

DO ENVIRONMENTAL ATTITUDES TRACK BUSINESS CYCLES? EVIDENCE FROM
THE GREAT RECESSION

by

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(Under the Direction of Susana Ferreira)

ABSTRACT

This paper uses European Social Survey (ESS) and Eurostat data to analyze the relationship between economic conditions (measured with a recession dummy variable, unemployment rates, and real GDP per capita) and environmental preferences (measured with an environmental valuation question and country-specific green party voting data). We disaggregate the economic indicators to the regional level and investigate an extended timeframe (2002-2017) to take full advantage of the diversity of Europe. We find that higher unemployment rates and lower real GDP per capita are associated with lower environmental concern and green party voting outcomes. Furthermore, the recession dummy is associated with reduced green voting even when the economic indicators are included, suggesting an effect of the recession itself, independent of fewer job opportunities and decreased wealth. This paper sheds light on questions of environmental policy feasibility and the microfoundations of the relationship between economic conditions and environmental preferences.

INDEX WORDS: Environmental concern, Environmental attitudes, Economic conditions, Recession, Green voting

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1. INTRODUCTION

Concern about environmental issues has fluctuated greatly over the past 20 years. A Gallup poll found that in 2000, 30% of U.S. citizens believed the seriousness of global warming was overestimated. In 2010, that number was up to 48%, and in 2019 it was 35% (Gallup 2019). The protests by the “yellow vests” in France which began in 2018 as a reaction to higher fuel taxes designed to tackle climate change demonstrate that in order for environmental legislation to be passed, ensuring public acceptability is critical. The failed 2018 carbon tax referendum initiative in Washington, a state in which, according to the Yale Program on Climate Change Communication (YPCCC), 70% of the population believe climate change is occurring, further displays the importance of political feasibility.

The pervasive nature of this acceptability obstacle, especially in climate change-related legislation, has led to the emergence of efforts with the specific goal of tracking environmental attitudes and their drivers such as the YPCCC. They publish the Yale Climate Opinion Maps, which estimate county-level attitudes on a variety of climate change stances and policies in the United States.¹ The United Kingdom has a public attitudes tracker survey specifically devoted to energy and climate change maintained by the Department of Business, Energy and Industrial Strategy.² Internationally, Climate Scorecard is an organization dedicated to compiling and reporting various countries’ national attitudes on climate change (ClimateScorecard.org).

¹ In conjunction with the Center for Climate Change Communication, they also devised Global Warming’s Six Americas, a categorization of the U.S. population into six different groups based on their levels of climate change belief and action taken.

² See <https://www.gov.uk/government/collections/public-attitudes-tracking-survey#public-attitudes-tracker-review>.

Traditionally, economists have focused on the efficiency and equity of environmental policy and the tradeoff between the two. However, understanding how to design policies that garner enough public support to pass has risen to prominence in recent years. Klenert et al. (2018) point out the importance of various insights from behavioral economics in achieving political feasibility, such as benefit and cost salience, policy labeling, and accounting for differing worldviews of constituents.

In this paper we estimate the effect of the 2008 Great Recession on the environmental attitudes of Europeans. Based on previous research, we hypothesize that macroeconomic conditions (often proxied by unemployment rates or GDP) are important drivers of the public's attitudes about climate change and the environment. As the economic conditions in a country worsen, measures of environmental concern generally go down (Elliot et al. 1997, Scruggs and Benegal 2012, Kahn and Kotchen 2010, Shum 2012). Compared to previous papers, we consider a relatively long timeframe covering the pre-, during-, and post-recession years. We are unaware of any papers that have looked at the impact of the 2008 recession on environmental attitudes past 2013. Analyzing a longer timeframe is crucial due to the extremely varied severity and timing of the recession in Europe. While some countries bounced back fairly quickly, in 24 out of 50 European countries there were subsequent follow-up recessions in 2010-2013 as direct repercussions of the European sovereign-debt crisis, and effects from the economic downturn lingered far longer than 2013.³

³ For example, in Italy, unemployment rates rose to about 8.5% in 2010 but then rose again and hovered around 12.5% from 2013-2015. In terms of real GDP, Italy has yet to reach pre-recession levels. In Spain, the unemployment rate shot up to 20% in 2010 and then hit another spike of 26% in 2013. Spain didn't reach pre-recession real GDP levels until 2016. Greece was also hit hard. In 2008, their unemployment rate hovered around 8% but in 2013 it peaked at 27%. At the end of 2015, that number was still high: about 24%. In 2008, Greece's real GDP was about \$350 billion. In 2017, it was down to \$200 billion. In contrast, in Germany, effects were relatively tame. Unemployment rates there reached a peak of about 7.5% in mid-2009 and then steadily declined. In the UK, unemployment rates lingered around 8% from 2009-2013 and then began to decline.

Compared with the focus on the U.S. from most previous literature, the unique diversity of Europe results in greater variation in macro-economic and socio-demographic variables both over time and across space. This diversity is fully taken advantage of by disaggregating economic indicators to the regional level, which is important because even within countries there is a high level of variation. In 2013, the Basque region of Spain had an unemployment rate of 16.6% while Andalusia's was 36.2%. Even in Germany there was a large degree of regional variation. In 2010, Bavaria's unemployment rate was 4.3% while Mecklenburg-Vorpommern's was 12.3%.

There is a longstanding literature on the relationship between economic growth and environmental outcomes. Prominent in that literature is the environmental Kuznets curve (EKC), first introduced by Grossman and Krueger's in 1991 in their paper examining the potential environmental effects of North American Free Trade Agreement. The EKC refers to an inverted-U shape relationship between income per capita and environmental degradation. After hundreds of papers, there is no consensus involving the empirical evidence around the EKC (Stern, 2004), and the literature has moved beyond establishing an empirical relationship between income and environmental quality to understanding the underlying drivers (Carson 2010).

