

When Will People Pay to Pollute?

Environmental Taxes, Political Trust, and Experimental Evidence from Britain

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Abstract

Previous studies have argued that political trust shapes public opinion with respect to policies for environmental protection, but this paper provides the first evidence that the relationship is causal. The paper presents results from survey experiments investigating conditions under which Britons are willing to pay taxes on polluting activities. Public willingness to pay increases sharply if new environmental taxes are offset by cuts to other kinds of taxes, but political distrust undermines much of the effect of this revenue-neutrality. People are also no more willing if revenues are hypothecated for spending on environmental protection, while making such taxes more tangible to people—by naming petrol and electricity as specific products to which they will apply—has a modestly negative effect.

Keywords

Environmental taxes; political trust; survey experiments; multilevel models

*See the attached file “code for When Will People Pay” for full R code for replicating all analyses reported in this paper, and the web location from which the data can be downloaded.

Put in the context of the political unpopularity of new taxes, the fact that any major environmental taxes have been introduced becomes remarkable, rather than the fact there are so few.

- Mark Pearson, OECD, 1995

Natural scientists have no doubt that pollution and resource use by humans is transforming the earth in ways that are fundamentally unsustainable (Rockström et al. 2009; Stern 2013). This is all the more tragic given that many such transformations are unnecessary: policy experts point to effective, low-cost solutions (e.g., Tietenberg 2013). Above all, mainstream environmental economics recommends that governments attach a price to polluting activities, in order to discourage polluters from imposing (externalising) the costs of their polluting activities onto others (e.g., Parry, Norregaard, and Heine 2012). Correcting the price a polluter must pay to engage in a polluting activity using a tax or obligation to surrender a tradable emission permit should be a cost-effective means of protecting the environment and maximising social well-being (Mirrlees et al. 2011; Pearce 2002; Rajah and Smith 1994). In practice, where such market-based mechanisms have been introduced, their record has generally been excellent.¹

Yet they are not actually being introduced very much. The environmental tax share of all public revenues in the European Union barely changed between 2006 and

¹ The U.S. SO₂ trading scheme and British Columbia's carbon tax are two examples of market-based measures for environmental protection that have proven extremely effective (Elgie and McClay 2013; Schmalensee and Stavins 2013). The European Union's Emissions Trading System is sometimes held up as evidence of ineffectiveness, but that scheme's failure to attach a meaningful price to greenhouse gas emissions was due to the unanticipated economic contraction of recent years, and the resulting surplus of allowances (Sandbag 2012). Overall the EU has been achieving substantial greenhouse gas emission reductions (European Environment Agency 2015).

2013 (Eurostat 2015), for example, and has generally been falling since the mid-1990s (Stamatova and Steurer 2013). In the UK specifically, revenue from environmental taxes peaked as a share of all total taxes and social contributions in 1998, and has changed little since 2001 (Office for National Statistics 2015). Given the growing scientific consensus about the seriousness of many environmental problems, and the slowly expanding evidence base validating the effectiveness of market-based instruments for environmental protection, why are governments making so little use of them?

One major reason is public scepticism, if not outright hostility. Public opposition to new environmental taxes has been the norm, and has killed efforts to introduce market-based mechanisms in places such as Australia (Baird 2014), Canada (Harrison 2012), and Switzerland (Maclucas 2015; Thalmann 2004).² We therefore need to know more about the sources of public opinion with respect to environmental protection generally, and how to present problems and solutions such that public opinion will allow states to take action (Keohane 2015: 24; see also Jagers and Hammar 2009). This paper aims to expand our understanding of conditions under which people are less hostile, and more open, to proposals for environmental protection using the market-based mechanism that is environmental taxation. The results in the paper should be of interest not only to scholars of environmental politics and public opinion, but also to policymakers and advocates seeking to foster public support. Methodologically, in using experimental evidence about the sources of public support for and opposition to market-based measures for environmental protection, the paper stands in contrast to most existing literature, which has relied on analyses of

² Some governmental reluctance to engage in better environmental protection is clearly due to lobbying by firms with an interest in externalizing their environmental costs (Farrell 2015); yet businesses are also sometimes open to the introduction of new environmental policies (see e.g., Pulver 2007; Vogel 2000).

observational data and has therefore been more vulnerable to the risk of omitted variable bias.

The headline result of the experiments presented here is that offsetting new green taxes with cuts to other kinds of taxes substantially increases public support, but framing revenue neutrality as merely a government promise rather than a fact substantially undermines the positive effects of offsetting.³ Stating that the new green tax revenues are to be spent on the environment has no impact on support. Making the increased taxation more real to people by pointing out that it would apply to goods and services they purchase also has no effect, unless reference is made to the taxation of petrol and electricity, in which case support declines.

The substantial impact of framing revenue-neutrality as a promise rather than a fact represents the strongest evidence yet that political distrust is an important reason for people's scepticism of market-based measures for environmental protection. Green tax increases are typically implemented in tandem with offsetting tax reductions elsewhere (Tietenberg 2013), often with the objective of winning public acceptance, and the results here validate that revenue neutrality should indeed be a powerful means of building support. But majorities of citizens in all countries appear not to believe that politicians keep their promises (Naurin 2011), and there is clearly widespread scepticism that revenue-neutrality will materialise in practice. As such, convincing the public to trust that governments will keep their promises on revenue-neutrality is a key challenge for environmental policymakers and advocates; seemingly, until voters are convinced, they will remain hostile.

³ This paper uses "green taxes" and "environmental taxes" interchangeably.

