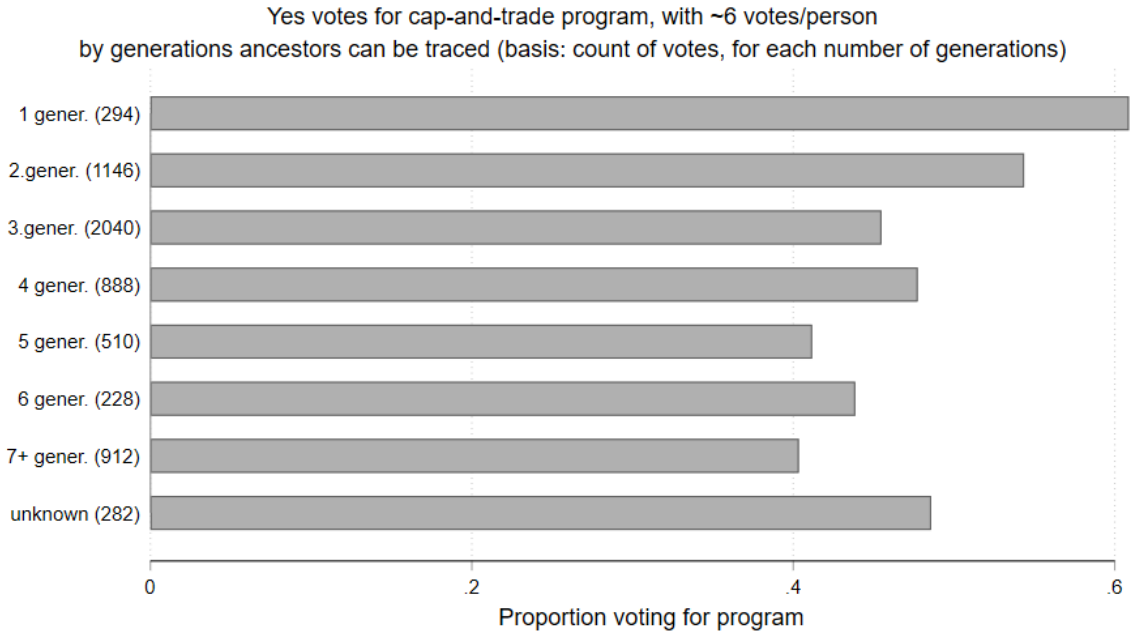


Figure F10

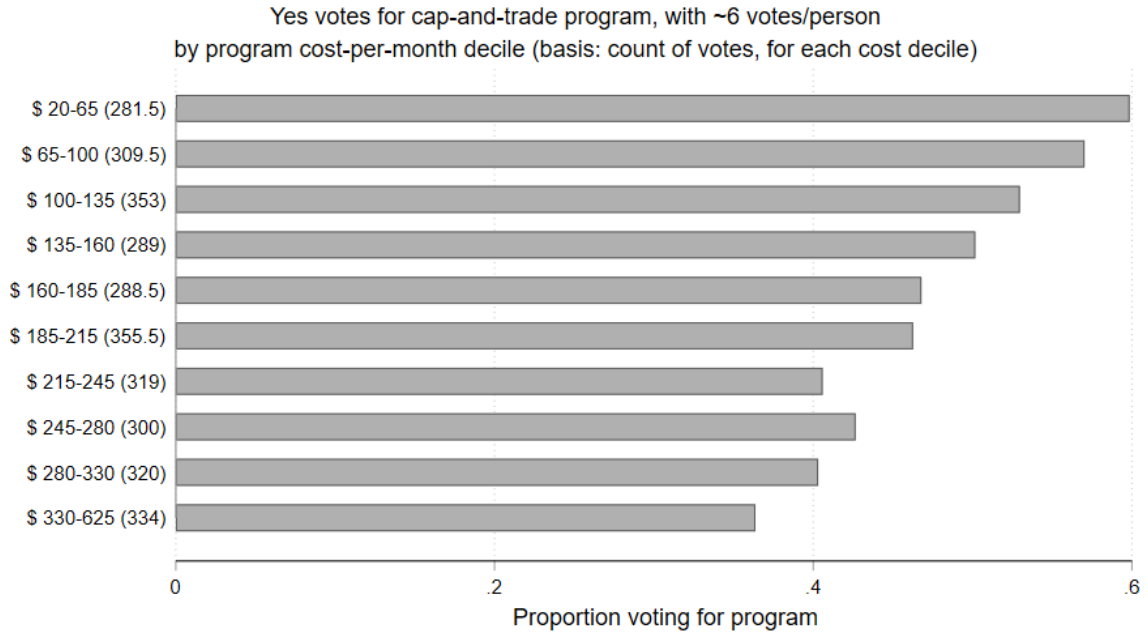
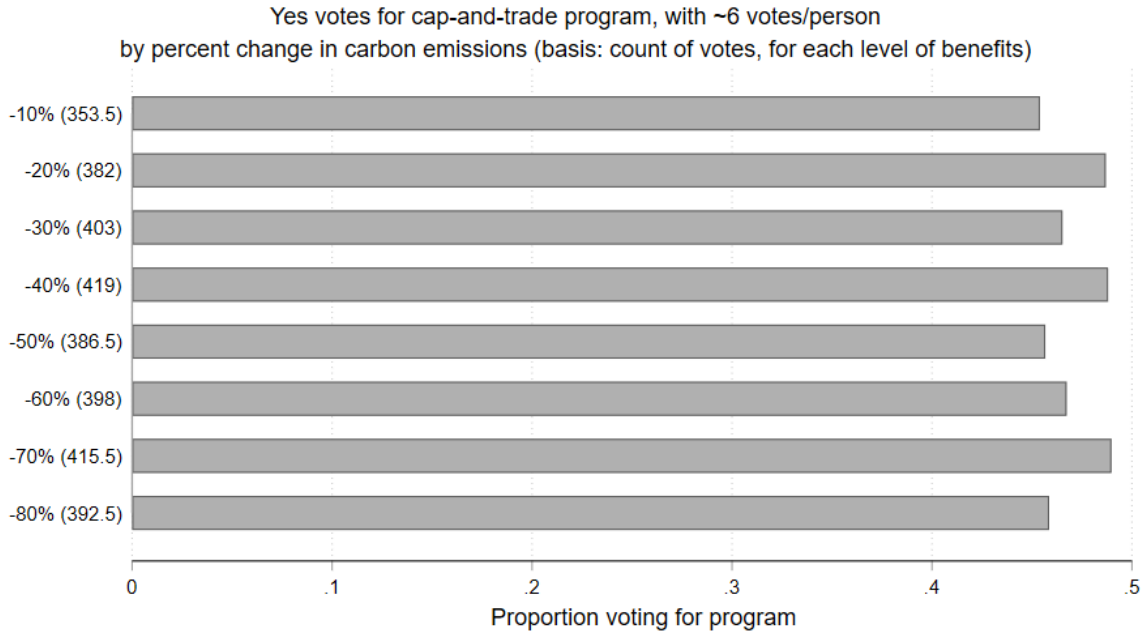


Figure F11

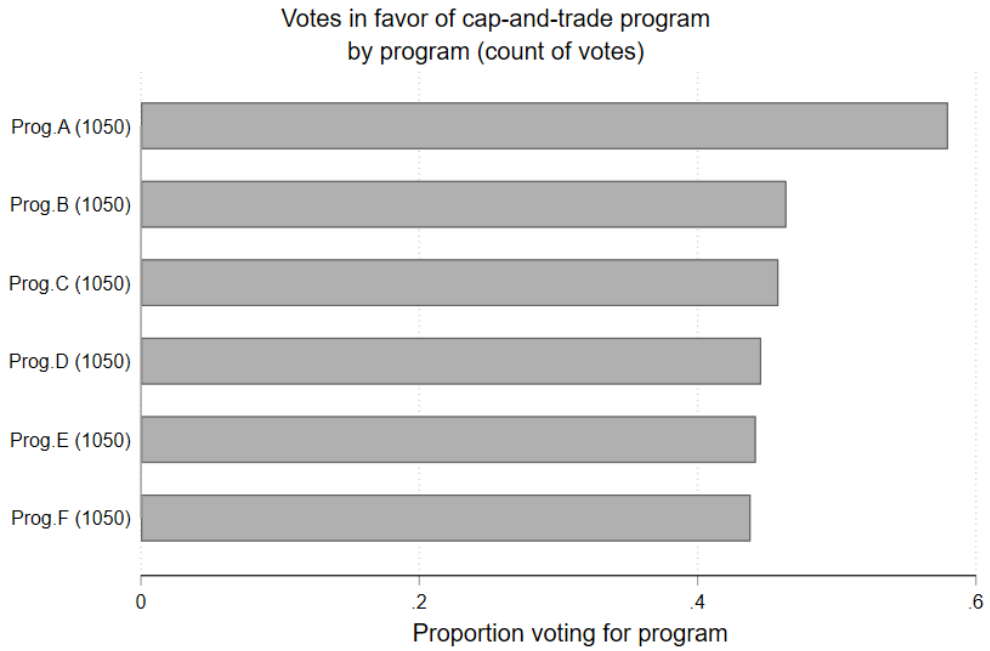


F.3 Share of "YES" votes by aspect of choice task

Recall that each respondent is asked to consider six different carbon cap-and-trade programs, Program A through Program F. All choice experiments that offer respondents more than just a single choice must contend with what happens as the respondent works through a sequence of choices. The attributes of Program A, unique to each individual, are incorporated into that individual's tutorial material as we explain the different groups of program features. Despite this, respondents may require a "burn-in" period as they get their bearings with these choice tasks (and potentially develop some personal choice heuristics). As the respondent works through the six choice tasks, they may also begin to experience fatigue, which may deplete their cognitive resources. Sometimes, respondents may rally as they realize they have reached the final choice task.

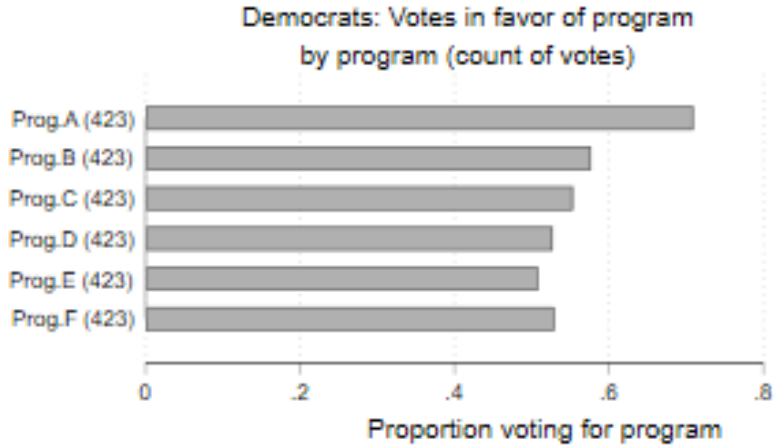
In this section, all of the figures show the progression in the specified variable as the individual works through Programs A through F. All of the attributes are randomized, as explained in Appendix E. Thus it is something that is going on with the respondent's engagement as they work through the six choices that leads to changes in voting patterns, not any systematic difference in the attributes of the cap-and-trade programs they are asked to consider.

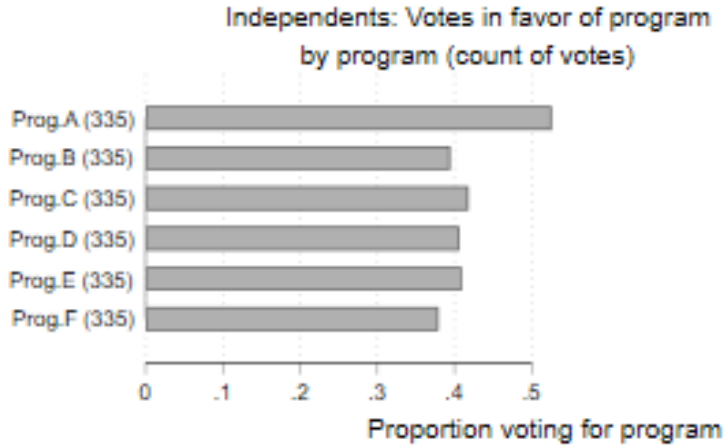
Figure F12



Attitudes toward climate change policy are known to differ substantially along partisan lines. Thus we break out these voting patterns across choice tasks by party affiliation.