Even with high incomes, stringent environmental legislation is unlikely to materialize if there are not strong preferences towards environmental quality. This paper analyzes how these preferences change not only with income but with a slew of other variables known to be associated with environmental preferences. We use two different measures of environmental concern, self-reported concern for the environment and voting for the 'green' party, the former more closely related to a stated preference approach and the latter related to a revealed preference approach. We track these measures before, during, and after the recession across

Europe and build models to explain their determinants, incorporating a slew of macroeconomic and sociodemographic characteristics.

2. LITERATURE REVIEW

Maslow's hierarchy of needs suggests a tiered ranking of needs beginning at physiological and peaking at self-actualization (Maslow 1943). Certain basic, immediate needs must be met to a reasonable degree before greater focus can be placed on more abstract, long-term ones. The impact of economic downturns on relatively immediate concerns such as paying bills versus the often long-term, abstract impacts of environmental degradation puts these two issues on different elevations of the hierarchy.

Indeed, as mentioned in the introduction, as the economic conditions in a country worsen, measures of environmental concern generally go down (Elliot et al. 1997, Scruggs and Benegal 2012, Kahn and Kotchen 2010, Shum 2012). Healthy economic conditions advance the case for more liberal legislation, while economic downturns advance the case for more conservative ideals (Durr 1993). Whether or not true, there is a perceived trade-off between environmental protection and economic growth among many in the public due to the higher levels of regulation associated with environmental policy. Ample survey questions frame the issue precisely this way to elicit preferences (Gallup 2019).

Besides economic conditions, a number of sociodemographic variables have been shown to be associated with environmental preferences. Younger people tend show more concern for the environment, along with politically left-leaning citizens, females, urban (as opposed to rural) residents, those with higher income, and people with more years of education (Van Liere and Dunlap 1980, Scott and Willits 1994, Elliot et al. 1997, Klineberg 1998, Dunlap et al. 2008).

Other variables that have been shown to affect environmental concern are institutional (Konisky et al., 2008, Rafaty, 2018) and interpersonal trust (Franzen and Vogl, 2013, Meyer and Liebe 2010). The public good nature of most environmental issues creates a social dilemma. If one does not trust that their fellow citizens will cooperate in contributing to the public good, freeriding concerns mean they are less likely to do so themselves. The encompassing nature of environmental issues means governments are often looked to for solutions. If a citizen has a high degree of perceived corruption, they no longer have confidence in the efficacy of their government to tackle these problems. This can cause environmentally concerned citizens to fall into a state of resignation. Higher levels of life satisfaction (Welsch and Kuhling 2010) and pollution (Klineberg 1998) have also been shown to be positively associated with environmental concern. Religiosity is another established factor influencing environmental concern, although evidence has been conflicting (Klineberg 1998, Sherkat and Ellison 2007).

3. DATA

Data for this research primarily came from 8 rounds (2002-2017) of the European Social Survey (ESS). The ESS is a biennial survey mapping social attitudes and behaviors across the European continent. The ESS conducts around 1,500 face-to-face interviews per country per round (800 for countries with a population of less than 2 million). To ensure comparability across countries, the ESS performs question-testing, and extensive translation work to make sure that abstruse words such as democracy or unification retain as similar meaning as possible across languages. One of the main strengths of the ESS is its question consistency across rounds. Another is that each observation contains the exact date and region where the interview was

conducted which can then be matched with the precise macroeconomic conditions of the region where the respondent resides.

2.1 Environmental Preferences

We used two different measures of environmental preferences for two different regressions. The first comes from a question in the Schwartz Scale of Human Values (Schwartz, 1992) supplementary questionnaire asking respondents how similar they feel to the person described in the following statement: “He/she strongly believes that people should care for nature. Looking after the environment is important to him/her.” Possible answers form six categories ranging from “not at all like me” (coded as 1) to “very much like me” (coded as 6). The other measure of environmental preference, “green vote”, is derived from individual-level, country-specific election voting. Only countries with a clear green party that showed up across all 8 survey rounds were used to form this metric. Those countries include Belgium (Agalev/Groen and Ecolo), Finland (Green League), France (The Greens), Germany (Alliance 90/The Greens), Ireland (Green Party), Netherlands (GreenLeft), Sweden (Green Party), Switzerland (Green Party and Green Liberal Party), and the United Kingdom (Green Party). If a respondent voted for one of the above parties, the dependent variable took a value of 1 and took a value of 0 otherwise. More detailed information on how these parties have performed in national parliamentary elections over the years is provided in Table 1 below.

While referendum-style ballot initiatives are not common in Europe (except in Switzerland), there is much more ideological plurality and variety of choice in political parties than in the United States. Green parties are well established in several European countries. Due to the high level of political diversity in European parliaments, coalitions are often formed between parties to get legislation passed. Even if a green party does not hold a large number of

seats, if they are part of the ruling coalition government, such as the Green League in Finland currently, they can influence legislation. The German Greens are in opposition to the current federal parliament, but they form a coalition in 10 of Germany’s state parliaments. In fact, in Baden-Württemberg, they are the majority party, in coalition with the Christian Democrats. In March 2017, The German Greens, took part in signing Schleswig-Holstein's Energy Transition and Climate Protection Act into law (Jungjohann 2019). Unlike in the United States, where a vote for the Green Party may be seen as a “throw away,” in many European nations a vote for a green party may be seen as an effectual act. We understand that green parties do not have a monopoly on environmentally inclined votes. A person with a high degree of environmental concern may vote for a party without “green” in the party name that has a similar pro-environmental policy agenda. However, without knowing exactly why a respondent voted for a party, using green party voting provides the highest likelihood of capturing an environmentally charged vote.