Background/Context

The European Union defines environmental taxes as those “whose base is a physical unit (for example, a litre of petrol or a passenger flight) that has a proven negative impact on the environment” (ONS 2015). By this definition, environmental taxes in the UK summed to £44.6 billion in 2014, representing 7.5% of all public revenue from taxes and social contributions, with households paying an average of £765 each for environmental taxes in 2012 (*ibid.*).⁴ Britain is fairly typical in the OECD in terms of the environmental tax share of all public revenues (see Parry, Norregaard, and Heine 2012: 103, citing data from OECD 2010).

What would it take to increase this share? Politically, there is a measure of public “support, consensus, or even merely passive tolerance that is essential to the introduction of any new, large-scale tax,” including an environmental tax (Pearson 1995: 358). Though the rationale for taxing environmental externalities was first articulated in the early 20th century (Sandmo 2015), environmental taxes have only really been implemented in more than trivial ways since the 1980s. Public opinion has not been supportive, however, and has not encouraged policymakers to put in place more such measures. Taxes remain an unpopular way of addressing environmental problems, even if they are a relatively popular kind of tax (Jagers and Hammar 2009). Environmental taxes are unpopular because all taxes are unpopular (Chartered Institute of Taxation (2009, cited in Smith 2009).

There is a rapidly expanding research literature on environmental attitudes generally. A number of works in sociology, for example, have addressed the demographic correlates of environmental concern, defined as “concern about environmental problems and support for environmental protection” (Dunlap and York

⁴ Such taxes include the UK’s climate change levy, aggregates levy, landfill tax, EU emissions trading scheme, carbon reduction commitment, and carbon price floor (ONS 2015).

2008). Such studies have focused largely on the importance of income (at both the national and individual/household levels), as well as underlying general values (e.g., Fairbrother 2013; Franzen and Vogl 2013; Shwom, Bidwell, Dan, and Dietz 2010). Beyond the demographic characteristics of individuals that correlate with different kinds of environmental attitudes, though, we still know little about the substance of the beliefs that lead people to hold the attitudes and preferences they do.

This article addresses support for market-based environmental protection mechanisms, building on a number of prior studies that have made good use of questions about taxation. Survey questions about a respondent's "willingness" to pay taxes admittedly leave somewhat implicit the scenario in question, but most respondents would seem likely to understand that the question is about a potential tax *policy* change, not about whether the respondent will choose individually to cheat on his/her taxes. As such, this is a different issue than tax compliance (on which see for example Bodea and LeBas 2014; Marien and Hooghe 2011). Questions about taxation are also useful insofar as they interrogate people's valuation of environmental protection at some cost (Cao, Milner, Prakash, and Ward 2014: 302). In the absence of any trade-off, supporting environmental protection seems a given. What is more useful, then, is understanding whether people support it strongly enough to pay a price, which tells us something about the strength of their commitment.

Setting aside relatively fixed demographic characteristics of individuals, what we currently know about the conditions under which people are more supportive of environmental taxes comes largely from public opinion polls little connected to the academic research literature. Probably the most extensive previous investigation of public attitudes towards environmental taxes was conducted by a self-styled "Green Fiscal Commission" (GFC) in Britain in late 2000s, which paid for a series of surveys

on the issue. The discussion that follows makes substantial use of the results of that work.

In the remainder of this section, I derive five hypotheses based on what literature there is on attitudes towards environmental taxes.

First, the Green Fiscal Commission (2007) found stronger support for green tax increases accompanied by offsetting reductions to other taxes. One study using data on Americans, similarly, found that support for a carbon tax specifically rose when it was tied to offsetting reductions in income tax (Ansolabehere and Konisky 2014). But questions remain about the robustness of this relationship, particularly as many people may not understand how a revenue-neutral tax shift could be beneficial for the environment.

Hypothesis 1: Offsetting environmental tax increases with tax cuts elsewhere will increase willingness to pay.

A “Green Tax Report” by the Chartered Institute of Taxation (2009, cited in Smith 2009) argues that hypothecation of revenues for spending on environmental protection should increase public support for green taxes. Similarly, specifically with respect to projects for reducing greenhouse gas emissions, the Green Fiscal Commission found greater support if taxes were hypothecated.⁵ And the House of Commons Environmental Audit Committee (2011) says that “even partially

⁵ In one survey in 2007, the Green Fiscal Commission asked a nationally representative sample of respondents: “In principle, do you think you would support or oppose green taxes?” 51% reported support, and 32% opposition. They then asked: “What if there was a guarantee that the money generated by the extra tax was spent directly on projects that would help to reduce carbon dioxide emissions—for example, the money could be used to subsidise public transport or home insulation. In principle, would you support or oppose an increase in green taxes if the money was spent in this way?” 73% reported support, and only 17% opposition. So telling people that the tax revenue would be dedicated to spending on the environment increased support for the new taxes.

hypothecating revenues from environmental taxes for environmental ends can also help to build greater acceptance.” In the case of an energy tax change in Germany, for instance, some members of the public “demanded that energy taxes be used to promote energy savings and subsidize public transport” (Kohlhaus and Meyer 2005: 141, quoted in Harrison 2010: 519-20). In short, people may feel environmental taxation is more legitimate if the associated revenues are spent on the environment. That may be because they do not understand how a tax can be environmentally beneficial (through its incentive effects)—thinking rather that spending is the key to environmental protection.

Hypothesis 2: Hypothecating the revenues from increased environmental taxes for spending on environmental protection will increase willingness to pay.