Figure F13


Democrats: Votes in favor of program
by program (count of votes)
Prog.A (423)
Prog.B (423)
Prog.C (423)
Prog.D (423)
Prog.E (423)
Prog.F (423)
0
.2
.4
.6
.8
Proportion voting for program


Independents: Votes in favor of program
by program (count of votes)
Prog.A (335)
Prog.B (335)
Prog.C (335)
Prog.D (335)
Prog.E (335)
Prog.F (335)
0
.1
.2
.3
.4
.5
Proportion voting for program

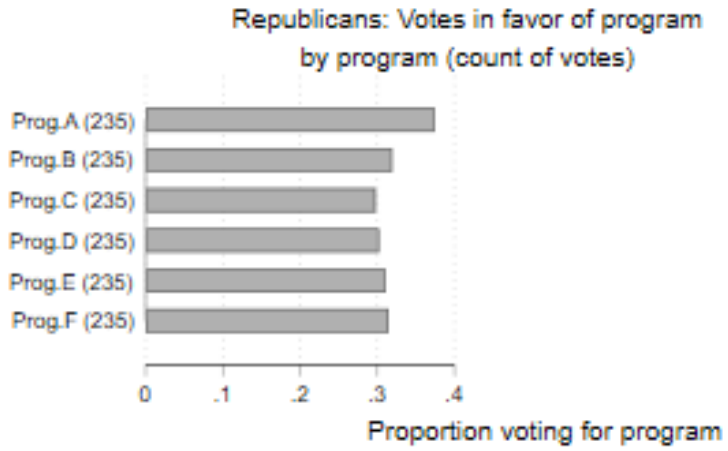

Republicans: Votes in favor of program
by program (count of votes)
Prog.A (235)
Prog.B (235)
Prog.C (235)
Prog.D (235)
Prog.E (235)
Prog.F (235)
0
.1
.2
.3
.4
Proportion voting for program

Figure F14

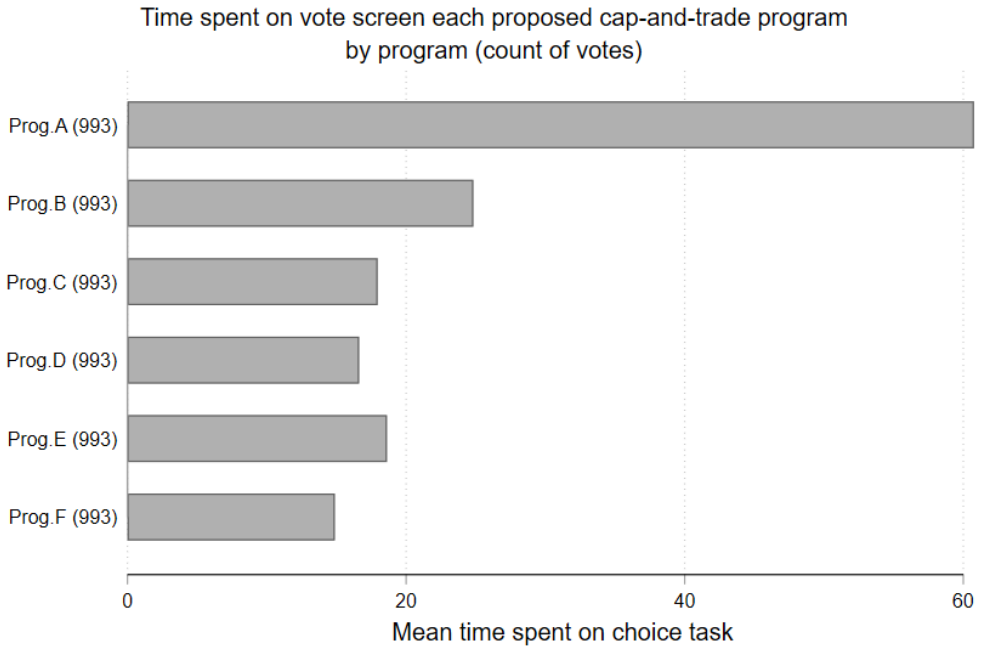


Figure F15

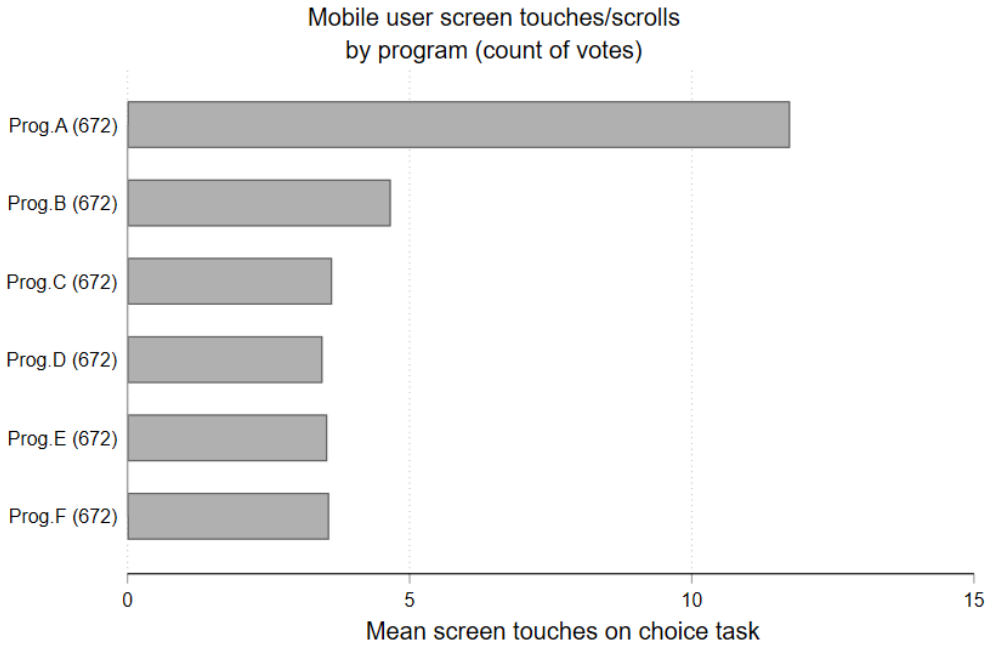
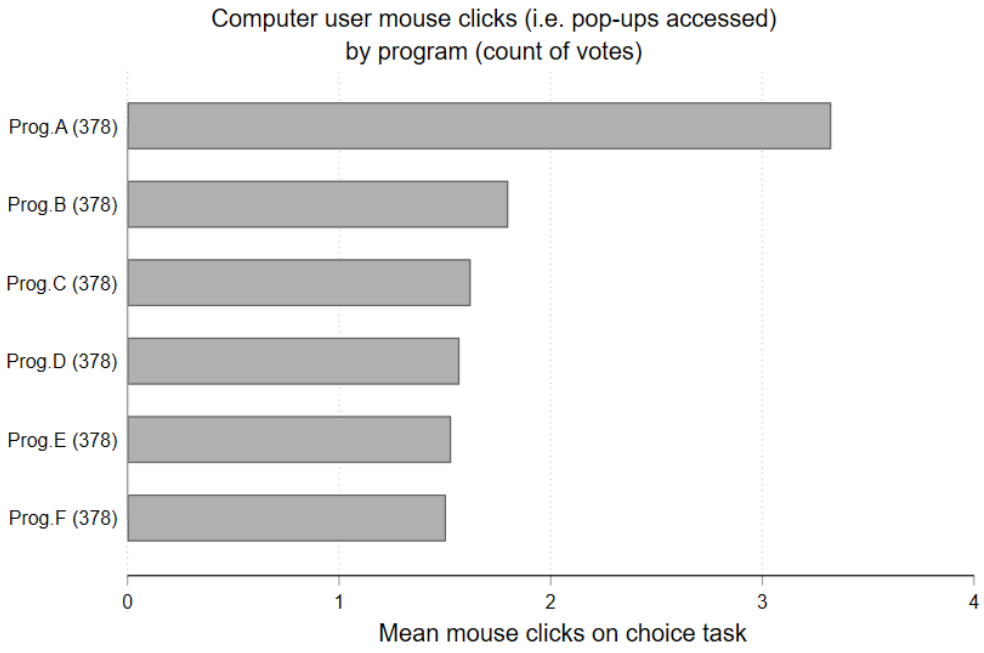


Figure F16


Computer user mouse clicks (i.e. pop-ups accessed)
by program (count of votes)
Prog.A (378)
Prog.B (378)
Prog.C (378)
Prog.D (378)
Prog.E (378)
Prog.F (378)
0
1
2
3
4
Mean mouse clicks on choice task

F.4 Identical distributions of program attributes across tasks?