Table 1: Green Party Performance

Country	Green Party Name (Year founded)	Total Seats	Election Year	% of Vote	# of Seats	Role in Government	
Belgium	Agalev/Groen Party (1982)	150	2003	2.5	0	No seats	
			2007	4	4	Opposition	
			2010	4.4	5	Opposition	
			2014	5.3	6	Opposition	
			2019	6.1	8	TBA	
	Ecolo Party (1980)			2003	3.1	4	Opposition
				2007	5.1	8	Opposition
				2010	4.8	8	Opposition
				2014	3.3	6	Opposition
				2019	6.1	13	TBA

Finland	Green League (1987)	200	2003	8	14	Opposition
			2007	8.5	15	Coalition
			2011	7.3	10	Coalition (2011-14); Opposition (2014-15)
			2015	8.5	15	Opposition
			2019	11.5	20	Coalition
France	The Greens/Europe Ecology (1984)	577	2002	4.5	3	
			2007	3.3	4	
			2012	5.5	17	
			2017	4.3	1	
Germany	Alliance 90/ The Greens (1980)	603	2002	5.6	55	Coalition
			2005	5.4	51	Opposition
			2009	9.2	68	Opposition
			2013	7.3	63	Opposition
			2017	8	67	Opposition
Ireland	The Greens (1981)	166	2002	3.8	6	Opposition
			2007	4.7	6	Coalition
			2011	1.8	0	No seats
			2016	2.7	2	Opposition
			2020	7.1	12	TBA
Netherlands	GreenLeft (1989)	150	2002	7	10	Opposition
			2003	5.1	8	Opposition
			2006	4.6	7	Opposition
			2010	6.7	10	Opposition
			2012	2.3	4	Opposition
			2017	9.1	14	Opposition
Sweden	The Green Party (1981)	349	2002	4.7	17	
			2006	5.2	19	
			2010	7.3	25	
			2014	6.8	25	
			2018	4.4	16	
UK	Green Party of England and Wales (1990)	659	2001	0.6	0	No seats
			2005	1	0	No seats
			2010	0.9	1	Opposition
			2015	3.6	1	Opposition
			2017	1.6	1	Opposition
			2019	2.7	1	Opposition

2.2. Sociodemographic variables

Data on sociodemographic variables (age, gender, education, marital status, employment, income, political leaning, religious attendance, marital status, community type, and household size), institutional trust, and life satisfaction come from the ESS. Possible responses to the religious attendance question range from “never” (coded as 1) to “every day (coded as 7). The income variable had inconsistencies across surveys. In rounds 1-3 of the ESS, 12 categories based on Euro or national currency intervals were used. In rounds 4-8, 10 decile categories based on country-specific income distributions were used. To overcome this, the median of the income interval the respondent identified was coded as the income for that respondent. National currencies were converted into Euros using exchange rates for the year in which the survey was administered, and all weekly/annual categorizations were converted to monthly. Measures of institutional trust, interpersonal trust, and life satisfaction were also obtained from the ESS.

2.3 Macroeconomic variables

Each observation in the ESS contains a Nomenclature of Territorial Units for Statistics (NUTS) designation. NUTS is a geocode standard adopted by EU nations for dividing countries into increasingly small subdivisions, where NUTS 1 is the least disaggregated and NUTS 3 the most disaggregated. For example, in Germany, the state of Bavaria is one of 14 NUTS 1 subdivisions. Bavaria contains 7 NUTS 2 administrative districts within it, one of these being Oberbayern. Within Oberbayern are 23 NUTS 3 districts. Each ESS observation’s NUTS designation allows matching of regional economic data from Eurostat and OECD to each observation. These data include annual NUTS 1/NUTS 2 unemployment data and annual NUTS 1/NUTS 2/NUTS 3 nominal GDP and population data, which was used to calculate real GDP per capita (in 2010 thousand Euros) using country-specific GDP deflators from the World Bank’s

World Development Indicators. Table 2 provides variable descriptions for the regional and national variables and question phrasing for the ESS variables. Appendix tables A1 and A2 list the level or regional disaggregation for the unemployment and GDP variables.

OECD and Eurostat quarterly national accounts were used to determine country-specific times of recession. The recession dummy was coded 1 if the country experienced two consecutive quarters of real GDP contraction. As mentioned, the ESS includes exact dates of each interview, which allows us to match observations with the recession dummy variable on a quarterly level. We also created a 1-quarter lagged recession dummy variable. The 1-quarter lag was used as we believe it is more realistic to relax the assumption that respondents are able to immediately react and assimilate to economic downturns. Table 11 details whether the nations were in recessions while the specific ESS was being fielded. 1 indicates recession, 0 indicates no recession, and N/A indicates that country was not administered the ESS that round.

Table 2: Variable Definitions

Variable	Description/Question Phrasing	Source
Environmental concern	“Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you. Use this card for your answer. She/he strongly believes that people should care for nature. Looking after the environment is important to her/him.”	ESS
Green vote	“Which party did you vote for in that election?” (referring to last national election)	ESS
Recession dummy	Coded 1 if respondent’s country was in a recession (defined as subsequent quarters of national real GDP contraction) during the date of the interview; coded 0 otherwise	Eurostat and OECD
Unemployment rate	Unemployment rate	Eurostat

Real GDP per capita (2010 Euros)	Real GDP per capita (2010 Euros)	Eurostat and OECD
PM2.5	National-level emissions of PM2.5 in gigagrams (Gg)	European Environmental Agency
Institutional trust	“Using this card, please tell me on a score of 0-10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust. Firstly... ..[country]'s parliament?”	ESS
Interpersonal trust	“Using this card, generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please tell me on a score of 0 to 10, where 0 means you can't be too careful and 10 means that most people can be trusted.”	ESS
Life satisfaction	“All things considered, how satisfied are you with your life as a whole nowadays? Please answer using this card, where 0 means extremely dissatisfied and 10 means extremely satisfied.”	ESS
Economy satisfaction	“On the whole how satisfied are you with the present state of the economy in [country]?”	ESS
Left-right political placement	“In politics people sometimes talk of 'left' and 'right'. Using this card, where would you place yourself on this scale, where 0 means the left and 10 means the right?”	ESS
Religious attendance	“Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays?”	ESS
Income	“Using this card, if you add up the income from all sources, which letter describes your household's total net income? If you don't know the exact figure, please give an estimate. Use the part of the card that you know best: weekly, monthly or annual income.” (all converted to monthly incomes)	ESS
Gender	Gender	ESS
Age	Age	ESS