Another reason people may be hostile to proposals for new environmental taxes is that they do not trust that governments will implement them fairly, and as they promise to do—such as in tandem with offsetting cuts to other taxes. As the Chartered Institute of Taxation (quoted in Smith, 2009) notes, “people do not trust governments to implement the environmental taxes in a fiscally neutral way.” Instead, people regard taxes on energy for example as “stealth taxes”: an Ipsos MORI poll in 2008 found for example that 59% of Britons agreed that “climate change is being used by the Government as an excuse to raise taxes” (Ipsos MORI 2010: 67). And Harrison (2012: 393) notes that even in the case of British Columbia—where a carbon tax has proven politically sustainable—“voters simply did not believe the government’s reassurances that the tax was revenue neutral” (see also Shwom, Bidwell, Dan, and Dietz 2010: 480). Survey data analyses point to trust, including political trust, as a

significant correlate of support for action on environmental issues generally (e.g., Franzen and Vogl 2013; Meyer and Liebe 2010). Trust has long been linked to collective action, and environmental protection is inherently an effort to resolve a collective action problem (Duit 2010).

Two possibilities, then, are that respondents could distrust that governments will fulfil their promises to make new green taxes revenue-neutral and/or to use the revenues they generate specifically for spending on environmental protection.

Hypothesis 3a: Framing the dedication of revenues from environmental taxes to spending on environmental protection as a government promise will reduce willingness to pay relative to framing it as a fact.

Hypothesis 3b: Framing revenue-neutral offsetting as a government promise will reduce willingness to pay relative to framing it as a fact.

Another informal finding from existing research is that people “externalise responsibility” a great deal (e.g., Lorenzoni, Nicholson-Cole, and Whitmarsh 2007). That is, they do not regard themselves as “polluters” and avoid confronting their own contributions to environmental problems, blaming corporations and governments (or even just other ordinary people) for such problems instead. As such, “most people ... do not accept that the main responsibility for taking action against climate change lies with individuals and families” (Gough 2011). It may then be the case that respondents respond more hostilely to proposals for environmental taxation the more they are confronted with suggestions that their own lifestyles have environmental costs.

Hypothesis 4: Drawing people's attention to the fact that environmental tax increases will apply to their consumption and spending will reduce willingness to pay.

Lastly, some previous studies have suggested that support for environmental taxes is particularly low where the tax will apply specifically to domestic energy and vehicle fuels (Green Fiscal Commission 2009; Hsu 2010; Jagers and Hammar 2009). Similarly, Shwom, Bidwell, Dan, and Dietz (2010) note that taxes on petrol have been the least popular policy measure, by far, in the two U.S. states they consider. In the case of the UK, the taxation of energy specifically is quite heavy (second highest in the EU), with most of the tax burden falling on households (Stamatova and Steurer 2012).⁶ Yet transport fuels and home energy are generally quite polluting, and so are likely candidates for environmental taxation.

Hypothesis 5: Drawing people's attention to the fact that environmental tax increases will apply to their consumption specifically of petrol and electricity, two products to whose prices people seem particularly sensitive, will reduce willingness to pay.

Methods

Social scientists are making growing use of survey experiments to understand the public's attitudes towards environmental degradation and protection (e.g., Bernauer and Gampfer 2013; Bechtel and Scheve 2013; Tingley and Tomz 2014). No such experiments, however, have investigated the impacts of political trust, and few

⁶ Mirrlees et al. (2012: 669) note that: "taxation of gasoline and diesel is the most substantial excise tax in the United Kingdom, accounting for 5 percent of all tax revenue."

have addressed conditions under which people are willing to pay to pollute (for one very recent example see Kaplowitz and McCright 2015).

I designed an experiment in which each respondent to a nationally representative survey received one of several different versions of a commonly used opinion question about support for environmental protection. The question specifically investigated support for environmental protection in the form of taxation, the base version reading: “How willing would you be to pay higher taxes in order to protect the environment? Not at all willing, not very willing, fairly willing, or very willing?” The International Social Survey Programme has previously used this question, across multiple waves, and another question somewhat like it has also been included in the World Values Surveys/European Values Studies.⁷

Respondents were randomly assigned to five treatments in ten different combinations—see Table 1 below (and also Appendix A, for the complete wordings of the ten different versions of the question). The five experiments running simultaneously investigated the impact on people’s responses of:

1. Stating that new environmental taxes would be offset by cuts to other taxes. (According to hypothesis 1, offsetting should increase support.)
2. Stating that new revenues from environmental taxes would be spent on (unspecified) programmes for environmental protection. (According to hypothesis 2, hypothecating should increase support.)
3. Drawing respondents’ attention to the possibility of the government not doing what it says, in having only “promised” to spend the tax revenue on the environment and offset the new taxes. (According to hypothesis 3a, only

⁷ The wording in the ISSP was very slightly different: “How willing would you be to pay much higher taxes in order to protect the environment?” The WVS/EVS question was: “I would agree to an increase in taxes if the extra money were used to prevent environmental pollution.”

promising hypothecation should reduce support compared to it being a fact.

According to hypothesis 3b, only promising to offset new taxes should reduce support compared to it being a fact.)

4. Emphasising that respondents themselves contribute to pollution, through their consumption, with the implication that new environmental taxes would affect the cost of things they buy. (According to Hypothesis 4, making environmental taxes more concrete should reduce support.)
5. Pointing out two specific products to which new environmental taxes would apply (petrol and electricity), and suggesting the prices of these already heavily taxed products would rise. (According to Hypothesis 5, taxing petrol and electricity specifically should reduce support.)

The experiment was conducted as part of the UK Understanding Society Innovation Panel (IP), a longitudinal survey representative of households in Britain (excluding Northern Ireland and north of the Caledonian Canal). The first wave of the Innovation Panel ran in 2008, and since then participants have been re-interviewed annually. The sample for the seventh, 2014, wave (IP7) consisted of households from the original 2008 sample as well as from refreshment samples added in 2011 and 2014. The data can be obtained from the UK Data Service.⁸ IP7 generated interviews with 2413 individual respondents, 2236 of whom provided valid responses to one of

⁸ Each wave of the IP entails both a household interview (conducted with one member of the household) and separate individual interviews with every member of the household (covering topics such as demographics, religion, health, employment, education, and politics). The household bill-payer or his/her spouse/partner (or another appropriate person) completes the household questionnaire, which includes an enumeration of all household members. Only household members aged 16 and over are interviewed in full, and received the environmental taxation experiment.

the ten questions about environmental taxes.⁹ The allocation into treatment groups was done at the household level, so all eligible adults in a household received the same treatment/question.¹⁰

The analyses below also take advantage of other data collected as part of the Innovation Panel. In particular, I investigate relationships with a number of key demographic and/or non-experimentally manipulated attitudinal variables. How do the effects of the randomly assigned treatments vary by people’s background characteristics?