Figure F17

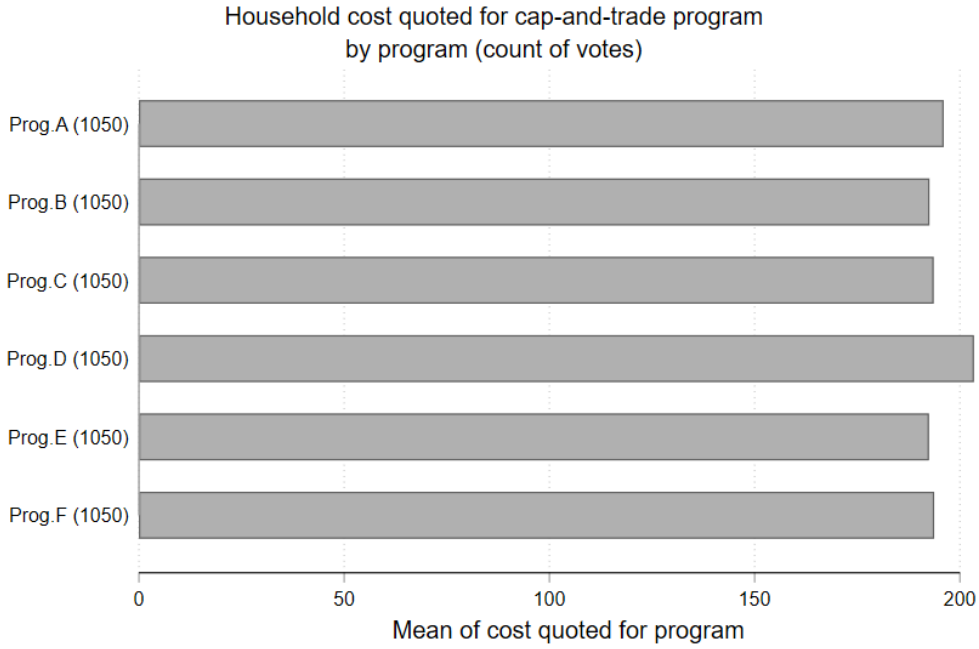


Figure F18

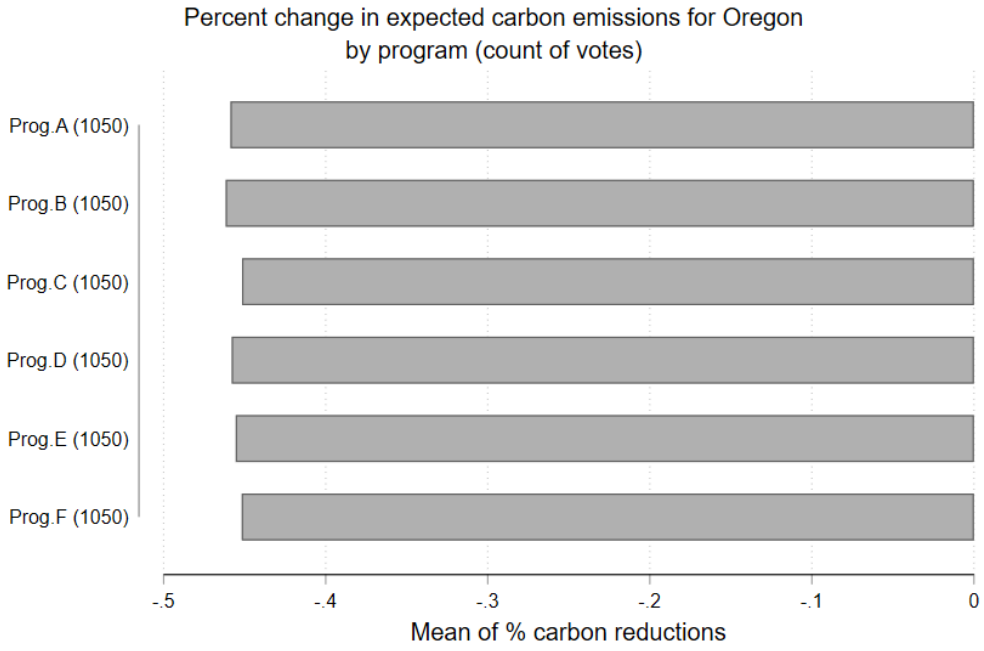


Figure F19

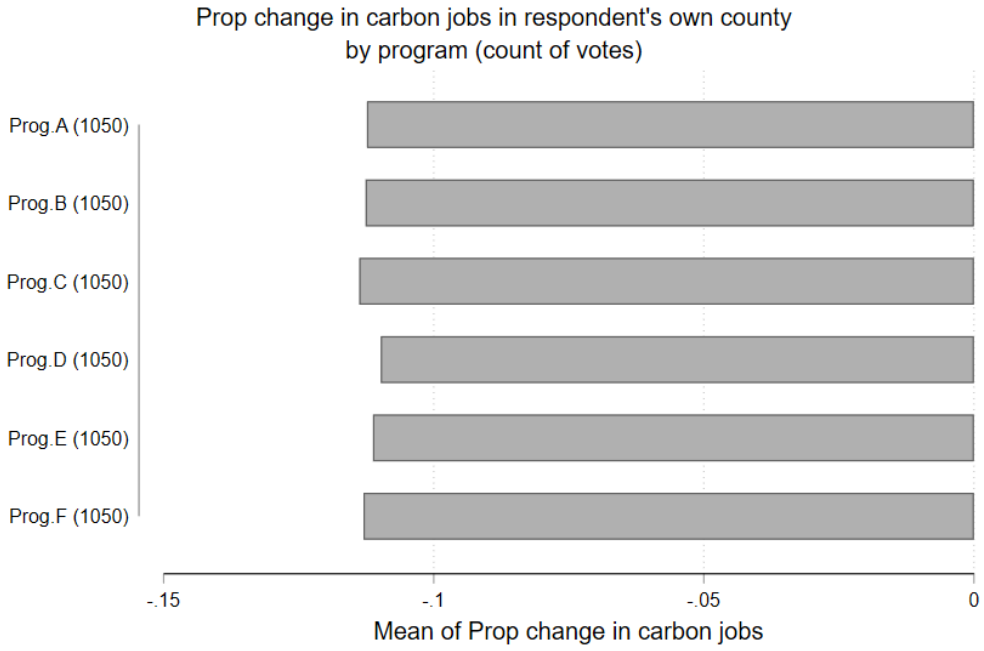


Figure F20

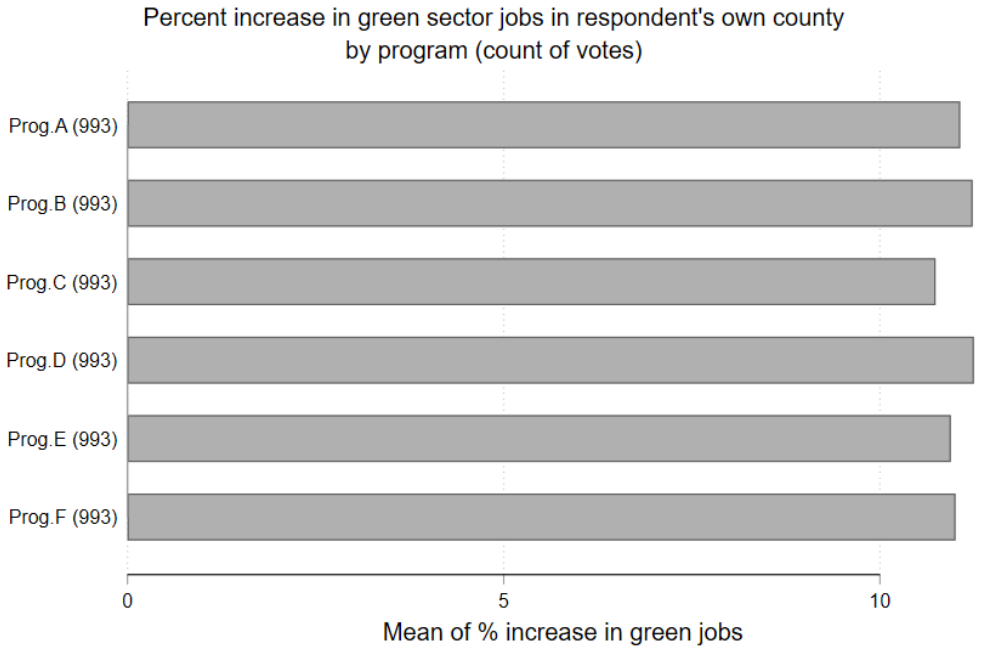


Figure F21

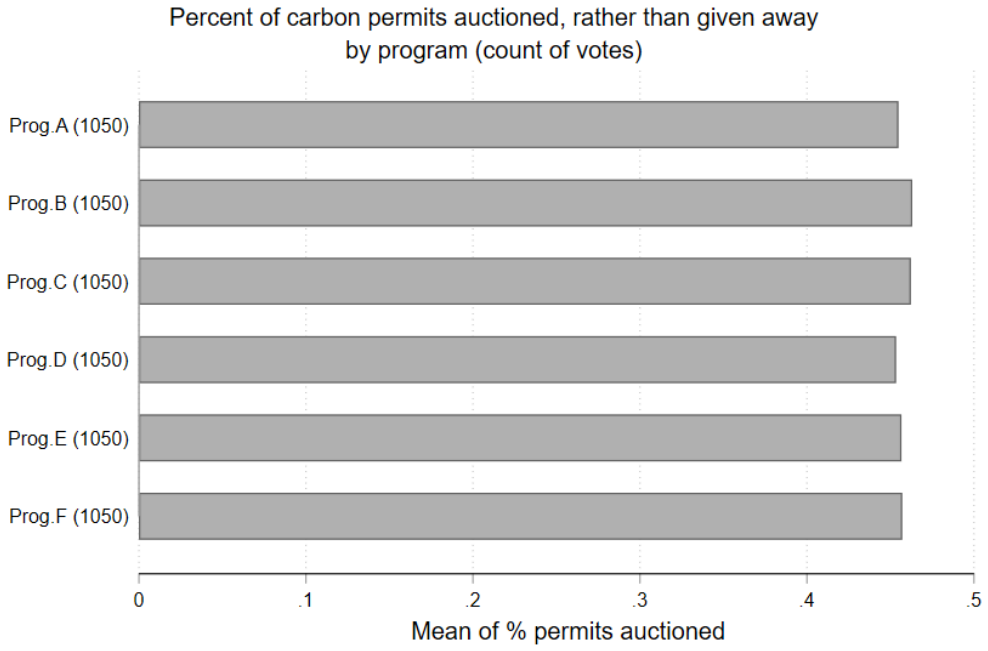


Figure F22

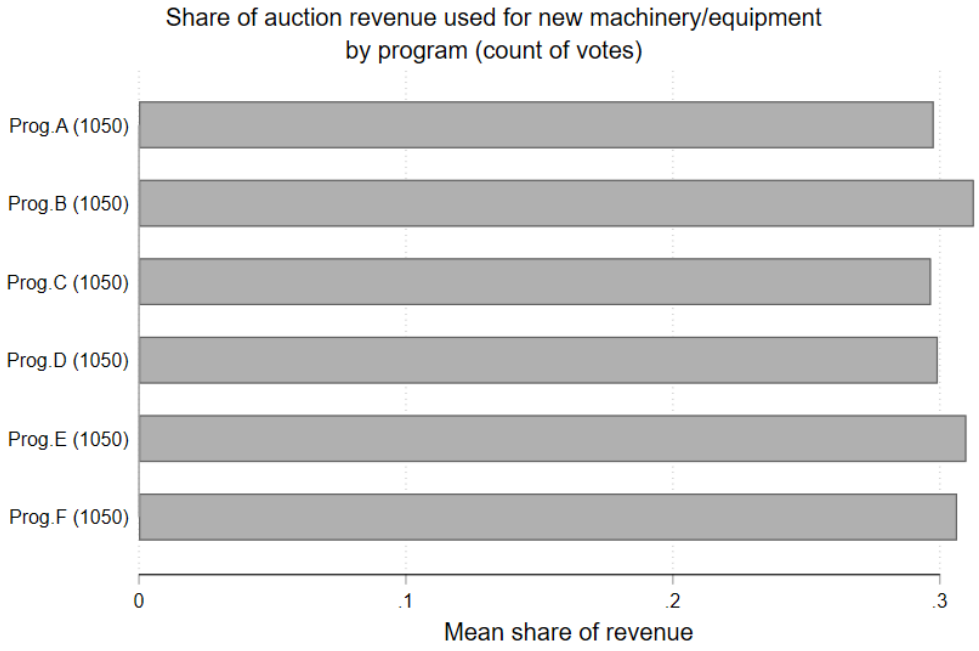


Figure F23

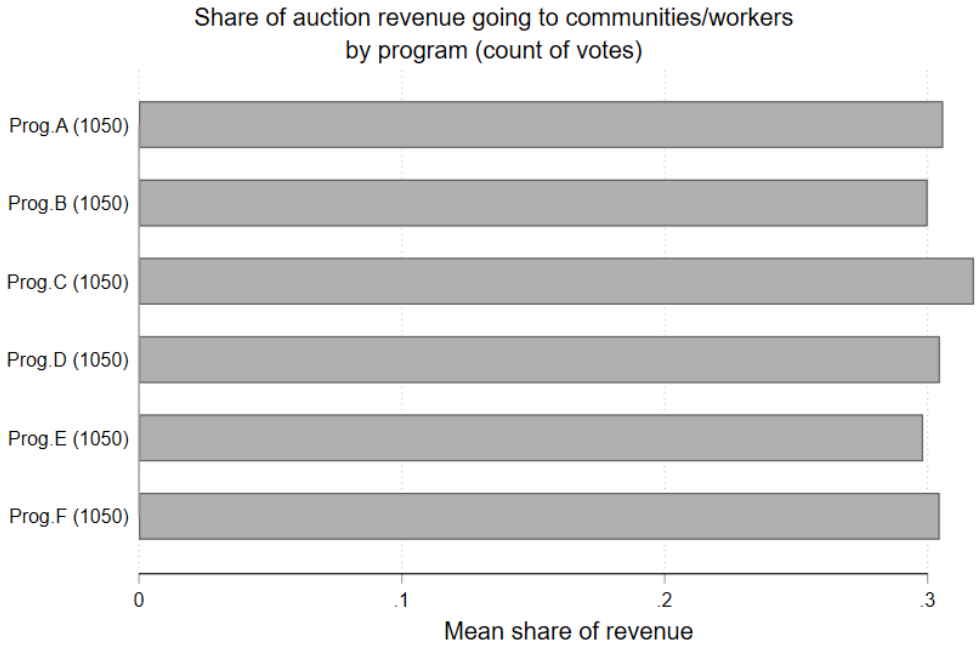


Figure F24

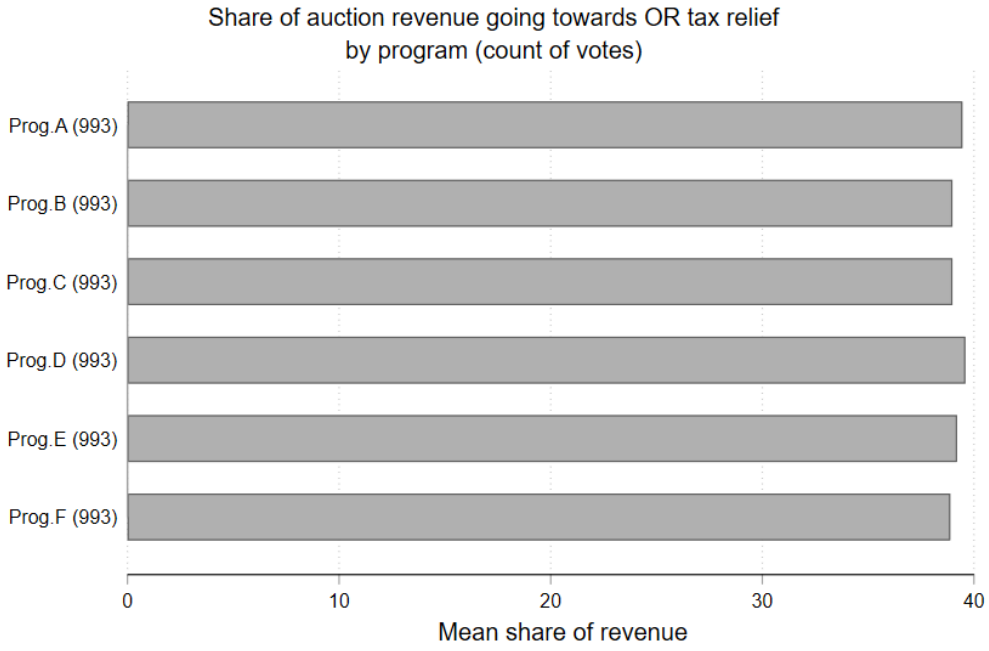
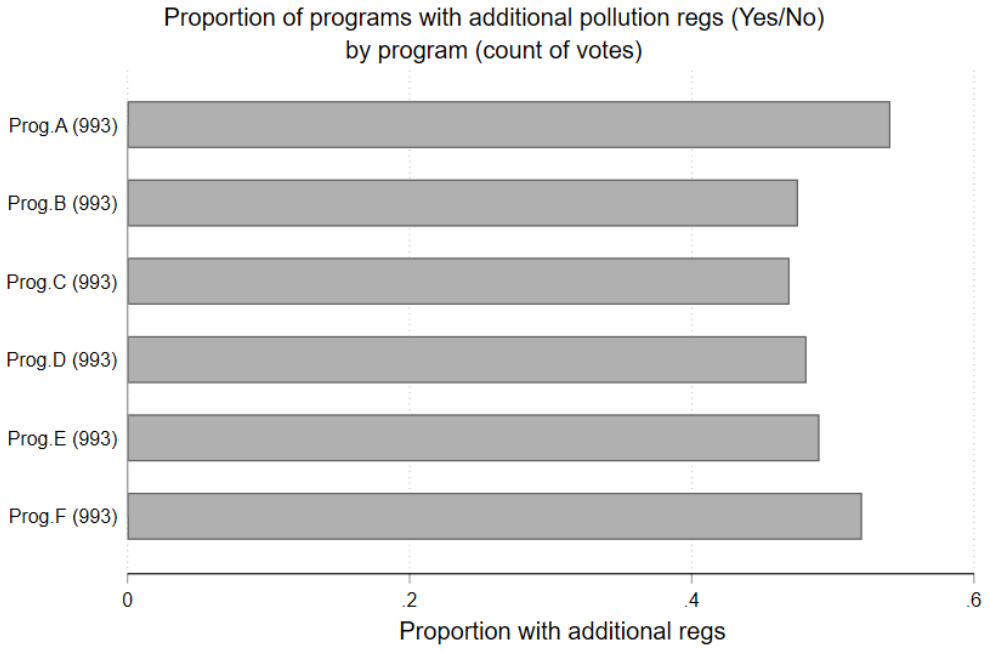