Years of education	“About how many years of education have you completed, whether full-time or part-time? Please report these in full-time equivalents and include compulsory years of schooling.”	ESS
Marital status	“This question is about your legal marital status not about who you may or may not be living with. Which one of the descriptions on this card describes your legal marital status now?”	ESS
Household size	“Including yourself, how many people - including children - live here regularly as members of this household?”	ESS
Children living at home dummy	Children living at home or not	ESS
Employment status	“And which of these descriptions best describes your situation (in the last seven days)?”	ESS

Table 3: Breakdown of Recession Indicator

ESS Round (Years survey administered)	1 (2002- 2003)	2 (2004- 2005)	3 (2006- 2007)	4 (2008- 2009)	5 (2010- 2011)	6 (2012- 2013)	7 (2014- 2015)	8 (2016- 2017)
Austria	0	0	0	N/A	N/A	N/A	0	0
Belgium	0	0	0	1	0	1	0	0
Bulgaria	N/A	N/A	0	1	0	0	N/A	N/A
Switzerland	0	0	N/A	1	0	0	0	0
Czech	0	0	N/A	N/A	N/A	1	0	0
Cyprus	N/A	N/A	0	0	0	N/A	N/A	N/A
Germany	0	0	0	1	0	0	0	0
Denmark	0	0	0	1	0	1	0	N/A
Estonia	N/A	0	0	1	0	0	0	0
Spain	0	0	0	1	1	1	0	0
Finland	0	0	0	1	0	1	1	0
France	0	0	0	1	0	1	0	0
United Kingdom	0	0	0	1	0	0	0	0
Greece	0	0	N/A	1	1	N/A	N/A	N/A
Croatia	N/A	N/A	N/A	1	1	N/A	N/A	N/A
Hungary	0	0	0	1	0	1	0	0

Ireland	0	0	0	1	1	1	0	0
Iceland	N/A	0	N/A	N/A	N/A	0	N/A	0
Italy	0	N/A	N/A	N/A	N/A	1	N/A	0
Lithuania	N/A	N/A	N/A	N/A	0	0	0	0
Luxembourg	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	0	0	0	1	0	1	0	0
Norway	0	0	0	0	1	0	0	0
Poland	0	0	0	0	0	0	0	0
Portugal	0	0	0	1	1	1	0	0
Sweden	0	0	0	1	0	0	0	0
Slovenia	0	0	0	1	0	1	0	0
Slovakia	N/A	0	0	0	0	0	N/A	N/A
Turkey	N/A	0	N/A	1	N/A	N/A	N/A	N/A

Because we consider two indicators of environmental preferences for which the samples are different, we present two tables of descriptive statistics. Table 4 shows the descriptive statistics for the sample used to explain environmental concern and Table 5 provides the descriptive statistics for the sample of countries with a clear green party across all survey rounds.

With a mean of 4.89 for the self-reported environmental concern variable, the average respondent agrees it is important to look after the environment. While variation itself is fairly small, there exists variation in how regions' and nations' environmental concern shifts over time. For example, going from round 3 (2006-2007) to round 4 (2008-2009) of the ESS, the mean environmental concern in Germany (a country relatively unaffected by the recession) actually increased from 4.79 to 4.85. Going from round 3 to 4, Spain's mean, although still higher than Germany's, decreased from 5.14 to 5.

The mean for the green vote variable is 0.062, meaning about 6.2% of respondents in the above-mentioned nations had voted for a green party in their county's last national election when

interviewed. This ranged from a number of regions with 0% green vote, such as the West Midlands in the United Kingdom in round 4 to 41.67% green vote in Bremen in Germany in round 5.

The mean unemployment rate for the ordered logit regression is 8.19% with a standard deviation of 4.74%. Both the mean and standard deviation are lower for the green vote regression: 7.23% and 3.4% respectively. This includes an unemployment rate of 3.1% in Northwestern Switzerland in round 4 and 21% in Sicily, Italy in round 6.

In both samples, average interpersonal trust is higher than institutional trust and average life satisfaction is higher than economy satisfaction. Most respondents live in towns or country villages. Over 50% of respondents report being employed in the last 7 days and about 5% report being unemployed.

Table 4: Descriptive Statistics for Environmental Concern Sample

National/Regional Variables	Observations	Mean	Standard Deviation	Min	Max
Recession dummy	204,605	0.193	(0.395)	0	1
Unemployment rate	204,605	8.19	(4.74)	1.8	36.2
Real GDP per capita (2010 thousand Euros)	204,605	29.63	(17.3)	2.47	123.29
PM2.5 Emissions (gigagrams)	204,605	58.24	(55.53)	1.11	234.99
Individual Variables					
Environmental concern (1-6 scale)	204,605	4.89	(1.01)	1	6
Institutional trust (1-10 scale)	204,605	4.7	(2.52)	0	10
Interpersonal trust (1-10 scale)	204,605	5.26	(2.39)	0	10
Life satisfaction (1-10 scale)	204,605	7.11	(2.16)	0	10

Economy satisfaction (1-10 scale)	204,605	4.76	(2.48)	0	10
Left-right political placement (1-10 scale)	204,605	5.09	(2.18)	0	10
Religious attendance	204,605	2.5	(1.5)	1	7
Monthly income (hundred Euros)	204,605	24.43	(20.93)	0.67	140.42
Female	204,605	0.51	(0.5)	0	1
Age	204,605	48.87	(17.59)	14	104
Years of education	204,605	12.7	(4.06)	0	54
Marital status: Married	204,605	0.547	(0.498)	0	1
Marital status: Separated	204,605	0.012	(0.108)	0	1
Marital status: Divorced	204,605	0.091	(0.29)	0	1
Marital status: Widowed	204,605	0.083	(0.276)	0	1
Marital status: Never married	204,605	0.267	(0.442)	0	1
Household size	204,605	2.64	(1.37)	1	18
Children at home dummy	204,605	0.38	(0.486)	0	1
Community type: City	204,605	0.2	(0.4)	0	1
Community type: Suburbs or outskirts of big city	204,605	0.13	(0.333)	0	1
Community type: Town or small city	204,605	0.309	(0.462)	0	1
Community type: Country village	204,605	0.303	(0.459)	0	1
Community type: Farm or home in countryside	204,605	0.065	(0.247)	0	1
Employment status: Employed	204,605	0.53	(0.5)	0	1
Employment status: School	204,605	0.063	(0.24)	0	1
Employment status: Unemployed, looking for job	204,605	0.038	(0.192)	0	1
Employment status: Unemployed, not looking for job	204,605	0.015	(0.121)	0	1
Employment status: Permanently sick or disabled	204,605	0.025	(0.155)	0	1