I measure people’s belief in climate change with an index comprising two questions about the past and the future:

- “As far as you know, would you say that average temperatures around the world have been higher in the last three years than before that, lower, or about the same?” (AVTEMP)
- “Do you believe that people in the UK will be affected by climate change in the next 30 years?” (OPECL30)

I take a response of “higher” to AVTEMP as stronger belief in climate change (since the scientific community agrees that the planet has been warming—see e.g.,

⁹ There were 101 don’t knows, refusals, and missing. For 76 respondents, another household member provided information about the respondent, rather than the respondent him/herself; these proxy interviews are excluded from the analyses. Of the 2337 non-proxy interviews, 1581 were conducted face-to-face, 4 by telephone, and 752 online. The 2413 respondents were members of 1427 different households; in a total of 58 households, 87 respondents completed the individual questionnaire, but nobody completed the household questionnaire, such that some household-level variables are missing. There were 657 households with a single respondent to the individual questionnaire, 612 with two, 112 with three, 35 with four, ten with five, and one with six.

¹⁰ The IP is specifically focused on experimental tests of survey procedures and the content of the questionnaire. Brief descriptions of all the IP7 methodological experiments and their results are available from: www.understandingsociety.ac.uk/research/publications/working-paper/understanding-society/2015-03.pdf. Further methodological details are available at www.understandingsociety.ac.uk/d/204/6849_ip_waves1-7_user_manual_June_2015.pdf and www.understandingsociety.ac.uk/d/196/IP7_TechReport_v4.pdf (the latter also including information about response rates).

Lewandowsky, Risbey, and Oreskes 2015). Goodman-Kruskal's G (a measure of association between two ordinal variables) for this index is 0.60), indicating an acceptably strong association between the two items. Disbelief in climate change is rare (20%).

Second, I measure left political ideology with an index comprising the questions JOBS and ADQHOUS ($G = 0.45$):

- “Do you think the government should or should not see to it that every person has a job and a good standard of living?”
- “Some people feel the government should see to it that all people have adequate housing, while others feel each person should provide for his or her own housing. Which comes closest to how you feel about this?”

Since these two questions address support for the state's active intervention in the economy, I also refer to them as measuring economic liberalism (in the European rather than American sense). This variable's usefulness as a measure of left political ideology is demonstrated by its capturing meaningful partisan differences: its mean score for Conservative party sympathisers is 0.45, 0.64 for Liberal Democrats, and 0.77 for Labour.¹¹ Left ideology is prevalent by this measure—almost half of Conservatives subscribe to it—and it maps on well to the parties' relative placements on an overall left-right index, judging by their platforms.¹²

Third, background political distrust, or cynicism, is measured as an index comprising answers to two questions ($G = 0.52$):

¹¹ I do not examine party identification further in the analyses below because it is missing for a large number of respondents.

¹² See the Manifesto Project of Volkens et al. (2015), who scored Labour -1.50, the LibDems 4.66, and the Conservatives 17.54 in 2010 (<http://manifesto-project.wzb.eu>).

- “Do you think that quite a few of the people running the government are corrupt, not very many are, hardly any of them are corrupt, or do you not have an opinion?” (DCRKD)
- “Do you feel that almost all of the people running the government are smart people, or do you think that quite a few of them don’t seem to know what they are doing, or do you not have an opinion on that?” (LDSMRT, reverse-coded)

Distrust by these measures is widespread, with a mean score of 0.71—consistent for example with an Ipsos MORI poll of British adults in 2009 that found only 13% generally trusted politicians to tell the truth, the lowest proportion out of 16 types of people (Ipsos MORI 2010). Neither question refers explicitly to trust, but other studies have found strong relationships between political trust and perceptions of politicians’ corruption and competence (Van Der Meer and Dekker 2011; Morris and Klesner 2010). Political distrust is only minimally correlated with political ideology ($G = 0.09$).

Fourth, interest in politics is captured by VOTE6 (with four ordered response options):

- “How interested would you say you are in politics?”¹³

Finally, demographic covariates are education (highest qualification), age in years (less the sample minimum of 16), rural as opposed to urban residence, gender (female is the reference category), and income (FIHHMNGRS_DV, gross household income in the month prior to the interview, divided both by 1000 and by the square

¹³ A number of unrelated experiments affected how these questions were asked. In the cases of LDSMRT, LDCRKD, AVTEMP, JOBS, and ADQHOUS, in each case respondents were randomly assigned to one of four versions of each question (two for AVTEMP). I ignore the distinctions in the analyses below, however. The random assignment to different wordings was done separately for each question, and the effects of the differences in wording were not large for any of these questions.

root of the number of household members). Appendix B presents descriptive statistics for all of these attitudinal and demographic variables.