Figure F25



F.5 Votes as a function of non-mutually exclusive categories

Figure F26

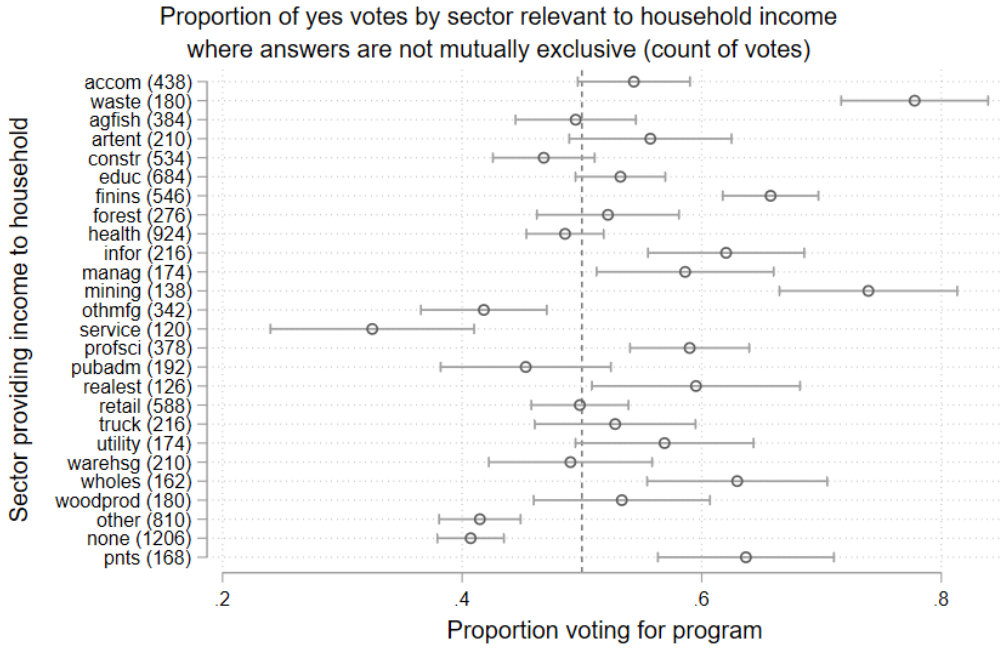


Figure F27

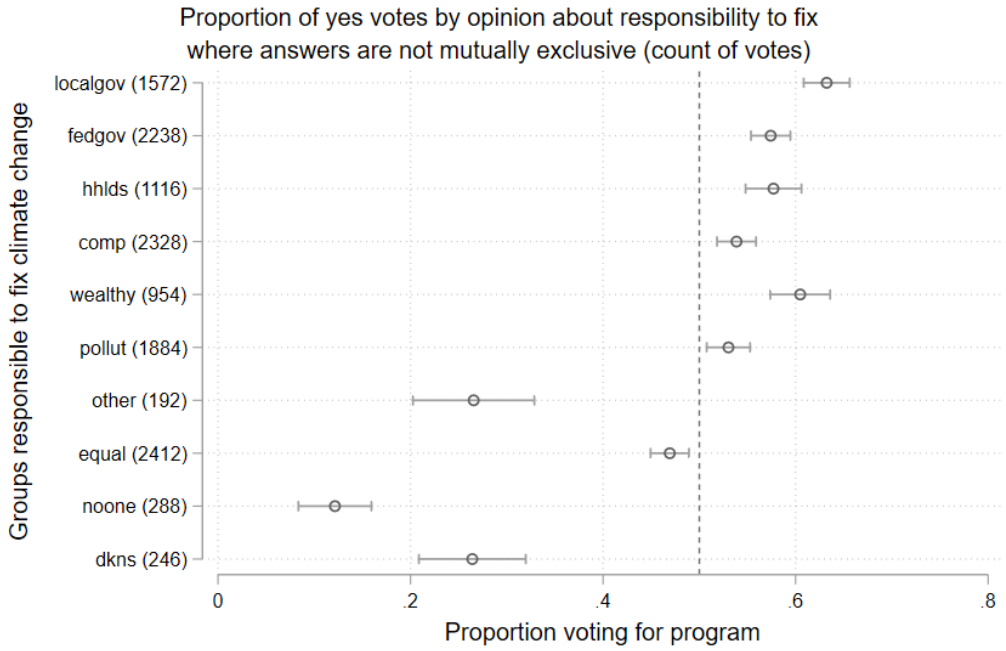


Figure F28

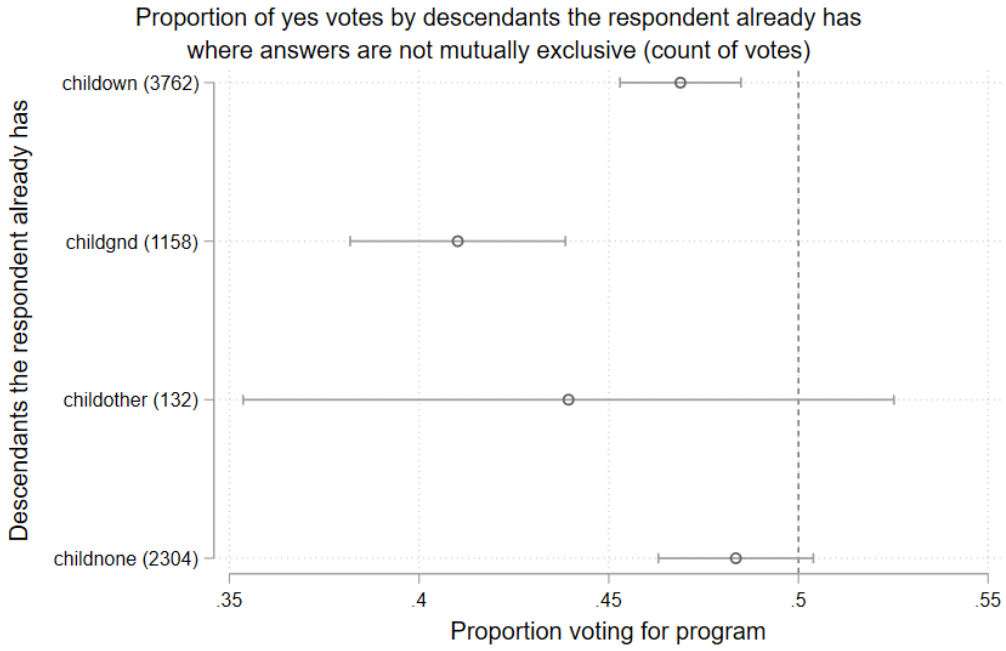
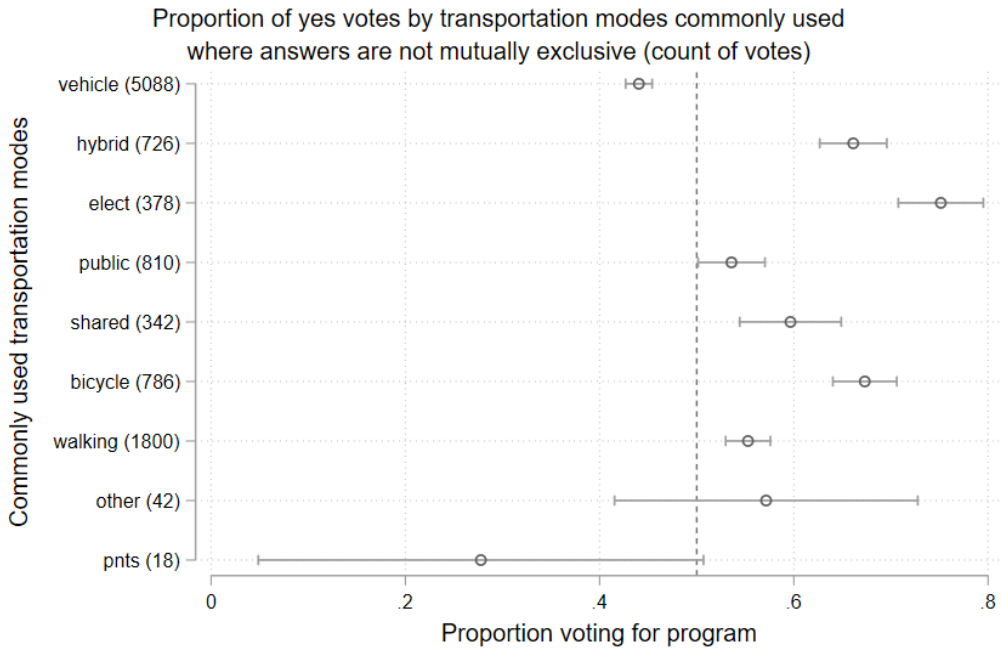


Figure F29


Proportion of yes votes by transportation modes commonly used
where answers are not mutually exclusive (count of votes)
Commonly used transportation modes
vehicle (5088)
hybrid (726)
elect (378)
public (810)
shared (342)
bicycle (786)
walking (1800)
other (42)
pnts (18)
0
.2
.4
.6
.8
Proportion voting for program

G Online Appendix: Verbatim Feedback from Respondents

The final question on our survey invited optional respondent feedback. The precise wording of the question was: "Thank you for sharing your opinions about different types of carbon cap-and-trade programs. If you wish, please provide some feedback before you go:" A multi-line text box invited longer comments, should the respondent desire to provide feedback.

The following table is the universe of non-empty responses to this question. We include this information for other prospective survey designers, since respondent feedback can be useful to the design of future surveys.

Table G1: Verbatim responses to final feedback question on the survey

Arbitrary identifier	Survey started	Text of feedback
R_3D7PDK0bhlro3Ac	7/30/2021 17:32	Such an interesting an eye opening survey. Really enjoyed this one.
R_2ck2EzkMgLq0aow	7/30/2021 17:33	Hope we get some form of a program passed! People will complain about cost.
R_1mLyJabWMChTUpF	7/30/2021 17:34	Thank you
R_2YQ95lwSeIvXwFF	7/30/2021 17:40	We need to slow climate change or else Good survey
R_2VOMtxCaX3ha0gH	7/30/2021 17:44	I love how this survey introduced and laid out the information. Everything was super clear, concise, and well done. I learned a lot:)
R_290lXPQHBCkYOjD	7/30/2021 17:52	No thank tou
R_SW8X41HynCIyev7	7/30/2021 18:09	Great survey thanks
R_06Tq4DfIUOLlH33	7/30/2021 18:22	No thanks
R_1OCQ9jnRqttAKV8	7/30/2021 18:48	I do not trust the government to be equitable or to use the funds in the manner in which was described
R_dbPiKnj9I5ImVvr	7/30/2021 18:59	Thank you for giving me information on a subject of such importance. We need to do something! IMO the wealthy business owners care very little about future generations, or even our earth. I don"t like that jobs will be lost, although other jobs will be gained, so I think for those that lose employment maybe training in a new field will be beneficial, for them, their families and their future generations.
R_qDQhUesi0BphP9f	7/30/2021 20:55	Thanjs
R_2wQQxkSdAXXJ0WX	7/30/2021 21:19	amazing and interesting survey! was never bored throughout it!
R_2wNZy5kvFKjcLPj	7/31/2021 11:47	Find a better solution
R_3kiVjihUmsFTE5O	7/31/2021 12:29	No thank you. Trump 2024
R_7TE9CE9XHBRyXYt	7/31/2021 14:21	â¦â¦â¦â¦.
R_2PaP1Kv49IT6b4M	7/31/2021 6:23	Very well put. Together survey I liked it
R_DkteoAYG6IRXPtD	7/31/2021 8:32	N/a
R_1erv5RTKfSjiUSQ	7/31/2021 9:26	I found this fascinating and exciting that we may actually get something going to help the pollution problem and slow climate change. I enjoyed this survey
R_6YzWCuoGLZeWAI9	8/10/2021 17:22	Very clear and concise. Presented in easy, bite sized pieces of info.

Continued on next page

Table G1 – continued from previous page

R_3QEkk5aIaOx0oYN	8/10/2021 18:05	The pay needs to be way way way higher for this "survey" if u want quality answers and data to your research. I promise u that u are NOT getting 100% real answers from people. I took the time but I know plenty of people who couldhavedsked their way through for the tiny incentive u gave to take on all the information required to understand to answer the questions correctly.
R_cZ08g8gZ2VTPgD7	8/10/2021 18:30	Very interesting survey
R_3dFduan3iduoD2Q	8/10/2021 19:33	Great survey!!!
R_b2xiBgLGjvaDfJ7	8/10/2021 20:57	It was nothing but pro cap and trade propaganda put forth by probably an indoctrinated group of students who never really had to struggle.
R_2woU9rGRGga1kwQ	8/10/2021 21:17	Thank you, I learned a lot tonight and will be paying more attention to this issue.
R_pJLzOwIqqPccVgJ	8/10/2021 8:17	Seems like these programs are going to involve a lot of beurocratic red tape that are just going to drive companies out of state and maybe out of the country.
R_DOaAXYtdr35MfqV	8/11/2021 10:20	Very comprehensive
R_qRAbWWkvq4WhFtL	8/11/2021 10:30	Thank you! I think this is a great and important survey.
R_1gjZ1sdSRuNtpch	8/11/2021 10:56	I like learning more about climate change. I"m not very informed but I know there is a lot of misinformation going around.
R_0kZlhxlwmrnAIlX	8/11/2021 10:58	Company, local government and fedral government need to stop making dams as well iy is the main issue for droughts and secound reason for drought is in oregon we have bad forest management so fires get huge and big due to all the under growth and then you need more water to put them out better manage ment all around is what we need better manage ment on dams forests and carbon producing companies
R_3JFxnBYnxx5u4em	8/11/2021 11:03	Thank you for making the effort to create this survey and ask people to figure out what would be best for everyone. In an ideal world this change would be cheap and free. This change is important for the future of our world. Yeah, the sun will explode but we can slow that down and the burning of earth by preserving earth as best we can and protecting earth as best we can for as long as we can until we can leave if that will be necessary. Saying we don"t find some way to refuel the sun so it doesn"t explode and burn earth. *shrug*
R_1CEzDOPi4jhOpk4	8/11/2021 11:04	Interesting.
R_2SCgM9iWqjWwvC1	8/11/2021 11:04	More info
R_3fNKMCovVmUuhlb	8/11/2021 14:16	Na
R_cCLOag2Bfl55QIN	8/11/2021 14:58	No thank you
R_w5fJ4YujchiLNnj	8/11/2021 16:36	No
R_1ONQYQyJvrucFl4	8/11/2021 17:05	thank you this was awesome
R_3IaBZTwl8MdbrP5	8/11/2021 20:19	This was a very good survey.
R_Q4yjIgMpzpSVNoB	8/11/2021 20:40	No feedback. Good survey. Keep it up.
R_qJ8m693Fci9VtAZ	8/11/2021 23:59	Anything Oregon does is a drop in the bucket compared to the pollution that China and other countries generate. The governor is an idiot.
R_3oNlih5PTG3lZnN	8/11/2021 3:39	interesting survey
R_2SGZuvYKjHEUyJ4	8/11/2021 6:36	Jobs gained in the green sector should outweigh jobs lost in carbon emitting sector. Industries emitting more should be âincentivizedâ to reduce. If that"s in tax"s or costs. Individual household costs should be offset in taxes. Increase incentives for households to go green. Burden should reflect greatest contributors to emissions not the general public.
R_2qEIfWQDjv0dT3k	8/11/2021 7:28	Good survey

Continued on next page

Table G1 – continued from previous page

R_30ub7IGzmyA1wRz	8/11/2021 8:07	Thank you for the time to take this survey. It was interesting to learn about the cap and trade and gain a better understanding.
R_3HwshwbHSHuvn7c	8/11/2021 9:26	Good
R_qwkOP0fJmCa9DC9	8/12/2021 0:30	Very interesting survey
R_ebNVjjQQ4QY26lj	8/12/2021 14:05	Good survey, lots of info.
R_0OLd5Xe2VUbgZkR	8/12/2021 15:14	fun survey
R_CaELBBS2sEHCizL	8/12/2021 15:22	I just hope we calm down on carbon emissions. But we have been a little
R_d11nxgfoNVP3KPD	8/12/2021 15:41	More needs to be done to power through Renewal energy sources
R_1ihDpkmDttDEzrA	8/12/2021 19:23	The more appealing the carbon cap-and-trade appears to the general consumer is low household cost AND minimal job losses the more likely it would pass.
R_1HkRMfxUS1hIuNr	8/13/2021 12:28	Nice article
R_9Gmz8l2aaukcxlT	8/14/2021 19:07	Cap and trade is going to be difficult to get buy in from a lot of people. Maybe exclude logging from the regulations. Look at margins in some industries, some may not be able to cut emissions without losing money or shutting down. Be careful not to cut off your nose to spite your face. If we lose roo many jobs the economy may not be able to recover. Maybe slow down with the emissions reduction.
R_2THjsiExSeaM36S	8/15/2021 10:16	:)
R_2wSqxwKVJL5EHl1	8/15/2021 16:50	thanks for the information
R_31L7G9ALUQMBxp7	8/15/2021 21:08	I don"t belive cap and trade is a moral way to force changes not everyone agrees with. We are highly considering leaving this state after youngest graduates due to increased extreme liberal programs that keep creeping into all parts o life. We believe that the climate is changing (and always has) but certainly not mostly from CO2 and cows. Fossil fuels and nuclear are so much more efficient and consistent than wind or solar. Until battery storage for these is greatly improved they are only usable when it"s sunny or windy. While supplementing with a more stable source is doable but requires so much more expense than just using the steady power from a more reliable source. I"m also unsure why Natural Gas which has zero CO2 is never discussed.
R_3G8IjWBKEO3aBpT	8/15/2021 22:05	Good jon
R_3rM3jzvPmt8nOLv	8/15/2021 8:04	A cap and trade is a no go for me. Job loss is a great now because of the ongoing "pandemic". Cap and trade would further create more jobs lost, and create an increase cost to every type of good imaginable with very little given in return. This is another attempt to have more government control. WE should"ve been looking at controlling carbon emissions back in the 60"s and 70"s where it was the greatest.
R_bBf9eMj4Um44kYV	8/16/2021 17:53	My issue with the options presented are that the ones that reduced a reasonable amount of carbon was devastating on the job market or on cost per month to families. There MUST be a way to balance it better because CLEARLY we need to take some action. Although I have no children or grandchildren to worry about and I am OLD and won"t be here for the worst of climate change, I still care deeply and we MUST do something.
R_bpaCDLlgMIzVzB7	8/16/2021 18:47	N/A
R_3PNza79jby9j5tS	8/16/2021 18:58	Don"t know
R_9Fzjj4zJoKJ2ATf	8/16/2021 19:32	This was very informative! Thank you!