Employment status: Retired	204,605	0.241	(0.428)	0	1
Employment status: Community or military service	204,605	0.001	(0.031)	0	1
Employment status: Housework	204,605	0.083	(0.275)	0	1

Table 5: Descriptive Statistics for Green Vote Sample

National/Regional Variables	Observations	Mean	Standard Deviation	Min	Max
Recession dummy	106,518	0.2	(0.4)	0	1
Unemployment rate	106,518	7.23	(3.4)	1.9	22.4
Real GDP per capita (2010 thousand Euros)	106,518	36.03	(15.23)	14.54	123.29
PM2.5 Emissions (gigagrams)	106,518	65.44	(62.04)	6.547	234.99
Individual Variables					
Green vote	106,518	0.062	(0.241)	0	1
Institutional trust (1-10 scale)	106,518	5.04	(2.33)	0	10
Interpersonal trust (1-10 scale)	106,518	5.55	(2.22)	0	10
Life satisfaction (1-10 scale)	106,518	7.41	(1.97)	0	10
Economy satisfaction (1-10 scale)	106,518	5.1	(2.3)	0	10
Left-right political placement (1-10 scale)	106,518	5.04	(2.05)	0	10
Religious attendance	106,518	2.28	(1.43)	1	7
Monthly income (hundred Euro)	106,518	29.48	(19.82)	0.75	140.42
Female	106,518	0.502	(0.5)	0	1
Age	106,518	49.35	(17.59)	14	102
Years of education	106,518	13.14	(3.83)	0	56

Marital status: Married	106,518	0.53	(0.5)	0	1
Marital status: Separated	106,518	0.012	(0.109)	0	1
Marital status: Divorced	106,518	0.102	(0.302)	0	1
Marital status: Widowed	106,518	0.075	(0.263)	0	1
Marital status: Never married	106,518	0.281	(0.45)	0	1
Children at home dummy	106,518	0.352	(0.478)	0	1
Household size	106,518	2.5	(1.32)	1	15
Community type: City	106,518	0.14	(0.35)	0	1
Community type: Suburbs or outskirts of big city	106,518	0.152	(0.359)	0	1
Community type: Town or small city	106,518	0.319	(0.466)	0	1
Community type: Country village	106,518	0.298	(0.458)	0	1
Community type: Farm or home in countryside	106,518	0.085	(0.28)	0	1
Employment status: Employed	106,518	0.542	(0.5)	0	1
Employment status: School	106,518	0.059	(0.236)	0	1
Employment status: Unemployed, looking for job	106,518	0.035	(0.184)	0	1
Employment status: Unemployed, not looking for job	106,518	0.015	(0.12)	0	1
Employment status: Permanently sick or disabled	106,518	0.03	(0.171)	0	1
Employment status: Retired	106,518	0.238	(0.426)	0	1
Employment status: Community or military service	106,518	0.001	(0.031)	0	1
Employment status: Housework	106,518	0.081	(0.272)	0	1

4. METHODOLOGY

Given the nature of the environmental preferences variables, we estimate two models: a multivariate ordered logit for the environmental concern dependent variable and a logit for the binary green vote dependent variable. Both regressions include country and year fixed effects as well as a large number of regressors to avoid omitted variable bias. The general form is as follows:

$$Y_{ijt} = g (\mathbf{X}_{ijt}, \mathbf{Z}_{ijt}, D_{jt}, \mathbf{Z}_{ijt} \times D_{jt}, \mathbf{X}_{ijt} \times D_{jt}, \gamma_j, \lambda_t, \varepsilon_{ijt})$$

where i indexes individual respondents, j indexes location (region/country), and t indexes time. Y_{ijt} is either of the environmental preference measures described above; \mathbf{X}_{ijt} is the matrix of socio-demographic variables (subjective income, gender, age, education, employment, household size, political leaning, religious attendance, community type, and marital status); the \mathbf{Z}_{ijt} matrix includes institutional trust, interpersonal trust, life satisfaction, and economy satisfaction, measured at the individual respondent level i , and unemployment rate and real GDP per capita, measured at the region/country level j ; D_{jt} is a dummy variable for the country-specific duration of the 2008 recession, γ_j is a vector accounting for national fixed effects, λ_t is a vector accounting for annual fixed effects, and ε_{ijt} is a normally distributed error term. The weight used is the product of the post-stratification sampling weight and population weight as suggested by ESS.

5. RESULTS

Table 5 below presents the odds ratios from the ordered logit environmental concern regression. Model (1) includes only individual characteristics and fixed effects. Higher levels of

both institutional and interpersonal trust are associated with higher levels of environmental concern, consistent with previous findings (Konisky et al., 2008; Rafaty, 2018). However, interpersonal trust appears to be the dominant of the two trust measures, with a higher significance level and a greater magnitude. This coefficient of 1.023 means the odds of answering the value question with “very much like me” (versus the other five categories) are 2.3% higher for every 1-point increase on the interpersonal trust scale. Going from least (0) to most (10) trust corresponds with a 25.5% (1.023 raised to the 10th power) increase in the probability of picking that top category.

Also consistent with previous literature, the higher a respondent’s life satisfaction, the more likely they are to place an importance on nature (Welsch and Kuhling 2010). Higher levels of economic satisfaction are associated with lower levels of environmental concern.