I present results below in the form of ordinal probit models fitted using the R package MCMCglmm (Hadfield 2010). Estimation was Bayesian, with flat priors. The probability of observing an outcome in category k is: $Pr(y=k) = F_N(\gamma_k|\mathbf{w}\boldsymbol{\theta}, \sigma_e^2) - F_N(\gamma_{k+1}|\mathbf{w}\boldsymbol{\theta}, \sigma_e^2)$, where F_N is the Normal distribution function, and σ_e^2 is fixed at 1. The γ 's are cutpoints (with one γ equal to zero); \mathbf{w} consists of fixed and random effects design matrices \mathbf{X} and \mathbf{Z} ; and $\boldsymbol{\theta}$ comprises vectors of regression coefficients $\boldsymbol{\beta}$ and random intercepts \mathbf{u} . Because some households included multiple respondents to the individual survey (and all members of each household received the same treatment for the experiment), I include a random intercept for households in each model. This had the effect of slightly widening the credible intervals for the coefficient estimates. Given the Bayesian estimation of the models, instead of frequentist p values, the tables with the fitted models below include the modelled probability that the sign of each estimated beta coefficient was the opposite of the mean value. (The coefficient estimates presented are posterior means.)

Results

First, Table 1 presents models of willingness to pay as a function of only observational data. These models investigate the demographic and attitudinal correlates of being willing to pay taxes to protect the environment. Model 1 includes only demographics—education, income, gender, age, and a dummy variable for rural rather than urban residence. Model 2 includes those demographics, plus a number of

attitudinal covariates: belief in climate change, left ideology (versus economic liberalism), political distrust, and interest in politics.

Table 1: Models with Observational Data Only		
Model	1	2
<i>Fixed Effects</i>		
Highest qualification:		
Other higher degree	-0.41** (0.00)	-0.31** (0.00)
A-level or equivalent	-0.43** (0.00)	-0.27** (0.00)
GCSE or equivalent	-0.75** (0.00)	-0.55** (0.00)
Other	-0.77** (0.00)	-0.52** (0.00)
None	-0.77** (0.00)	-0.61** (0.00)
Income	0.02 (0.31)	0.01 (0.43)
Rural	-0.10 (0.16)	-0.10 (0.13)
Male	-0.15* (0.01)	-0.18** (0.00)
Age	0.00 (0.11)	0.00 (0.10)
Belief in Climate Change		1.23** (0.00)
Left Ideology		0.13 (0.08)
Political Distrust		-0.40** (0.00)
Interest in Politics		0.13** (0.00)
(Intercept)	1.55** (0.00)	0.46* (0.02)
<i>Random Effects (SD)</i>		
Households	0.94	0.77
<i>Cutpoints</i>		
1	1.02	1.00
2	2.62	2.55
Deviance Information Criterion	3793	3775
N (households, individuals)	1100, 1560	1100, 1560

Note: Random effects are presented on the standard deviation scale. Figures in parentheses are the modelled probabilities of the parameter having the opposite sign; coefficients are marked with * if the probability is less than 0.05, ** if less than 0.01. The reference category for highest qualification is possession of a degree.

Model 1 shows that higher- versus lower-income earners are no different in their willingness, and nor are rural versus urban residents, or older rather than younger Britons. But men and women, and even more so education groups, differ significantly: women are more willing to pay to protect the environment, and so are more educated people.

Adding attitudinal covariates makes little differences to these demographic relationships. Model 2 shows that, not surprisingly, respondents who believe in climate change are more willing to pay taxes. The politically distrustful are less willing, and those with left political ideologies are more so. *Ceteris paribus*, those more interested in politics are also more willing. These results are consistent with prior empirical research discussed earlier.

Table 2: Raw Percentages of Each Response, by Combination of Conditions

	<u>Treatments</u>				<u>Responses (%)</u>				
	Offset*	Spent	Promised †	Things You Buy	Petrol and Electricity*	Not at all willing	Not very willing	Fairly willing	Very willing
A						29.1	32.9	32.9	5.1
B	X					6.8	18.6	44.3	30.3
C		X				24.7	35.9	35.4	4.0
D	X	X				13.5	20.7	43.7	22.1
E		X	X			27.1	29.4	37.4	6.1
F	X	X	X			22.8	24.2	38.4	14.6
G				X		25.2	30.3	38.7	5.9
H	X			X		9.6	16.1	44.0	30.3
I				X	X	27.7	43.8	25.1	3.4
J	X			X	X	16.0	20.3	42.6	21.1

Raw percentages of respondents giving each answer, depending on the combination of treatments they were assigned.

* effect statistically significant at the 0.05 level (one-tailed)

† effect statistically significant at the 0.05 level (one-tailed), in interaction with Offset

Next, Table 2 presents the results of the five experiments, in the form of the raw percentages of respondents who provided each of the four possible answers, under ten different combinations of the five experimental conditions. Table 2 shows that, among respondents who received the base version of the question (A), about a third provided each of the three less supportive responses, and only a small number (5.1%) gave the most supportive response (“very willing”). The distribution of responses varied substantially across the other nine scenarios, indicating that differences in question wording made a meaningful difference.

Table 3 presents the results of the experiments as analysed using multilevel models (such models being appropriate given the nesting of respondents within households). The first model in Table 3, with only dummies for the various experimental treatments on the right-hand side, presents the core findings of this paper.¹⁴ First, revenue-neutrality is a strong means of increasing acceptance of environmental taxes: the coefficient on Offset is large. People are much more willing to pay if new environmental taxes are offset with tax cuts elsewhere. Hypothesis 1 is therefore supported.

Second, and somewhat surprisingly, the evidence here suggests people are not more enthusiastic if green tax revenue is “Spent” on the environment. If anything, people are somewhat *less* willing to pay new environmental taxes, if told that the revenues will also be spent specifically on programmes for environmental protection. Hypothesis 2 is therefore not supported.

¹⁴ Appendix C presents a model with each of nine treatment conditions entered simply as a dummy variables relative to the base category A.