Continued on next page

Table G1 – continued from previous page

R_2SIZFoHN47yIbAk	8/16/2021 19:34	Noticed what seems to be a common error when discussing carbon emissions stating that vehicles emit carbon dioxide not carbon monoxide that is what is the result of motor vehicle operations. Everyone seems to ignore that carbon dioxide is the primary food for green plants - implying that what we should really be looking at is reducing our reduction of trees and plants and actually plant more.
R_1gjV33O1RBVHG1y	8/16/2021 20:58	Appreciate learning cap an trade
R_1j7c5vWb8KCfjvb	8/16/2021 20:58	It was a good survey
R_25SpcbqzoSCsY6U	8/16/2021 21:55	Great
R_1f7tHcWVURapL2d	8/17/2021 12:14	no
R_8BUpssMIhXpIHrH	8/17/2021 16:32	Good survey
R_1i4mNTpwBpjKUe2	8/17/2021 19:51	i know we as a nation need to start making changes
R_piONTnkZiQsextn	8/17/2021 19:52	Na
R_Olh3mlxgkjtr7Il	8/17/2021 19:52	Great topic.
R_ZIRAIhNDcnfwXoB	8/17/2021 1:49	A great survey .. cuz nothing more important than our health
R_2BmI4F5GvGgDwJ5	8/17/2021 23:45	N
R_294ypaYkTxaRsl8	8/17/2021 6:23	My problem is Captain trade is it always ends up costing smaller but this is not the larger businesses larger businesses somehow always keep out of these things and leave the financial costs on small businesses which hurt your community
R_1poCEuC5PoODWxo	8/18/2021 10:58	Anytime the government sass another level of bureaucracy it is costly, inefficient, and a mess.
R_8f9qQbmuNVSp5zH	8/18/2021 11:15	None
R_6ik2Dddu5C0D3pf	8/18/2021 11:23	action on climate change is needed now. we must use all available tools that we have now and improve them as we get smarter
R_0BCs0KygOCai7XX	8/18/2021 15:39	its a good survey and i like it.
R_3iUReEkFOz4MVXB	8/18/2021 17:25	I think this survey has good points on why we need carbon emission reductions in the world because of how climate change is effective humans, animals and many other forms of life on earth. We should all do something right now rather than later on.
R_2QrE4QLo5tPXLKS	8/18/2021 1:29	I have both worked at a survey call center and don"t a lot of surveys. This was one of the best I have ever seen. It was professional, informative, and unbiased.
R_Xoo8vWeUokuELeN	8/18/2021 2:04	It was really informative and I like the layout too see definitions of the topics.
R_2bIuam2u6GxJnYV	8/19/2021 13:07	great survey, very informative
R_0pjcO4m0PsjW6Qx	8/19/2021 15:27	Presenting each program separately was good; however, it would have also been useful to have them presented together to compare aspects within a singular "picture" as opposed to each individually. Similar to when you are shopping various products online, how you"re capable of doing side-by-side comparisons of features.
R_3EbWYLeZpDCtcEw	8/19/2021 20:09	Great survey.
R_27H8uGBlWTz4e3C	8/19/2021 6:28	Climate change is real we must all step up to the challenge to reverse the effects.
R_3hyhuFxdpE1gIhx	8/19/2021 7:37	I did learn a lot
R_CfzGCoxgcT9LCeZ	8/20/2021 18:48	Very nice. Very very fresh my friends. Lovr the survey!
R_2aM6UvgK5UYhTEy	8/20/2021 21:51	Global warming is real. We should do our part.

Continued on next page

Table G1 – continued from previous page

R_utb7sTe9hmgbma5	8/21/2021 10:03	Free the workers from responsibility and hold corporations accountable for their actions which is resulting in the death and destruction of our planet. That"s all, thanks
R_1FDHRaJTqpRDqaF	8/21/2021 15:43	No thanks
R_1dlVxhtsp92UzWU	8/21/2021 17:15	I learned a lot taking this survey!
R_RELvBGchLm23SJH	8/21/2021 17:43	Thank you for letting me be a part of this survey!
R_ulUK65dPaNfw9Hj	8/21/2021 17:54	best survey yet. Keep up the good work
R_1IN6Xs2EWVrTpy5	8/21/2021 17:54	Great survey subject
R_2QtHMSCW219ziUI	8/21/2021 18:03	None at this time
R_WkTzOzYvWGI9TP3	8/21/2021 9:03	It much more great survey.
R_3p8TMOVBEUNdOUa	8/21/2021 9:51	This was very easy to follow and i appreciate the level of detail and the easy to understand graphics that were put into the information sections of this
R_22zUeCmjYYexDNv	8/22/2021 0:56	none
R_27QIK5ymKDQh6eN	8/22/2021 0:57	Very interesting survey
R_3GfD6XAsnU2Rpdy	8/22/2021 11:25	Thank You!
R_2amkwSuiAE7r6gY	8/22/2021 11:36	The monthly household costs all seemed pretty exorbitant to someone on SSI – even the lowest amount was more than 10% of my income. Whatever the chosen program, a good share of the auction money will have to be spent on relief for low-income households or we"ll be in a pretty bad situation. (If you do another survey on this in the future, perhaps you could take that into account.)
R_1pGd52hzj1XUabz	8/22/2021 12:38	Ok
R_3ssMVntxm8nVEZF	8/22/2021 13:34	Good Survey!
R_3qksrBMXDkAwkvz	8/22/2021 16:24	No
R_2XiLXXjJTi4eeLM	8/22/2021 16:32	Global warming is real please reach out to the right people to stop it before we all fry!!!!
R_1gIyWwALvmkoNnj	8/22/2021 17:44	This survey was fascinating and educational yet did not portray a bias one way or the other on a very controversial topic. Thank you for the chance to learn and participate in my views as a contribution to the thought process.
R_5cEKSqWPA3GO0Kt	8/22/2021 19:07	No thank you
R_1r7Gt6d6cZLQYyO	8/22/2021 23:08	Thank you
R_87JYb2V5m6d0Mrn	8/22/2021 5:11	Oregon has money in reserve to use instead of taxing citizens.
R_1gpx5dJ9x9aPZMs	8/23/2021 12:37	Thank you so very much for the great opportunity to participate in this important survey! ðð½
R_2VEyFFuk2tjKWxB	8/23/2021 13:25	I learned something today, that I will carry with me into the future. Thanks.
R_3G8RgZsLToZW9Iq	8/23/2021 13:26	it is exciting
R_29aGT58Dc9yWYv4	8/23/2021 14:01	Very interesting survey
R_tKWfL9ibDuqZxzX	8/23/2021 14:48	Good survey. Learned something.

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Table G1 – continued from previous page

R_pMni1dmiUI0CiR3	8/23/2021 15:00	Carbon cap-and-trade programs are nothing more than the Progressive"s way of oppressing business and controling the common man. Another method of the Progressive"s to move the country further to the left. I do not believe they really care about carbon emmisions. It"s just another way to elivate their elite status and cause the rest of the population to become more dependent on the government handout.
R_3iHXCYVFATa6AH4	8/23/2021 17:11	I am not a believer in any kind of Federal or State government legislating in the marketplace. If you want the proof of that just check Amtrak or off track betting in N.Y. Government and politicians screw up everything they touch.
R_81c5h1QoHnnjkuB	8/23/2021 18:59	Thanks for survey
R_1LUSy3Wb6eRjrHL	8/23/2021 21:18	Great survey, very salient questions and problems.
R_OxHPGQp4NLhndDj	8/23/2021 21:42	I like the survey. I learned alot
R_bpwVVnsk6ygteRb	8/23/2021 22:52	This was a cool survey and it"s really informative
R_1kNPcz8zK1s8kRZ	8/23/2021 23:01	I really appreciate the blue text that provided additional context for the issues presented
R_2VCjZF4nMHu6cUP	8/23/2021 3:21	Ok
R_1g7KIM8xaBhlCKu	8/23/2021 4:32	Would have liked a better understanding where monthly household cost were coming from, I.E. fuel ,food,electric utilities or natural gas, groceries ect, a breakdown of percentage?
R_1CqdYkOnN85zbaH	8/23/2021 6:45	The weather is changing day by day. We are facing a lot of calamities these days. It"s very important to save our environment. We need to take proper steps to reduce green house gas from our environment and we have to plant more and more trees. Thank you for asking.
R_2PhdgDMZHZjeLL3	8/23/2021 8:42	I think as a resident I want to make sure others in these industries can find a new trade. I know they hear this type of thing and get scared and automatically flip out and shoot it down. But if these specific people could be encouraged or incentivized to move to a green sector that could help? Or I"m dreaming haha. I appreciate Oregon for trying to do this. Historically we have been progressive. I"d vote for a plan that YES limits other pollutants, limits future pollution, and does not cost the household more than $200 or so
R_2QlBlHmfZ4GZtl8	8/23/2021 8:53	I enjoyed this survey and actually learned some
R_2434emmPsyuhy6n	8/23/2021 9:10	I think not al citizens having to bear costs for climate change are very high when businesses should pay the highest amount.
R_3dWjRKsvK1dn502	8/24/2021 0:01	Nothing additional
R_3nGY5gnaMS7ySUL	8/24/2021 0:52	Very informative survey. Didn"t know the Oregon government was considering a cap on carbon emissions
R_3NCibWGOuxEgxwn	8/24/2021 13:40	Great information, although I did see some inconsistencies of information. Also, a very strong bias opinion on the topic
R_2xQnrCATeqx6BWw	8/24/2021 15:16	nice!
R_2v0pNLUs6lmfi6L	8/24/2021 17:06	Great survey! Educational + easy to complete. I do wish I had the option to go back & save my place as I wanted to revisit the previous Programs & since I couldn"t, I had to refill the survey; but it was worth it.
R_cvuUb7qvW8dkAjn	8/24/2021 23:25	Carbon caps aren"t enough.
R_27EhxlMB6zigEAH	8/24/2021 23:49	Thanks
R_bPJzm92n9aeEtbP	8/24/2021 2:26	Liked this survey. Different very thought provoking
R_1i8MugFQhBHc09G	8/24/2021 4:34	Superlative survey. A win/win as it provided excellent feedback to you and provided an excellent education to the survey participant re the particularities of the cap-and-trade initiative.

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Table G1 – continued from previous page

R_2TRgLsV12h5h5mL	8/25/2021 12:08	Thank you for the information
R_3qkZozmqfwCsbn7	8/25/2021 19:52	I wish more was explained about the household cost estimated. Is that just the elevated cost for goods and services provided by merchandisers? I would have voted much more in favor of those costs then; seems expected. Or is that amount an estimated out of pocket cost or tax paid directly by myself to the government or other committee in charge of this plan? I am living leanly as it is and would prefer the costs go to the companies instead of me. Or I need to know how much of my money is going where exactly; ie not to campaign costs and overhead.
R_yloMsGuzSfTGikh	8/25/2021 19:57	Thanks for increasing my awareness!
R_2aS30I0kL3v28Xy	8/25/2021 23:44	I like the survey I have taken for where I live in Clackamas Oregon
R_1JXFNHzS8vNzl8l	8/26/2021 10:03	I got lots of information about carbon cap.
R_2YFKXhUPx3z5Gy4	8/26/2021 12:41	This survey was really nice
R_31AjNrGPlezXNcq	8/26/2021 18:40	I think the survey was informative but may not be the most understandable to the typical audience, especially those with little schooling. A video may be more effective in breaking down what was included here.
R_2RaeVUUQ0tI8co4	8/26/2021 19:47	I was thoughtful in my answers but feel I could of understood the charts more. I started to feel tired and became impatient. I wonder if I would vote differently tomorrow, after a study session.
R_1eWwN6JlhkvWEpF	8/26/2021 22:10	Please do your part to save the planet.
R_urmnJYF2Fpe5WUx	8/26/2021 23:25	I can say its really good to know about our mather earth. And do what is good for everyone. And take good care of it. The cost reflects . Thanks
R_1PRzAHmAnQ86kC2	8/27/2021 11:04	Good survey
R_2TtmePKKLLHAHQf	8/27/2021 18:02	None of the above
R_22MtjhbgK7lHGHO	8/27/2021 21:14	This is a very vital problem we are facing and the more information, the better!
R_3oBEs09sdZnVphH	8/27/2021 21:41	nothing I can think of, Have a nice day!
R_3HhS3OVyoSatq1S	8/27/2021 2:11	I don"t know
R_Wv1ntSFZv3ZCQh3	8/27/2021 2:38	This was a good and informative survey. I enjoyed it. Thanks for asking.
R_22tBKKTZwupggql	8/28/2021 12:12	I like this survey so much and I know so things which I don"t know before.
R_1eKTbwlKUVeDTCY	8/28/2021 13:47	It"s a bs program
R_3Vsqa4LYhQ94fsZ	8/28/2021 16:14	No thank you
R_1PTyLvsWmK4mPfL	8/28/2021 16:29	I felt that all of the proposals fell short in the amount of the emission reduction for a 30 year period. At my age, 30 years is not relevant, but it is for my children and grandchildren.
R_3FJPKcA3wAsZuJ9	8/28/2021 16:36	It was informative and quick
R_5sSAlXBx0nxKvMl	8/28/2021 17:38	Decent
R_1jq4gnQ3K833NoM	8/28/2021 17:44	I would like to know more where can I find the info
R_PUNPGQJ2Uf9f9cJ	8/28/2021 1:53	Maybe show a video instead of making people read the important info
R_Dl40O7GAyrc39v3	8/28/2021 20:41	Before participating in this survey I had no idea that this was a thing that was being talked about. Thank you for giving me something to think about and research further!
R_9yN8jZKUqyri48h	8/28/2021 21:44	It was very informal to learn about climate change and maybe make a impact on the climates
R_2e4FYotxYpGtXGE	8/28/2021 22:19	None