Socio-demographic characteristics, such as gender, education, and political-leaning have their expected signs. An additional year of education raises the likelihood of being in the top environmental concern category (versus the lower five) by about 3.5%. Those who live on farms or in the countryside are significantly more likely to agree with the value statement than urban residents. Perhaps this is indicative of their closeness with a more natural setting. Age has a significantly positive coefficient, counter to previous research. Even with age coded as a categorical variable broken down as 15-19, 20-29, 30-39, ..., 80+, those in their 30s, 40s, 50s, and 60s were significantly more likely to vote green than those in their 20s. This may be due to much of the age effect being captured in the retired dummy variable.

Compared to people who had been performing paid work the last seven days, respondents who were unemployed and looking for work, were significantly more likely to identify with the value statement. Intuition would point toward unemployed respondents showing less concern for

the environment, as securing a job is the more immediate, pressing issue. Kahn and Kotchen found a similar, counterintuitive result, and offered the possible explanation that the respondent may believe supporting environmental causes will create “green job” opportunities (Kahn and Kotchen, 2010). Retired respondents were significantly less likely to identify with the value statement than employed respondents. Monthly income has a significantly negative sign, which goes against intuition as well. Environmental concern is expected to increase as income increases, following a similar Maslow’s hierarchy line of logic as that of the unemployment variable.

Model (2) includes the recession dummy, which is insignificant. Magnitudes and significances of the individual characteristics remain the same as those in model (1).

Model (3) sees the inclusion of unemployment rate and real GDP per capita. The recession dummy remains insignificant. A 1-point increase in the unemployment rate lowers the probability of being in a higher set of environmental concern categories (versus all lower ones) by 0.4%. This effect would be a 2% reduction in likelihood if the unemployment rate rose by 5% (0.996 raised to the 5th). Higher levels of real GDP per capita are associated with higher environmental concern. A 10,000 Euro increase in real GDP per capita raises the probability of reporting more care for nature by about 3% (1.003 raised to the 10th). Again, coefficients on individual characteristics are robust going from model (2) to (3).

In model (4), PM2.5 emissions are included, but are not significant. The recession dummy remains insignificant. Unemployment rate, real GDP per capita, and the individual characteristics all retain the similar magnitudes and significances as those in model (3).

Interestingly, the inconsistencies with theory regarding employment status and income mentioned above disappear when using the green vote dependent variable, discussed next.

Table 5: Environmental Concern Ordered Logit Results – Odds Ratios

	(1) Individual characteristic s	(2) (1) + recession dummy	(3) (1) + (2) + economic indicators	(4) (1) + (2) + (3) + PM2.5
Recession dummy	-	0.961 (0.0279)	0.969 (0.0284)	0.965 (0.0282)
Unemployment rate	-	-	0.996*** (0.00166)	0.995*** (0.00167)
Real GDP per capita (2010 thousand Euros)	-	-	1.003*** (0.000775)	1.003*** (0.000782)
PM2.5 emissions (gigagrams)	-	-	-	1.002 (0.00103)
Institutional trust	1.007** (0.00334)	1.007** (0.00334)	1.007** (0.00334)	1.007** (0.00335)
Interpersonal trust	1.023*** (0.00337)	1.023*** (0.00337)	1.024*** (0.00337)	1.024*** (0.00337)
Life satisfaction	1.028*** (0.00394)	1.028*** (0.00394)	1.028*** (0.00395)	1.028*** (0.00395)
Economy satisfaction	0.980*** (0.00358)	0.979*** (0.00359)	0.977*** (0.00364)	0.977*** (0.00365)
Female	1.111*** (0.0158)	1.111*** (0.0158)	1.110*** (0.0158)	1.110*** (0.0158)
Age	1.020*** (0.000718)	1.020*** (0.000718)	1.020*** (0.000718)	1.020*** (0.000718)
Years of education	1.035*** (0.00202)	1.035*** (0.00202)	1.035*** (0.00202)	1.035*** (0.00202)
Monthly income	0.997*** (0.000480)	0.997*** (0.000480)	0.996*** (0.000487)	0.996*** (0.000487)
Political leaning	0.951*** (0.00315)	0.951*** (0.00315)	0.951*** (0.00315)	0.951*** (0.00315)
Household size	0.989 (0.00744)	0.989 (0.00743)	0.989 (0.00744)	0.989 (0.00744)
Children at home dummy	1.012 (0.0199)	1.012 (0.0199)	1.012 (0.0199)	1.012 (0.0199)
Religious attendance	1.023*** (0.00513)	1.023*** (0.00513)	1.022*** (0.00513)	1.022*** (0.00513)
Employment status Employed	Baseline	Baseline	Baseline	Baseline

School	0.944 (0.0334)	0.944 (0.0334)	0.948 (0.0335)	0.948 (0.0335)
Unemployed, looking	1.179*** (0.0438)	1.180*** (0.0438)	1.187*** (0.0442)	1.187*** (0.0442)
Unemployed, not looking	0.987 (0.0570)	0.986 (0.0570)	0.991 (0.0573)	0.992 (0.0573)
Permanently sick or disabled	1.275*** (0.0618)	1.274*** (0.0618)	1.275*** (0.0618)	1.275*** (0.0618)
Retired	0.934*** (0.0222)	0.934*** (0.0222)	0.935*** (0.0222)	0.935*** (0.0222)
Community or military service	0.804 (0.198)	0.805 (0.198)	0.814 (0.201)	0.816 (0.201)
Housework	1.009 (0.0253)	1.009 (0.0253)	1.008 (0.0253)	1.008 (0.0252)
Community type				
City	Baseline	Baseline	Baseline	Baseline
Suburbs	0.964 (0.0247)	0.965 (0.0247)	0.966 (0.0248)	0.967 (0.0248)
Town or small city	0.963* (0.0195)	0.963* (0.0195)	0.974 (0.0200)	0.974 (0.0200)
Country village	1.009 (0.0205)	1.009 (0.0205)	1.022 (0.0209)	1.022 (0.0209)
Farm or home in countryside	1.148*** (0.0427)	1.148*** (0.0427)	1.165*** (0.0435)	1.165*** (0.0435)
Marital status				
Married	Baseline	Baseline	Baseline	Baseline
Separated	0.955 (0.0592)	0.956 (0.0592)	0.954 (0.0591)	0.954 (0.0591)
Divorced	1.098*** (0.0286)	1.098*** (0.0286)	1.094*** (0.0286)	1.095*** (0.0286)
Widowed	0.881*** (0.0255)	0.881*** (0.0255)	0.881*** (0.0254)	0.881*** (0.0255)
Never married	0.960* (0.0205)	0.960* (0.0205)	0.958** (0.0205)	0.958** (0.0205)
Country fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Observations	204,605	204,605	204,605	204,605