Table 3: Models including Randomly Assigned Treatments

Model	3	4	5	6	7
<i>Fixed Effects</i>					
Offset	0.95** (0.00)	1.06** (0.00)	0.96** (0.00)	0.87** (0.00)	0.94** (0.00)
Spent	-0.13 (0.08)	0.21 (0.24)	0.01 (0.49)	0.16 (0.28)	0.02 (0.43)
Promised	0.16 (0.09)	0.27 (0.22)	-0.10 (0.34)	0.01 (0.48)	0.19 (0.17)
Offset : Promised	-0.62** (0.00)	-0.85* (0.03)	-0.77** (0.00)	-0.53 (0.09)	-0.76** (0.00)
Things You Buy	0.07 (0.21)	0.50* (0.05)	0.38* (0.01)	-0.17 (0.24)	0.16 (0.15)
Petrol and Electricity	-0.32** (0.00)	-0.42 (0.07)	-0.47** (0.00)	-0.14 (0.28)	-0.42** (0.00)
Belief in Climate Change		1.69** (0.00)			
Left Ideology			0.37* (0.02)		
Political Distrust				-0.64** (0.01)	
Interest in Politics					0.28** (0.00)
: Offset		-0.22 (0.19)	0.04 (0.40)	0.15 (0.24)	-0.01 (0.44)
: Spent		-0.40 (0.13)	-0.23 (0.16)	-0.41 (0.12)	-0.14 (0.08)
: Promised		-0.08 (0.43)	0.45 (0.08)	0.24 (0.27)	-0.01 (0.45)
: Offset : Promised		0.28 (0.30)	0.18 (0.33)	-0.20 (0.35)	0.11 (0.23)
: Things You Buy		-0.55 (0.06)	-0.50* (0.02)	0.43 (0.08)	-0.09 (0.16)
: Petrol and Electricity		0.19 (0.29)	0.23 (0.16)	-0.33 (0.15)	0.09 (0.16)
(Intercept)	0.70** (0.00)	-0.58** (0.00)	0.47** (0.00)	1.16** (0.00)	0.36** (0.00)
<i>Random Effect Variance</i>					
Households	0.64	0.58	0.67	0.75	0.60
<i>Cutpoints</i>					
1	0.97	0.98	0.96	0.98	0.96
2	2.42	2.47	2.47	2.50	2.43
Deviance Information Criterion	5473	5015	5128	4236	5458
N (households, individuals)	1427, 2413	1339, 2083	1339, 2101	1211, 1739	1385, 2231

Note: Random effects are presented on the standard deviation scale. Figures in parentheses are the modelled probabilities of the parameter having the opposite sign; coefficients are marked with * if the probability is less than 0.05, ** if less than 0.01.

Third, there is clear evidence that many people distrust government promises. The coefficient on “Promise” is not statistically significant by itself, but that is because (as per the previous paragraph) people appear not to value spending revenues from green taxes on the environment. They therefore are not concerned about the risk of governments failing to follow through on promises to do so. Hypothesis 3a is not supported. People do, however, clearly care about revenue neutrality. Where the government’s promise is not only to spend revenues on the environment, but also to offset new green taxes, then people have reason to worry about the risk of promised outcomes never materialising. The coefficient on the interaction effect “Offset : Promised”, capturing how the effect of Offset changes if it is a government promise rather than a *fait accompli*, is therefore negative and significant. Hypothesis 3b is therefore supported. While fiscal neutrality makes environmental protection much more appealing to the public, political distrust appears to reduce the positive effects of framing new environmental taxes as fiscally neutral. Considering the relatively minor difference in the wording between versions D and F, the magnitude of the impact on the responses is surprisingly large.¹⁵

Fourth, making the possibility of increased taxation more concrete to respondents, and framing respondents themselves as polluters, makes no significant difference. Hypothesis 4 is therefore not supported.

Fifth, however, specifically naming petrol and electricity as goods that would be subject to the hypothetical new tax substantially undermines support. Hypothesis 5 is therefore supported.

¹⁵ Note that D and F describe scenarios where taxes—and thus public revenues—stay the same, but spending increases. The result by implication will be a net public deficit.

Models 4 through 7 in Table 3 are similar to Model 3, except that each one includes a series of interaction effects. In each case, an attitudinal covariate is interacted with each of the randomly assigned treatments. For each model, then, the first six rows show the effect of the treatment on the base category: people who do not believe in climate change, who subscribe to economically liberal ideology, who are politically trusting, and who are uninterested in politics, respectively. The next coefficient, in each model, indicates the difference between people holding the alternative and reference values for the attitudinal covariate in question. Then the next six coefficients capture the difference between the randomly assigned treatment's effect on people with the alternative and reference values for each of those same attitudinal covariates.

As in Table 2 above, belief in climate change, subscribing to left/anti-liberal political ideology, being politically trusting, and being interested in politics all predict more willingness to pay. But the effects of the various treatments do not differ much across these different types of people, even if they are quite different in their views. In Model 6, the probability that the effect of Offset : Promised is negative is less than 95%, unlike in the other Models, but the magnitude of the interaction effect is not actually much different. That it is smaller, however, reflects logically that the politically trusting—measured by the questions about politicians' competence and corruptness—are less sceptical of politicians' promises than the politically distrusting. Much the same is shown by the negative sign of the triple interaction effect in Model 6 (Distrust : Offset : Promised). Only for the politically distrustful is this interaction effect negative; these people are therefore the most affected by the knowledge that revenue-neutrality is a promise rather than a fact.