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R_1C9gU5xorp19Ytr	8/29/2021 0:29	i loved this survey because it was informative and i was able to learn a few things that i didn"t even know about
R_2OH0akuSC6stxLA	8/29/2021 10:20	Your choices of political affilation did not include Libertatian which it should have. It appears that several of the current issues are missed by you, such as a political class that will not do their job such as desalinazion plants and population control. Without stopping countries from poluting the oceans and without China and India being accountable a more serious peoblem will confront us soon, no fish in the oceans. Lack of clean water.
R_2xEGwY5Np0w8hWJ	8/29/2021 13:45	Reducing emissions will be expensive & maybe even painful to some, BUT if we don"t do something it will only get worse. We need to starting doing something
R_2QM6g9SV0BiKy9P	8/29/2021 16:01	Don"t want to
R_2AGxYbEbb2zGuMm	8/29/2021 16:23	Very interesting questions
R_2AFpxYZspWdOvA5	8/29/2021 16:29	no additional feedback
R_31dfMDx97lWsCWP	8/29/2021 16:55	Had no idea this was coming. Something does need to be done. I guess we will all feel pain of some sort
R_2uEXmaqTLtsisx1	8/29/2021 16:58	Try to minimize household cost would be better idea. Somewhere $150 would be reasonable.
R_xu6GvKWsUqBQOC5	8/29/2021 17:02	Let those who can afford it most pay the most/lose the least from this plan. Money returned to the state should be disbursed to lower income households to offset the greater costs to them. Worker and communities who lose income should get the most support.
R_3si7yvyDy8pWwlQ	8/29/2021 17:35	I appreciate this informative survey
R_3EA5haEeqTUtjuZ	8/29/2021 18:05	Thank you
R_1nO39Ldj3YAxXdB	8/29/2021 18:47	No
R_11jRxMZzOfYx1Hi	8/29/2021 18:58	The surgery was really nice i loved how it talked about climate change
R_004u2AnIoYRAURb	8/29/2021 19:19	I understand what cap and trade is all about now - thanks!
R_1Qae2GKfy2deaUt	8/29/2021 20:59	No
R_2rJHAOgVgJ1gSpH	8/29/2021 21:02	I think the majority of people are coming to the realization that climate change is real; however, Americans are so slow to implement change and those who would oppose these changes do so for mostly political and financial reasons.
R_2E0hLr8Pt1UAgId	8/29/2021 21:18	Whatever we do, in 50 years it will be wrong
R_2z5Vlx5k5L838Te	8/29/2021 21:37	We support 3 generations, 5 people total, from a small family business. As much as we wish to help solve pollution, we would really suffer with monthly costs over about $100, and even that would effect our family future
R_3sCLEosJSvKd23n	8/29/2021 5:09	No thanks
R_1dy8WlpSahToNwL	8/29/2021 5:21	No fight the fight.
R_1MX29jrgGCAHIHH	8/29/2021 7:31	I"m all good
R_2ZDoHjBTn1k8Gtv	8/29/2021 8:55	I enjoyed the new information.
R_2sYkB3dCvoN4AyT	8/29/2021 9:51	I really found this survey informative.
R_BXugEo4drrtnx3X	8/30/2021 11:10	Please consider how many homeless people and how many low income families are already struggling. We are the little guys nobody considers, and we are your neighbors, family, and friends. We deserve to live a meaningful life too

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R_12hx62VZvIcrqUY	8/30/2021 12:22	Thankyou for the information , it was very enlightening.
R_3PIigQBWqwUq2i6	8/30/2021 12:33	It is interesting to talk about this topic since we ourselves are destroying the planet and nobody does anything, it is good to be informed and know what is trying to do something
R_27DTVzcAqZjyFPo	8/30/2021 14:31	Technology is available today that could be used without the economic downsides to the cap-and-trade. For example, there is a company called Bloom Energy that produces fuel cells, which convert Natural Gas, Propane, Methane, Bio-fuels, which virtually no carbon emissions. Imagine not electric batteries for cars (very costly and environmentally unsound) or solar panel batteries, no longer being required. It"s the emissions we are after and Bloom energy provides a reasonable alternative. Also, just because Oregon does a cap and trade policy does not mean that our efforts would affect the global climate change. China, Russia, Europe, etc. must all get in or the changes will not be effected.
R_1IMnQv4Nup7yzpa	8/30/2021 15:23	I loved this surgery !
R_1rp2akHEWE9XuGW	8/30/2021 15:27	Would people living on just social security, below the federal poverty level, still have to pay the same amount for household costs or is it based on household income? I didn"t see any explanation as to how this figure was established. If it was proportionate to your income I would have been more favorable to voting yes on the various scenarios.
R_27l4a3fUQhp8NlR	8/30/2021 15:40	Thought provoking.
R_1f40lj32taj8YU9	8/30/2021 16:10	poor study
R_4HDwcKqvTEGOCat	8/30/2021 16:44	I enjoyed reading the explanations of any future vote we"ll need to make.
R_1MVRAODsIPkesA2	8/30/2021 16:59	The information we have about the earth in general is not that very old. We cannot justify climate change we we know so little about the cycles of our planet over vast periods of time. Carbon dating is what we rely upon for our information but carbon dating to see in the past in not reliable. You can lab reproduce a specimen that can carbon date to 30,000 to 50,000 years old in a matter of hours in a laboratory. We know so little about the earth"s cycles.
R_2rubJXps8WHTXf2	8/30/2021 17:25	These programs won"t make a difference in my opinion if Countries like China, and India don"t reduce their pollution.
R_21hMIgiKHGJ2DwD	8/30/2021 17:31	Climate change exists. The earth"s climate changes. Humans have an influence. Total cause? No. A brook flows, things get in the way, this causes change like speed/idle,. Humans put things in the brook, more changes, I.e. direction, flow. If humans can put less stuff in the brook, less changes, but there will be changes. This is climateâ¦always changing. Can humans help the change. I hope so. Thank you for your work. Amazing stuff you provided.
R_12QmJ0MgUYR6DGy	8/30/2021 18:25	The idea that cap and trade would pass off expenses to individual households makes the concept unappealing. Corporations are already milking us for everything they can, avoid taxes, grossly underpay their workers, and make exorbitant profits at the expense of the people and the earth. It is unfair to plan a way to further drain us when so many are already barely getting by and now would be expected to absorb the costs of corporations that must change some of their industrial practices to mitigate climate change that they caused by those same greedy short sighted practices. They out source to foreign countries with no labor or environmental regulations because THEY DON"T CARE ABOUT ANYTHING BESIDES THEIR BOTTOM LINE. Now they want the people to absorb the costs accrued from changing a few of their greedy practices? NO corporations need to be held accountable and they can absorb these costs from their profits and bonuses.

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R_3CW1OO4SOeZJNko	8/30/2021 18:38	We here a lot about climate change in the mid 70"s we were told a new ice age was coming than in the 90"s they started saying global warming was happening. The models they produced had no bearing on reality showing incredible increased in heat in a very short time. None of those model"s came close to what has actually transpired. I live on the Oregon coast and if the ocean level"s are rising it must be very slowly because I have walked on these beaches since 1965 and they look no different now in 2021. The last 3 summers I have noticed that fall has started in the month of July with leaves changing color early not waiting for more traditional time like September. The sun is the largest driver of our climate and with the low sun activity we may be seeing a cooling trend over the next few years so spending a lot of time and money on trying to stop climate change maybe we should try to understand why our models do not register reality. Florida and New York City were supposed to be underwater 10 years ago. Far as Green jobs go just exactly what would those be...installing solar cells to generate power...I live on the Oregon coast and I have news for you we have fog all summer long and you can not generate a lot of power from the sun when it"s foggy now you could set up solar cells inland a ways and get some sunlight but than you would have to have power lines to bring the power where it"s needed and what would be the cost and benefit to do that.
R_WccPqH2XGIsAD73	8/30/2021 19:05	I just turned 71. and have seen how the world has changed and from carbon gas has affected are air. the world needs to do some thing to improved the air.
R_3qTZEkALvURB6Vi	8/30/2021 21:13	thank you
R_2rC4eEghAQwbd5B	8/30/2021 21:20	My low score on "informative" is because this is a long-time area of interest for me. I cannot use solar power without destroying magnificent oaks. I believe that carbon pricing may be a fairer system than cap-and-trade. THe main problem is that our military runs on oil, and so we protect our interests abroad in terms of oil acquisition, as well as US$ hegemony for oil purchase and global loans.
R_bEmmlOCVHVEbIad	8/30/2021 22:24	Thank you
R_1CHMlxXjI6Kdzd3	8/30/2021 22:27	Doing this survey made me more informed about the carbon cap-and-trade programs. One is never too old to learn.
R_qxq4nJOeWAP5iO5	8/30/2021 3:50	No thank you
R_1H7FKF8f14GOCf0	8/30/2021 4:54	I really don"t have any opinion but if it"s going to help us all in general and why not go for it
R_12EYzfTrdOs6phW	8/30/2021 9:03	When you ask why I voted against a certain Program, it would have helped if you showed the program alongside my possible choices so I could recall what I liked or disliked about the Program I voted down.
R_CmlEr96Bcd6pqvf	8/31/2021 0:06	good/helpful explanation of carbon cap and trade program
R_VInZyRufBWZkVod	8/31/2021 0:07	This survey is very educational amd a great way to make people take time to think about subjects they most likely never think about . And it"s important for these discussions to take place
R_6FOtjMli5c9n5fz	8/31/2021 10:55	I didn"t like the amount of job loss, and cap and trade seems like it would need A LOT of oversight to manage.
R_3ltwBoNyAQ9Gi7i	8/31/2021 12:20	Thank you for inviting me to indeed my input on your survey. For such a complex subject, this survey was as simplified as much as possible, it seemed to me.
R_3D5DldDmiBYtAV8	8/31/2021 14:19	Great information
R_2378QzL2If1K2aI	8/31/2021 16:08	This survey was a little bit interesting, but also pretty boring unfortunately.

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R_ZE0C31QpP4dLE2Z	8/31/2021 1:32	One thing surveys apply to are people who are married or live with someone and who have children/grandchildren. I have none of those areas. I think adding something like unmarried or single would be good. God has not blessed me with any of that. This whole "title" is completely new to me, but the subject matter is partially new and partially known. I found it interesting that you covered everything from households to small and conglomerate businesses and the employment side. This is exactly what happened in going from moonshine to alcohol being legalized AND from manual to electronic means in homes and businesses like horses/buggies to vehicles. All are massive and global changes. As a point, I try to buy from companies that have a footprint in Oregon even if buying is online. Example is that Amazon has a warehouse in HIllsboro, OR so our Oregonians are employed there. Keeping the spending dollars in Oregon for our folks is important to help to keep our economy more robust now and in the future.
R_1Ii0cbkzBf8FNkM	8/31/2021 3:15	Keep oregon green with a place for wildlife and country folk without taxing their animals. They people life off the land as much as they can and let their neighbors Contribute to think nuggets grown on chickens as chocolate milk comes from brown cows. And when you look for land to developers don"t take the middle of a hay field needed for horses. You may not Think it hurts, there isn"t enough money to buy the hearths and memories of our ansestors.
R_1QLbYXMGUr2GnZx	8/31/2021 5:45	I hope the world becomes a better place.
R_1dHnjxyJHIhJMgm	8/31/2021 7:36	I saw only one option, I thought I was going to see 6.
R_2R2IItuFfuwsYzR	8/5/2021 14:11	None
R_2E5CS03arySfC7y	8/5/2021 14:26	None
R_ZJJyGULqLrB7MSB	8/5/2021 14:37	I"ve never taken a survey like this before. Thankyou for giving me the opportunity to learn a little more from this survey.
R_12MGwe4xCekwKEC	8/5/2021 14:44	I don"t have any feedback to provide at this time.
R_2Cj1h6ounyN3kuP	8/5/2021 15:32	Very detailed
R_1DUdJdrzWz1exSl	8/5/2021 15:36	Hi
R_3EsC8ioOKhara0p	8/5/2021 15:41	Thank you for an opportunity to learn about types of carbon cap-and-trade programs. Its very helpful to knowledge more depth of emissions we need to take a control to reduce climate drastic changes from now on and in the future.
R_85HCxPAzksPVUOd	8/5/2021 16:24	I believe there should be a cap and trade program. Just work out the details to not pass so much on to thr households and make it fair to all.
R_1GH9ImZBsEZYrT9	8/5/2021 16:46	Love the information I received taking this survey.
R_PMNBKjuP6c3d5cJ	8/5/2021 19:22	Very interesting and informative survey
R_DBpkCj8kMpqA08x	8/5/2021 20:20	I have none
R_2qCKIjuQuWZIbG6	8/6/2021 0:10	Thank you for the concise explanations. It really helped guide my choices for votes!
R_3ff3wJu978G3agc	8/6/2021 11:36	Too much reading. Not interested in this enough to be able to keep my attention easily
R_8Aoy3JkceGu7KMN	8/6/2021 12:20	As a former research assistant at the UO, I"m interested in the non-neutral phrasing you used in this survey.
R_2ZIhERL3zY3XAoG	8/6/2021 17:24	Carbon tax isn"t going to help. Has anyone ever heard of the ice age? The dinosaurs lived in a time in the planet"s history when the earth was much warmer on a global scale. Then the ice age happened. About 32000 years ago the earth started moving back to where it was. Nothing humans did reversed the ice age and nothing is related to carbon, that"sa lie perpetrated on people to part them from their money and freedom.
R_1l0n4ok530bomVH	8/6/2021 19:59	No feedback to provide
R_23Wtm3yTF8Et2c0	8/9/2021 21:50	The less time the democrats are around in politics is better for the earth and population.