Table 6 below presents odds-ratios from the logistic regression using the green party voting dependent variable. Model (1) includes only individual characteristics and fixed effects. Institutional trust is not significant but interpersonal trust is highly so. The coefficient of 1.135 indicates a 13.5 percentage point (pp) increase in the probability of a green vote. This means if a respondent's probability of voting green is 10%, a 1-point increase on the interpersonal trust scale would increase that likelihood by 1.35% (0.10×0.135) to 11.35%. Going from least to most trust corresponds with a 252 pp (1.135^{10}) increase in the probability of a respondent voting green. If their probability is initially 10%, that 10-point hike in trust increases it by 25.2% (0.10×2.52) to 35.2%.

Life satisfaction is insignificant, in contrast to the results from Table 5. However, economy satisfaction is positively significant. In line with previous research, right-leaning respondents are less likely to vote for a green party, females are more likely, and respondents with more years of education are more likely. The coefficient on age is significantly positive, again counter to previous research. Respondents who have more people living in their household are less likely to vote green. Those who have children living at home are more likely. Those who attend religious services more often are less likely to vote green. Counter to the results from Table 5, and more in line with intuition, unemployed respondents are less likely to vote green than their employed counterparts. No longer significantly negative as in Table 5, income is insignificant. Those who live in suburbs, towns, and villages are all highly significantly less likely to vote green than urban residents. Interestingly, people who live on farms are less likely to vote green than urban residents only at the 10% significance level.

Model (2) includes the recession dummy, which is highly significant and corresponds with a 25.9 pp decrease in the likelihood of a green vote. This means, for someone who has a

10% green vote probability, entering a recession lowers that probability by 2.59% to 7.41%. Collectively, this means a country with 10% of votes going the national green party entering a recession reduces that number to 7.41%. Other than economic satisfaction, which becomes significant only at the 10% level, all significances and magnitudes for individual characteristics are robust going from model (1) to (2).

Model (3) incorporates the economic indicators. The recession dummy remains highly significant and its magnitude slightly lowers to a 24.5 pp negative effect. Both unemployment rate and real GDP per capita are also significant at the 1% level. A 5% increase in unemployment rate is associated with an 18.9 pp decrease in the likelihood of a green vote. This reduces an initial 10% green vote probability by 1.89% to 8.11%. Increasing real GDP per capita by 20,000 Euros increases green vote likelihood by 19.6 pp. All else equal, and with a latent green vote probability of 10%, a respondent living in a region with a real GDP per capita 40,000 Euros is 1.96% more likely to vote green than a respondent living in a region where its 20,000 Euros. Going from model (2) to (3), economic satisfaction loses its significance, but there are no significant changes in the effects of the other variables.

PM2.5 emissions are included in model (4). The magnitude of the recession dummy is increased to a 27.5 pp negative effect. The magnitude of unemployment rate coefficient slightly increases while that of real GDP per capita slightly decreases. Higher PM2.5 emissions are associated with higher green vote probabilities. A 25 gigagram rise in national PM2.5 emissions is associated with a 22 pp increase in the probability of a green vote. Individual characteristics retain their significance levels and magnitudes going from model (3) to (4).

The effect of being unemployed is comparable to that of being in a recession (both lower the probability of a green vote by a bit less than 30 pp). A 5,000 Euro increase in real GDP per

capita offsets the effect of a 1% increase in unemployment. An additional year of education is comparable in magnitude to the effect of a 1-point increase in interpersonal trust. A 3% increase in the unemployment rate negates the effect of an additional year of education.

Table 6: Green Vote Logit Results - Odds Ratios

VARIABLES	(1) Individual characteristics	(2) (1) + recession dummy	(3) (1) + (2) + economic indicators	(4) (1) + (2) + (3) + PM2.5
Recession dummy	-	0.741*** (0.0669)	0.755*** (0.0693)	0.725*** (0.0671)
Unemployment rate	-	-	0.959*** (0.00581)	0.957*** (0.00597)
Real GDP per capita (2010 thousand Euros)	-	-	1.009*** (0.00164)	1.008*** (0.00173)
PM2.5 emissions (gigagrams)	-	-	-	1.008*** (0.00283)
Institutional trust	1.009 (0.0100)	1.010 (0.0100)	1.009 (0.0101)	1.009 (0.0101)
Interpersonal trust	1.135*** (0.0118)	1.135*** (0.0118)	1.134*** (0.0118)	1.134*** (0.0118)
Life satisfaction	1.003 (0.0118)	1.004 (0.0118)	1.003 (0.0118)	1.003 (0.0118)
Economy satisfaction	1.022** (0.0107)	1.020* (0.0107)	1.010 (0.0107)	1.012 (0.0108)
Female	1.447*** (0.0585)	1.445*** (0.0584)	1.451*** (0.0588)	1.452*** (0.0588)
Age	1.006*** (0.00196)	1.006*** (0.00196)	1.006*** (0.00197)	1.006*** (0.00197)
Years of education	1.129*** (0.00585)	1.129*** (0.00585)	1.131*** (0.00587)	1.131*** (0.00586)
Monthly income	1.001 (0.0012)	1.001 (0.0012)	0.9999 (0.0012)	0.9998 (0.0012)
Political leaning	0.756*** (0.00708)	0.755*** (0.00708)	0.752*** (0.00712)	0.753*** (0.00713)
Household size	0.942** (0.0221)	0.943** (0.0221)	0.944** (0.0221)	0.945** (0.0221)