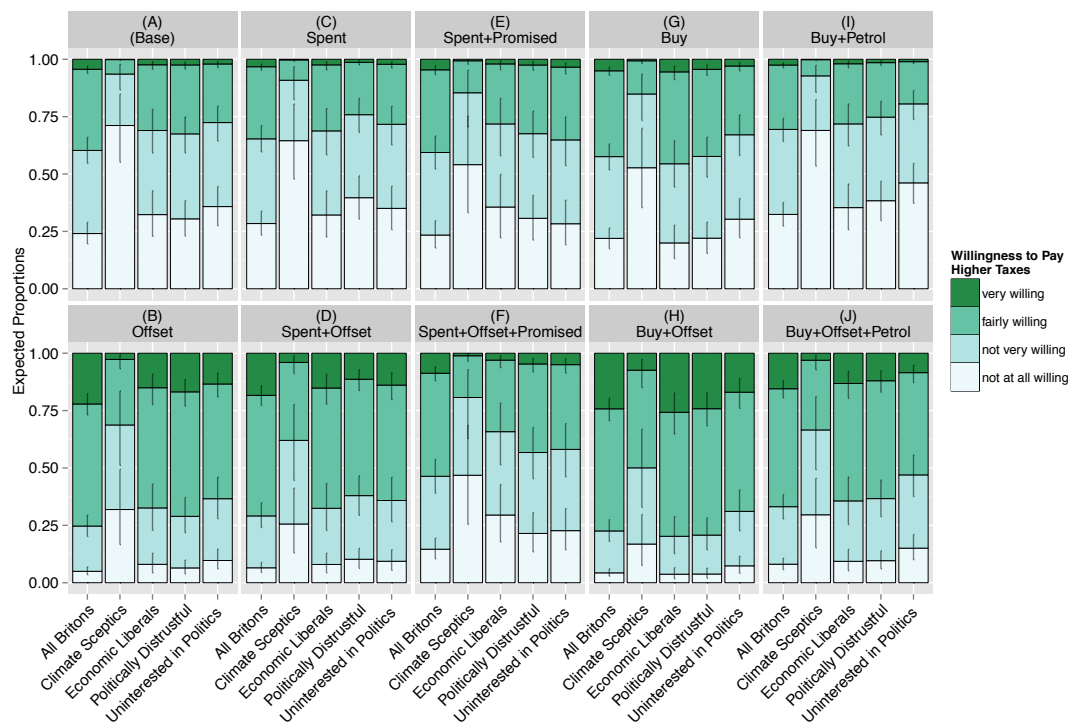
Since interpreting interaction effects is challenging, and to provide the a sense of the magnitudes of the effects, Figure 1 presents the expected proportions of responses by different categories of people under different randomly assigned scenarios. The five categories of people presented are: Britons as a whole (the whole sample), climate sceptics, economic liberals, the politically distrustful, and the politically uninterested. The expected proportions are derived from the five models appearing in Table 3, in order. Darker shades of green represent greater willingness to pay higher environmental taxes.

Comparing different groups of people in the base scenario (A), clearly climate sceptics are most hostile to proposals for new environmental taxes, with almost three-quarters unwilling to pay for new green taxes. Notably, however, in the most positive scenario (H), only about half of climate sceptics are not at all or not very willing—a substantial change. And climate sceptics are a very small minority; responses to the two questions about climate change are both very skewed to the upper end of the scale (see Appendix B). The other groups are more similar, with economic liberals the least distinct from the general population, suggesting that in Britain there is no great political divide with respect to willingness to pay new environmental taxes. In many of Figure 1's panels, the politically uninterested are more distinct than economic liberals.

The scenarios in the bottom row of Figure 1 represent those where new environmental taxes are offset by tax reductions elsewhere, and the responses to these scenarios are all more enthusiastic than those in the upper row; the bottom row is greener. But the column where the two rows differ the least is the middle one (scenarios E and F)—where spending revenues on the environment and providing offsetting cuts to other taxes are only government promises, rather than a fact.

Comparing scenario F to scenario D, it is clear that the added greenness generated by Offsetting is substantially mitigated. That is, adding “Offset” (moving from scenario C to D, or A to B) can make a substantial difference, but adding “Offset” in the presence of “Promised” (moving from E to F) makes little difference. Given the marked differences between the responses from people assigned to scenario F as opposed to D, and the fact that the only difference between these two scenarios is whether revenue-neutrality is a government promise rather than a fact, many people clearly do not regard government promises as credible. The results of this experimental treatment therefore demonstrate the effect of political distrust.

Figure 1: Modelled Probabilities of Providing Each Response, by Combination of Conditions



Note: Expected proportions of respondents providing each of the four possible responses, under ten different scenarios, derived from the five models appearing in Table 3. The vertical lines represent 95% Bayesian credible intervals.

Discussion and Conclusions

The survey experiments described in this article suggest reasons why the public is so often hostile to what policy experts generally consider the most effective means of protecting the natural environment. Consistent with results from qualitative focus groups, the public's hostility to environmental taxation appears to be due in large part to political distrust. People do not believe the government will follow through on promises to offset new environmental taxes with cuts to other taxes (Green Fiscal Commission 2009; Lorenzoni, Nicholson-Cole, and Whitmarsh 2007). Even in positive cases elsewhere, where a substantial new environmental tax has proven politically sustainable and the public has been accepting, there has been substantial scepticism about revenue neutrality. (See for example the case of British Columbia—Harrison 2012; Lachapelle, Borick, and Rabe 2012.)

Further research would benefit from exploring how the relationship between political trust and willingness to pay environmental taxes may differ across different kinds of political/cultural contexts—such as low rather than high-trust societies. Britain is middling in this regard, among high-income nations. Especially given the hugely U.S.-focused character of the literature, we need more systematic comparisons of cross-national differences. More broadly, we also need to know more about the effects of different kinds of framing, and how such framing relates to attitudes towards taxation generally.