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R_3exckSvKotu1enA	9/1/2021 10:06	Educational outreach explaining the benefits of Cap and Trade may aid in changing minds of the resistors.
R_2AWPyhnyjkTG7vE	9/1/2021 11:37	Excellent survey truly providing you with information which I need for a better understanding of such subject
R_2PcDo25kzomXtuL	9/1/2021 14:41	I am 89 yo. I returned to Oregon where I was born, after a lifetime doing research. Much of this activity was in atmospheric physics. As a result, I can find no evidence of global climate change, and I believe there is no such thing as a "greenhouse gas". So, who benefits from Cap and Trade? Well, Al Gore embarked on this when his personal wealth was approx. $2 million. he is now worth $200 million according to WSJ. Other Super wealthy Californians have been promoting this scheme for years. We also have to consider profoundly corrupt politicians. Consider the fact that Oregon built a nuclear power plant, and decided to demolish it a few years later. I don"t think we want to entrust such a huge program to profoundly corrupt politicians.
R_1Q0AB2YuTnORvCu	9/1/2021 19:12	I migh5 have changed my vote if options were different order but minimally.
R_3PS2BcRnmT0EJVf	9/1/2021 19:39	All of us must work together to solve Climate Change concerns. I think Oregon"s Cap and Trade initiative to be more fair than other alternatives, and represents a creative means of addressing this very serious issue of attempting to cool the planet down as well as curtail green gas emissions. The cost to individual households in some of the scenarios seem prohibitive. Local and national legislators from both sides of the aisle must work together to creatively pay for Cap and Trade schemes to spread the cost. Poor people simply cannot afford to pay for industry"s greed.
R_yQHeSxqDJjPjVYd	9/1/2021 20:23	It"s was boring and I wish it was something more interesting.
R_3MxHXel5TufumY9	9/1/2021 20:58	Since the industrial revolution began, we are just experimenting.
R_r78NcDpPdvGT3eV	9/1/2021 21:10	Interesting survey
R_3NLjZzj6hjynwsH	9/1/2021 22:22	I like to know
R_2YmFeRxNsbNRxp4	9/1/2021 22:38	none
R_1Ke7t6XCfEBSZ4k	9/1/2021 2:51	Be good to natur
R_1g6pmezq0nRzGoR	9/10/2021 14:53	I like F the best!
R_1NxAKlWEoMasQmp	9/10/2021 3:02	Very interesting and learned a lot.
R_24dsZPPIf2twh1i	9/11/2021 10:32	Great articles made .e.want to vote
R_1rH9tM9VikRAL2t	9/11/2021 12:38	Very in informative, but a little too lengthy.
R_10IuuHdTVbWlQsd	9/11/2021 13:25	Nothing to add
R_2OVH4TYbb7ig4Hw	9/11/2021 13:40	Good survey. Hope the points are there too
R_2zOVDOaakbUb0Iq	9/11/2021 14:35	Stay healthy, stay safe!
R_URwDa8CGkD1YBzj	9/11/2021 18:08	No matter which way the issues go, the consumer will ultimately pay the price. If companies pay more to operate their businesses, consumers will pay more.
R_3pqXN0Maht6QUyL	9/11/2021 18:09	It was a decent survey
R_Xudk6RuHYEkqhSF	9/11/2021 18:12	all good
R_XhSTlBnfthItbbz	9/11/2021 18:36	None
R_2WNcZlTD3WtbA0m	9/11/2021 18:40	Tbh idk
R_3PpFeNIG3xuUsFO	9/11/2021 18:44	A lot of info

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Table G1 – continued from previous page

R_1f0YQHxNMJ3IVOs	9/11/2021 18:56	Climate change sucks
R_3nPFyzMTuNaiobs	9/11/2021 19:02	I dont understand why not allowing other pollutants isnt in every plan . It also does mot make sense to me that if a company sells their permits they would be allowed to pollute more
R_1OCrfH4lvi9NZhc	9/11/2021 19:08	we as a people need to makes changes before it‘s to late.
R_2xyD2PJHI0J62MZ	9/11/2021 19:27	you pay now or you pay later with you"re life. Tax corporations and manufacturers who never pay the fair share of taxes.
R_2QLguR76QsHrTbD	9/11/2021 19:29	I really appreciated how the information was broken down and easy for me to understand about a subject i had previously known very little about.
R_zeDTVB0neIV8aTD	9/11/2021 19:32	I don"t disagree about climate change. But I don"t believe it"s all human caused. I think it"s just part of the normal cycle the earth goes through.
R_3nwrTwSLDOGHSWb	9/11/2021 19:35	In this area goverment making rules that hurt more than help. We have forest fires,bad forest management,and air is not heathly to breathe.
R_1msfcUWF8tjTvIT	9/11/2021 19:37	Thank you for doing this!
R_24pbIwzkKunGd76	9/11/2021 19:43	The survey was very interesting and contained very good information.
R_1GCeTM4Wg170YxP	9/11/2021 20:22	N/A
R_1NC8FhS0MeNkdYl	9/11/2021 20:37	None
R_daIB0wptYpuA0OR	9/11/2021 20:58	Thank you for this survey. It was very informative and helps much more to understand the terminology. I definitely agree that climate change is real and change needs to happen. However, it is also very scary to me as I live on less than $1,000 a month. My apartment is heated with natural gas...if it changes, housing costs are going to rise. They are already high in this area, and so is homelessness. My vehicle is gas powered...if these changes happen, I will have to buy a hybrid...I can"t afford to buy a new car. If we don"t abide by the new changes, insurance and fuel costs will most likely rise. Worst of all, because this is unaffordable, me and people like me will still be part of the problem rather than the solution!
R_a4sbRdSFABCyLqV	9/11/2021 21:01	No
R_33cYLbpj83Txeg2	9/11/2021 21:10	I enjoyed this survey and hope more people get to see it!
R_2uNFnCZhO4d5Qtg	9/11/2021 21:26	keep giving the information more and more are realizing the thruth.
R_3PoZBHNwPzT6DbM	9/11/2021 21:48	I am scared for the future of my generation and the generations that follow. The threat of climate change is imminent and existential, all action that can be taken to slow it should be taken.
R_tYW3BFp5EgYHXDH	9/11/2021 22:06	Thank you for sharing the knowledge and including me on this survey!
R_1ILeHcSACyNHGVA	9/11/2021 22:32	Thank you for letting me share my opinion
R_1JUSgwPKpMkCQLw	9/11/2021 22:32	Good survey and can be very helpful for Oregonians who have no idea on what"s happening today in our world.
R_1oEYM3hpTCeongW	9/11/2021 23:29	It really is scary these times we live in, something has to give. I don"t think for Oregon a personal income tax is fair or right or will solve Climate change.
R_1OC8NbrKq9TaGF0	9/12/2021 0:10	Nothing. Thank you.
R_3dNihX6j8Y5o0Co	9/12/2021 0:22	I like that they care about the environment
R_CdL4MunODwnwwIp	9/12/2021 22:24	No

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R_3CnTPfYkTd6hVzr	9/12/2021 3:18	I could talk about this quite a bit. But I don"t believe climate change is a problem for us. Okay maybe not that it"s not a problem. But I don"t believe that it"s because of humans. I think it"s just another topic to discuss to make a problem to divide us Americans mostly. If globally warming were real how come planets in our solor system have experienced âglobal warmingâ issues with no people living on them. I think after thousands of years the world planets etc are going to slowly make huge impacts on it"s structure. If this was an issue why is it only been talked about now I feel it"s just another reason to get people to argue with each other to divide us. It"s another reason to shut down businesses it"s another reason to charge more money to live here it"s another reason to destroy America it"s all political
R_2QSYdD8eAp5XZKX	9/12/2021 4:10	I believe the carbon tax is a good idea, Teaching and educating the public on better ways to reduce the carbon imprint and effective ways to do it would help.
R_2y7ODnHVaS12eA7	9/12/2021 4:48	thank you for using larger text
R_3J4sY0psGClMm3G	9/12/2021 4:54	its very good
R_3Jsjfu5CEBr5h4I	9/12/2021 5:00	none
R_22Y0Es6EB2CIQZS	9/12/2021 5:58	no
R_1gME3xUE2FlDKU3	9/12/2021 6:43	Took longer than expected
R_1QnBGlvsGVTBPqc	9/12/2021 6:51	When you show a screen asking why I voted for or against the program you showed on the previous screen, why not have that program displayed on the side so I can easily remember what I liked or disliked about it?
R_1pVFxwDvZx7CvRd	9/12/2021 7:47	someone will be making a ton of money from these programs and I guarantee that it won"t be we the people.
R_2YaHSK7tG5V3xnw	9/12/2021 8:16	As I stated climate change is a serious issue and I cannot get passed what the leaders of this country and of Oregon has done to our America and for that reason I would vote against anything they try to pass without believing they are doing it for their own poltical gain. As of today I will never stand by anything our government is in favor of. The leaders of Oregon do not do what is best for communities only what is best for them.
R_3HM23LmPmDdrxUI	9/12/2021 8:56	We all need to take part in reducing our own carbon footprint. Everyone needs to pay their fair share. I need to pay my share for using natural gas and electricity, gasoline for my car. Companies that have more carbon emissions need to pay for what they are polluting. I say auction all permits and every year increase those costs. We will need to force a replacement for or build governmental industries. God made us highly intelligent and even though we knew it was wrong we have taken shortcuts to improve our bottom line when we knew it affected our environment. Time to stop it and I believe the government could have prevented most of this had we not allowed certain industries in our country.
R_2AHfoycVmeePqvE	9/12/2021 9:06	$215 more money per household will just make it harder for the average long-time Oregonian. Our state is so wrongly taxed in so many ways. Make takes equitable–whomever uses it, pays for it. I"m a lifelong Oregonian and instead of this idea, charge people to drive like the DOT has brought up. More and more people and cars is a real problem–start charging people auto taxes for the amount of miles they drive. Whomever drives the most, pays the most!!! This would also reduce traffic on our roads. I work full time and drive less than 5000 miles/yr in my auto and always have for 40+ years. Most people drive like 25,000 miles or more. Charge them by the mile!! That will reduce a great amount of Carbon Dioxide. Charge the autos coming across our boarder of Oregon a toll coming in—just to pass through, etc.
R_3IYPlQFDFPB56PZ	9/12/2021 9:33	I"m not sure any of this will work we don"t have control over the world
R_1rwDgn5RmqKumGR	9/12/2021 9:37	I will not support any kind of legislation that doesn"t allow me to vote on it.
R_3szXx1cJ0PUv9eV	9/12/2021 9:41	nothing in particular
R_3LXbAc7jfjdody0	9/13/2021 15:54	The survey was very informative
R_210Ucx2ibaWuSad	9/13/2021 20:35	I learned a lot, and appreciate the education.

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R_1pSWnPYlVwNryaO	9/14/2021 10:06	nothing to add
R_1n0faYTbDoN1gLj	9/15/2021 20:43	Thank you for an educational and bias free delight of a survey
R_cGtCHA9oTFvGG2d	9/15/2021 7:14	None
R_3qJ784TDNlpAvwo	9/16/2021 22:47	Gfsk
R_vrf7Xr7FQSSHV7j	9/17/2021 10:50	If this is going to be coming soon, I would love to see more information advertised to the public. This is the first I heard of this.
R_2Bhbp15dgtrnFjg	9/17/2021 13:43	Fantastic Survey! Thank for all of the knowledge!
R_1OUnXuidmAVogLj	9/17/2021 15:54	n/A
R_1mVrzLkA1TXmjZM	9/17/2021 16:02	thx
R_30tPCDNGnPqLudG	9/17/2021 19:50	nope
R_0wDwXruSMOQyGo9	9/17/2021 8:53	Thank you
R_3vXW4rq4MC1ZXtn	9/18/2021 0:54	Great survey thanks
R_2S6yP1EmPMvq7a9	9/18/2021 11:01	I like how people start to know more about the climate change
R_1q1CGARVCS4LzDo	9/18/2021 11:30	Raising taxes doesn"t change the climate.
R_ON06GR2PJTE3qbn	9/18/2021 14:15	Very good
R_1C91E8CWsQO9Zmj	9/18/2021 14:59	Thank You!
R_2SH9o6smP4At0kO	9/18/2021 16:33	The most informative survey I have ever taken. The survey had more information that could be absorbed in a few minutes that I have read. Very well done.
R_3FQYNyEjh7C1MAA	9/18/2021 1:52	Try to reduce the use of disposable products and drive as little as possible
R_Y9NeH2ZSy5TP4rv	9/18/2021 20:32	Fun survey
R_4NqpU8jHkdQsRP3	9/18/2021 20:41	I am very active in the CUT-OUT of Pollution in our environment due to the fossil fuels and I personally ride my electric longboard to and from every single location that I have to visit each day. I STRONGLY SUPPORT the TRANSITION to GREEN, Electric and non pollution causing ways to cut out any unnecessary waste and trash on Earth
R_2sTlURbPq13cPAs	9/18/2021 22:28	Thanks for the quick surveys
R_3HMr1AGpWDAhzBD	9/18/2021 8:27	we all have to act before it"s too late
R_33dkQZ44qH7r4KG	9/19/2021 0:23	I really like the subject that this survey was on. I wasn"t sure what content you guys were going to offer at first. I live in Eugene Oregon and gaining awareness on Climate change is very relevant in the community. Carbon emissions are one of the main culprits of climate change
R_Og9CNpHkegKuiQx	9/19/2021 11:09	U should give some available answers that u don"t agree with so people can tell more of there truth
R_ZqSFF09fbx9UEk9	9/19/2021 17:21	Hey this was propaganda to scare people about climate change to force them to vote on cap and trade.
R_1FnT4sMVd7Xhlm7	9/19/2021 22:17	I definitely liked the survey. I just wish it was a little bit more informative but it really is relevant to today"s life