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Appendix A

- a. How willing would you be to pay higher taxes in order to protect the environment?
- b. How willing would you be to pay higher taxes in order to protect the environment, if the government reduced other taxes you pay by the same amount?
- c. How willing would you be to pay higher taxes, if the government spent the extra money on protecting the environment?
- d. How willing would you be to pay higher taxes, if the government spent the extra money on protecting the environment and reduced other taxes you pay by the same amount?
- e. How willing would you be to pay higher taxes, if the government promised it would spend the extra money on protecting the environment?
- f. How willing would you be to pay higher taxes, if the government promised it would spend the extra money on protecting the environment and reduce other taxes you pay by the same amount?
- g. How willing would you be to pay higher taxes on things you buy that pollute the environment?
- h. How willing would you be to pay higher taxes on things you buy that pollute the environment, if the government reduced other taxes you pay by the same amount?
- i. How willing would you be to pay higher taxes on things you buy that pollute the environment, like petrol or electricity?
- j. How willing would you be to pay higher taxes on things you buy that pollute the environment, like petrol or electricity, if the government reduced other taxes you pay by the same amount?

Appendix B

Table B1: Descriptive Statistics						
Variable	Mean	Min	Max	Unique	Valid	SD
Age (years-16)	34.21	0	80	80	2413	18.17
Education						
Degree (reference)	0.25	0	1	2	2400	0.43
Other higher degree	0.14	0	1	2	2400	0.34
A-level etc.	0.22	0	1	2	2400	0.41
GCSE etc.	0.24	0	1	2	2400	0.43
Other qualification	0.07	0	1	2	2400	0.26
No qualification	0.08	0	1	2	2400	0.28
Income	2.20	0	16.67	1356	2326	1.31
Male	0.46	0	1	2	2413	0.50
Rural	0.23	0	1	2	2413	0.42
Political Distrust	0.71	0	1	5	1788	0.32
LDSMRT	0.24	0	1	2	1988	0.43
DCRKD	1.30	0	2	3	1953	0.73
Belief in Climate Change	0.80	0	1	5	2141	0.26
G_OPECL30	0.85	0	1	2	2231	0.36
G \bar{W}	1.48	0	2	3	2231	0.61
Left Ideology	0.63	0	1	3	2166	0.38
ADQHOUS	0.66	0	1	2	2190	0.47
JOBS	0.60	0	1	2	2220	0.49
Interest in Politics	1.34	0	3	4	2325	0.93

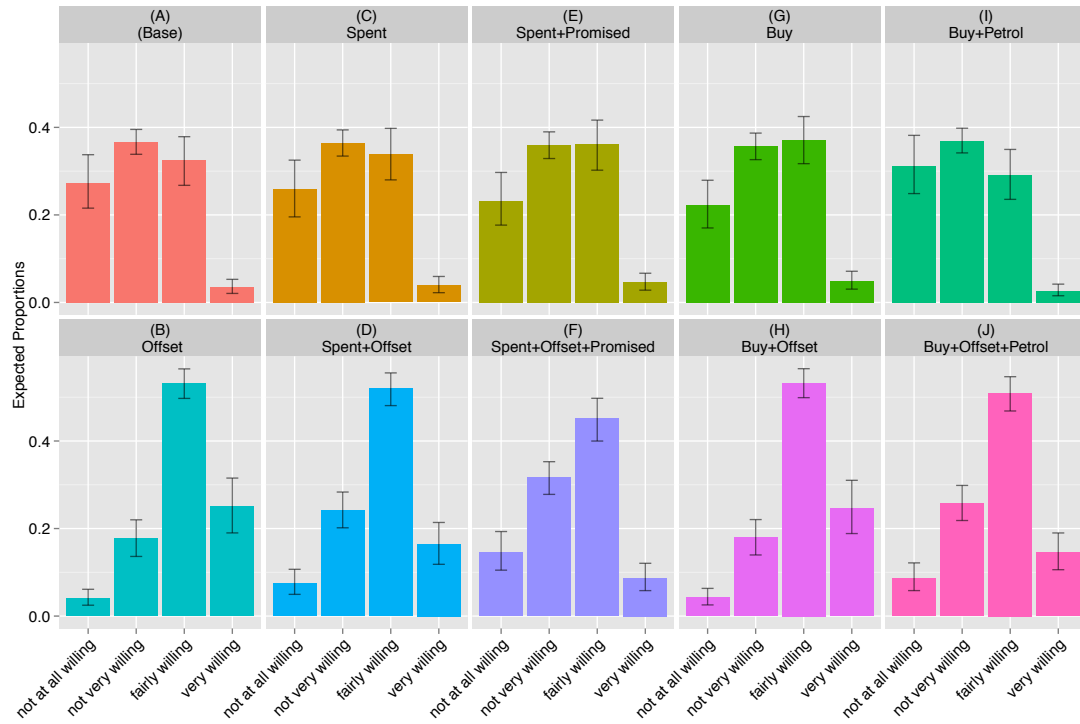
Appendix C

Table C1: Model with Treatment Dummies

<i>Fixed Effects</i>	
Treatment2	1.15** (0.00)
Treatment3	0.05 (0.37)
Treatment4	0.84** (0.00)
Treatment5	0.12 (0.17)
Treatment6	0.45** (0.00)
Treatment7	0.16 (0.11)
Treatment8	1.13** (0.00)
Treatment9	-0.11 (0.19)
Treatment10	0.76** (0.00)
(Intercept)	0.61** (0.00)
<i>Random Effect Variance</i>	
Households	0.64
<i>Cutpoints</i>	
1	0.97
2	2.43
Deviance Information Criterion	5493
N (households, individuals)	1427, 2413

Note: Random effects are presented on the standard deviation scale. Figures in parentheses are the modelled probabilities of the parameter having the opposite sign; coefficients are marked with * if the probability is less than 0.05, ** if less than 0.01.

Appendix D

Figure D1: Modelled Probabilities of Providing Each Response, by Scenario

Note: Expected proportions of respondents providing each of the four possible responses, according to the model in Appendix C. The vertical bars represent 95% Bayesian credible intervals.