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R_3pi12WtTSC0GMs9	9/19/2021 2:24	I think we are humans need to not take away the jobs that built the society we all live in and enjoy and actually develop new ways to do those Jobs that are actually not creating emissions and as humans we need to start thinking about how to relocate because the plants already ruined and we all have made our way of life so important to our lives that it"s not going to change easily and we should put our energy and efforts elsewhere
R_0BXMBnN4C2COmgF	9/2/2021 0:24	it is very important to talk about this topic and climate change
R_bNtmqSu2RXya7vz	9/2/2021 10:28	No opinions that you would care to hear about.
R_2dnBHjewMtXF81W	9/2/2021 11:29	Grubhub hun
R_2qgi2piRy6g5CbD	9/2/2021 12:57	I know climate change is a big problem but this bill if passed would hurt a lot of small businesses
R_25BMUa2aAH24eXS	9/2/2021 13:37	Thank you so very much for the opportunity and letting me do this survey. It was very informational very thought-provoking and I enjoyed it very much thanks again! ð
R_2tsqy2shEdJeigp	9/2/2021 14:43	Wish there"s more surveys like this was interesting to more more about carbon caps
R_exJbLTDOxI7PvdT	9/2/2021 16:27	Nothing more to add at this time
R_3k4wvcx7JcdXz1R	9/2/2021 18:24	No thanks.
R_28LJHAU4y0Um3Yx	9/2/2021 1:07	None
R_22QuiTZaD7PkK6v	9/2/2021 20:04	No thank you
R_3NHSEsLNtXrEwDi	9/2/2021 20:56	Cape and trade is horrible. And horrible for the people of Oregon.
R_20Zmsyfw6mTryob	9/2/2021 23:31	Great
R_3g2bjgudbB3Fw0D	9/2/2021 4:11	Thank you for the information.
R_2rSgneCyYAy9FWT	9/2/2021 9:04	Really interesting survey. This topic has been on my mind lately.
R_21v5CzBxkyQYMuQ	9/20/2021 17:02	great survey
R_ah2gOSIdV3pOBuV	9/20/2021 18:45	I live it everyday and never give up. Oregon is the best.
R_zVe4VQQDwvAoVXz	9/20/2021 9:11	Feedback
R_3qeNTMCWI5qLe1c	9/21/2021 19:01	It was a good survey
R_11XeHjGAwY1BN3Q	9/23/2021 8:50	Not at this time.
R_3g8icvurnMqZDpl	9/24/2021 10:39	Thank you.
R_3knCXD2QwWTvCHi	9/24/2021 14:15	Great survey, thank you for the neutrality.
R_9pHs6JsJitUyJwJ	9/24/2021 19:51	Sounds like a beneficial plan to lower carbon emissions.
R_2eXAJ6nNzLG4y0t	9/24/2021 8:45	Thank you
R_1Iddg9kNrIbafRX	9/25/2021 22:08	Great
R_1rBPzFS1dlhdAIa	9/25/2021 3:29	No thanks.
R_2TXmXgzL7XaXM5h	9/26/2021 20:54	I seriously doubt that ANY carbon regulation in the US will have any impact so long as China continues to outpace everyone on gas emissions and the global community does nothing to stop them.
R_1kSsjEFlFB2Rseh	9/28/2021 16:33	It"s always nice

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R_ezfeHKQ9IHQwtnb	9/28/2021 21:41	N/A
R_2QPq1KimVM9xgay	9/28/2021 23:26	The survey was great
R_3HFvfCGLNLgkm7i	9/28/2021 2:28	Environmental protection does not affect the work and rest of Americans all the time, and carbon emission is a major factor affecting the environment. We should pay attention to this matter, jointly improve the ecological environment and protect our home
R_1LUzbnVzYIDFlKr	9/3/2021 0:11	Perhaps if you lowered my taxes I could afford $3000 per year higher expenses for your carbon dream. Portland is becoming so expensive, we really can"t afford paying more! Our sewer bill just went up, our water bill is more expensive this year, electric, nat gas... Now oil and gasoline are going up. When does the little guy get a break? When do tax paying citizens benefit from all the liberal programs Oregon government puts into place? You build the Max that no one rides and that I continue to subsidize. Why not charge people the actual cost of a max ride and let me keep my money? Until you can figure out a way that your idea will financially benefit me, I"ll always vote no on a new government tax.
R_3NEwJ2fuKArf8y6	9/3/2021 10:32	Es interesante
R_3plJRXtB9DlLX7a	9/3/2021 10:55	Well thought out and easy to navigate survey. Best I"ve seen on the platform
R_eyNohCmYbAWhsaZ	9/3/2021 11:07	Great survey
R_3qTLc0OSSpd9cO3	9/3/2021 11:40	Thank you for informative and educating information! This is very relevant to me and my community!
R_vDjTixxhBkxgkyl	9/3/2021 12:20	This survey was really cool
R_1f46Dl4TVYyXuBE	9/3/2021 17:10	This was an intense survey, with a lot of information. I wondered about the use of images (like the first image of fire, or the images of polluted sky or protests), as it seems like they really push the cap-and-trade/pro-climate change viewpoint (which I agree with) and make the survey less objective, or possibly make people more on the conservative side of things less likely to complete it.
R_27QcxYRCuH797pM	9/3/2021 19:00	I"m very interested in the program and support it if it is affordable for us or our home. We are on a limited income, and can"t really afford the fees per home or the possible expenses of the plans. The $90.00 was really pushing it.
R_2fjrJozpXM4LfFd	9/3/2021 21:08	I love surveys like this!
R_3CKs7r7G3yD6RQb	9/3/2021 22:25	This was a great survey! I loved all the information that was given
R_2rITLkclGl5ZBkR	9/3/2021 23:14	Offer a company solutions, or make the new company have a permit before even building. Make economic electric cars more affordable.
R_1OT8EgOXDKb8rGH	9/3/2021 8:52	It was very informative
R_25sXmYBvd5NGnzC	9/4/2021 12:13	Thank you
R_qX9HtSBy8YQUsZX	9/4/2021 14:12	None
R_24uXB9bRVnJMTnB	9/4/2021 15:14	Interesting and relevant
R_5uQCQ3ZLRTSmSFr	9/4/2021 16:37	The biggest thing glossed over by the green energy proponents is the additional cost of the greatly larger number of jobs required to make the same amount of output. Seems pretty stupid from a practical standpoint to not highlight this context. It is always sold as a good thing to create additional jobs, while ignoring the ineffeciency.
R_3JlMlssvr2DwVkI	9/4/2021 18:03	Cap and trade is a scam by Democrats to Try to control and take more money from people.
R_2TNPCfRSQoYrvZl	9/4/2021 18:36	Program F would be the best choice.

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R_RPq2lwsGGUzKImJ	9/4/2021 19:09	1) Letting companies but sell or trade these permits is a bad idea. Why, because the bigger polluters are the biggest cash makers. at 2 to 2.5 percent a year reducing pollution. It will be five to ten years before we see much locally so why give the worst a way to prolong this level of pollution. 2) The areas in industry that pollute the most and the stuff we consume of these needs to be looked into with the of removing say plastic wrap for plastic bottles. 3) Everything the household does daily when being ecological is by choice, so why can"t we not work on cutting down on what will go to the dump.
R_330V6RVSQA9UTVb	9/4/2021 19:16	So many families are truly struggling in my community. While we ALL should be concerned about our planet and take responsibility for our part in caring for it. It is hard to support something that could make it even harder for people to survive. I do not want to see even more people lose their jobs, and possibly homes.
R_0UuPWpNlXlhuWUV	9/4/2021 19:49	Cap and trade in any form is horrible. And wrong for Oregon. Govt cant manage money they have now, you think they"d actually give back with any of this money?!?! So what if you add jobs, what do you tell the peoples who"s livlyhood you took away?!
R_2dfNuYPPLlJak4G	9/4/2021 23:26	Oregon gets something like 70% of its power from Hydro. Why are you whining about carbon credits?? Just convert to electric and build more hydroelectric dams.....
R_3EGzsy7bX1StmIa	9/4/2021 8:52	Interesting made me think
R_1lmJdPBIi7oWPmG	9/4/2021 9:59	great, fun survey
R_3O3A5jOo82C2EhT	9/5/2021 0:47	The information was well-explained to where I was able to understand it, but in a way that kept it short and sweet. It was unbiased and allowed me to feel free to be able to think and vote for myself, and really stressed and pushed that, which I greatly appreciated. It was really informative, too, and I learned about something new that is important and relevant to me, and I had some fun learning it! Great little survey, and thank you for letting me be a part of it! Keep up the good work!
R_2qwv5FKBuKUS6Ys	9/5/2021 12:59	No feedback
R_1DYAH7I5j05q2AP	9/5/2021 13:26	This survey was really good
R_21mFgeaDQR1Y3pl	9/5/2021 13:52	Great survey, I think students across Oregon would benefit from doing this!
R_3Nwwf2wIt1X2MgG	9/5/2021 15:45	Love it. Let"s do something.
R_3jTgNtd18whjiQt	9/5/2021 15:57	It is horribly offensive to ask someone what their gender is. I do not have a gender. It"s like asking someone what kind of soul they have. I not only do not believe in gender identity, but the idea of having a gender is traumatic and oppressive to me. Ask for a person"s sex, not their gender. Not everyone has a gender, but everyone has a sex.
R_1LksNedMrRlXHJl	9/5/2021 16:02	i loved this survey because i learned so much
R_ptUj6kNFcHfJ7nr	9/5/2021 16:30	Nothing to add
R_Du9qKOpKxIk84Uh	9/5/2021 16:57	I am all for being more green but it shouldnt cost more prices are already way too high natural should cost less.
R_egmfq0XcmXyPqP7	9/5/2021 17:28	Carbon cap is being placed in the wrong area. Oregon has gone down in pollution, maybe not much but we have by something like 1% or more where russia and china has gone way up. Force them to make a change and stop punishing the ones who are doing something already about it! We can not make up for someone elses failures all the time!
R_2TZPmYmuBzj09O0	9/5/2021 17:53	My beliefs are the earth is going thru a heat cycle. Accelerated by humans. We have only been keeping record of temps and climate for such a short time compared to the age of the earth. There have been several Ice ages and I dont believe SUVs melted that ice.
R_0BcSOTqNTUM0RGN	9/5/2021 18:06	This was very informative.
R_28P2Re1hXI7HH99	9/5/2021 18:22	Great survey and information.
R_26gtTGfkKC29Gta	9/5/2021 18:25	Thank you that was very interesting, i actually never thought about a cap and trade program

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R_29ib5QsxH9i0wsi	9/5/2021 18:57	Carbon cap seems like good idea although I think there are too many variables to get it done
R_2Bqv6w7gE6cK7WZ	9/5/2021 19:07	thank you for this very important work!
R_1gS0e0EHMxJO0MV	9/5/2021 20:21	I love it hope we get more like this
R_3iDyvfJpYmIQYBm	9/5/2021 20:49	Thank you so much for sharing learned alot
R_OvSrQNT5vE2Ua6R	9/5/2021 21:30	I think equipment purchase assistance for small businesses is really important. Also not related to this exactly but towns like Eugene need to stop allowing healthy trees to be cut down. Also it seems that usable buildings are allowed to be demolished to building apartments. Seems so wasteful. Institutions are short sighted.
R_5zQWU4Q4mTaId1v	9/5/2021 8:58	Thanks for this vital research.
R_3RrzKSqJAWASVPx	9/6/2021 0:52	In general I am in favor of caps but not so much the trade portions. I can see big business who is polluting the most affording the extra permits to allow them to continue business as usual.
R_3sBsskYLokFTnru	9/6/2021 11:03	No feedback at this time
R_w1NRVJLsxkga0gx	9/6/2021 12:32	It was great
R_1pA8ZoTe4CtgilE	9/6/2021 14:10	Good survey
R_yD6H7PA8coV6uU9	9/6/2021 15:05	Thank you for the information
R_VOspZbegC8uQWfD	9/6/2021 17:10	Thank you
R_3PHPv1C3YX9HqvL	9/6/2021 17:43	N/A
R_6X8JGrU2ko6qcrD	9/6/2021 19:24	Good stuff bud
R_sETUVATtYiL7f57	9/6/2021 7:01	C & T is another government scam to fleece more revenue $$ to alleviate their addiction to tax & spend stream. Special interests have lobbied our elected officials into their pocket. The âScam-demicâ was planned and is rolling along.
R_2bT9RprI1Db9roi	9/6/2021 9:00	I am very surprised that this survey was the work of only ONE graduate student & ONE professor. This was quite a lengthy & complex series of statements that were WELL ILLUSTRATED and with copyright credits for every photograph! The optional pop-up explanations were very helpful to me, particularly since I had not heard of some of these nuances of CAP & TRADE before today. I felt that the competitive plans that I was asked to review & vote on were NOT trying to shift my opinion, but were rather objective, each in their own standing! I personally have previous experience, decades ago, in survey design, implementing surveys & survey tabulation, so I have a fair understanding of what sort of work the Economics student & professor still have waiting ahead of them, as you collect response from this very interesting survey. I wish you a lot of success on this project, and I honestly hope that Oregon"s legislators of BOTH political parties read & absorb the results of this survey. [...self identification omitted...]
R_2lOJCSp3OVluzrr	9/7/2021 14:13	I"m glad I could do something that might be useful in the decision making
R_2vZCnNj2UzXj5zP	9/7/2021 16:06	Survey worked great very enjoyable to fill out and complete.
R_3qsMa7ckN5ffKrD	9/7/2021 7:41	Carbon cap sounds like a great idea. Trying to implement it would be had to do.
R_3m7CuDV0LNlwAfS	9/8/2021 16:39	Thank you for taking action. Any of these plans is better than none. One wonders about the morality of allowing an undereducated electorate vote on the existance of the species.
R_2qsFN8eN4CXd432	9/8/2021 21:44	Fun time with the Surveys
R_2B8VbeyewZu3mpR	9/9/2021 10:00	Liked how much info there was to learn
R_2PnStK3FSehCubT	9/9/2021 10:59	wow - I sure learned - and understood a lot of information. This will be a VERY hard problem to solve - and it will sure NOT be able to please everyone!!!