Children at home dummy	1.321*** (0.0747)	1.320*** (0.0746)	1.329*** (0.0753)	1.328*** (0.0753)
Religious attendance	0.957*** (0.0145)	0.957*** (0.0146)	0.943*** (0.0145)	0.943*** (0.0145)
Employment status				
Employed	Baseline	Baseline	Baseline	Baseline
School	0.941 (0.0830)	0.940 (0.0830)	0.958 (0.0847)	0.956 (0.0846)
Unemployed, looking	0.687*** (0.0772)	0.686*** (0.0770)	0.707*** (0.0798)	0.704*** (0.0796)
Unemployed, not looking	1.007 (0.165)	1.003 (0.164)	1.046 (0.173)	1.050 (0.174)
Permanently sick or disabled	0.804 (0.125)	0.799 (0.125)	0.787 (0.124)	0.788 (0.124)
Retired	0.617*** (0.0474)	0.617*** (0.0474)	0.631*** (0.0485)	0.630*** (0.0484)
Community or military service	0.402 (0.278)	0.406 (0.280)	0.438 (0.307)	0.438 (0.308)
Housework	0.898 (0.0643)	0.896 (0.0643)	0.868** (0.0627)	0.866** (0.0626)
Community type				
City	Baseline	Baseline	Baseline	Baseline
Suburbs	0.863** (0.0547)	0.861** (0.0546)	0.839*** (0.0538)	0.839*** (0.0538)
Town or small city	0.763*** (0.0406)	0.763*** (0.0407)	0.762*** (0.0417)	0.757*** (0.0416)
Country village	0.748*** (0.0412)	0.748*** (0.0413)	0.740*** (0.0421)	0.735*** (0.0420)
Farm or home in countryside	0.823* (0.0921)	0.824* (0.0921)	0.821* (0.0927)	0.815* (0.0923)
Marital status				
Married	Baseline	Baseline	Baseline	Baseline
Separated	1.049 (0.201)	1.058 (0.204)	1.069 (0.203)	1.070 (0.204)
Divorced	0.937 (0.0646)	0.937 (0.0646)	0.921 (0.0638)	0.921 (0.0637)

Widowed	0.698*** (0.0820)	0.699*** (0.0821)	0.697*** (0.0817)	0.696*** (0.0815)
Never married	1.181*** (0.0667)	1.180*** (0.0667)	1.159*** (0.0659)	1.156** (0.0657)
Constant	0.0181*** (0.00365)	0.0186*** (0.00375)	0.0216*** (0.00466)	0.0161*** (0.00358)
Country fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Observations	106,518	106,518	106,518	106,518

We believe the discrepancies between these two models result from the contrasting nature of the dependent variables. The environmental concern measure used in the first model is more abstract while the one used in the second model is actionable and, in principle, less susceptible to desirability bias. This idea is similar to the significant deviances often observed between revealed vs. stated preference results. The failed carbon tax proposal in Washington, a state in which there is majority stated support for a carbon tax, mentioned earlier, is one example of this.

Furthermore, the dependent variable in the first model is a more internal, value-focused measure while that of the second model is a more external, policy-focused measure. This contrast might provide another explanation for the unexpected income and unemployment coefficients in the first regression.

An issue with the environmental concern variable is that 30% of people responded with a 6, choosing the highest concern category. 70% responded with a 5 or 6. Moreover, only 2.5% of people responded to the value statement with “not like me” or “not like me at all”. This low level of variation signals a poor elicitation of environmental concern for the purposes of analysis. In an attempt to create a dependent variable more indicative of people’s environmental concern using the value question, we recoded it as a binary variable in which 1 indicates the highest category of

environmental concern and 0 indicates all others. However, running a logistic regression using this variable gives fairly similar results as to those in Table 5. The differences being that institutional trust, religious attendance, and the retired dummy all became insignificant while PM2.5 became significant positively, the children at home dummy became positively significant, and the suburbs dummy became negatively significant. Results from that regression can be found in Table A3.

We ran another logistic regression with the same variables as those in Table 6 but also included interaction terms between the recession dummy and unemployment rate, real GDP per capita, institutional trust, interpersonal trust, life satisfaction, economic satisfaction, years of education, subjective income, political leaning, employment status, and community type. Interactions with the economic indicators were included to allow for variation in reactions based on economic conditions while in a recession. Those who live in relatively rich regions (higher real GDP per capita) will likely adjust their voting behavior in the face of a recession differently than those who live in relatively poor regions. Similarly, those who are relatively more trusting and satisfied with life may react differently to economic hardships than those who aren't. Perhaps those qualities act as buffers. Interactions with education, income, political leaning, employment status, and community type were included as those are all core socio-demographic variables of high interest.

The results from that regression are presented in Table A4. The interaction coefficients aren't as intuitive as the marginal effects and predictive margins drawn from the model so discussion below will be focused on those results.

Table 7 presents the average marginal effects of the interactions from the above regression. The figures following Table 7 graphically show predictive margins based on the

above interaction model. Looking at Figure 1, there is a significant difference in the probability of a green party vote outside of and during a recession. From Table 7, respondents in a recession are, on average, 1.65% less likely to vote green than their non-recession counterparts.

Figure 2 shows that in non-recession periods, increases in unemployment rate are associated with lower green vote probabilities. From Table 7, in non-recession periods, a 1% increase in the unemployment rate is associated with 0.27% drop in the average probability of a green vote. Interestingly however, during times of recession, the unemployment rate doesn't have a significant impact on green voting. This may represent an acclimation to the economic downturn. Unemployment rates are already expected to be high, so an increase is less concerning. Outside of recession a 1,000 Euro real GDP per capita increase is associated with a 0.05% increase in the probability of a green vote. However, during recessions, this marginal effect loses its significance. During difficult economic conditions the normally bolstering impact of real GDP per capita on green voting disappears. Looking at Figure 2, being in a recession indeed significantly shifts green vote probabilities downward for middle-wealth regions, but it does not alter the slope of the effect.

Interpersonal trust is highly significant. From Table 7, a 1-point increase in self-reported interpersonal trust is associated with a 0.67% increase in probability outside of recession and 0.76% increase during recession. As can be seen in Figure 3, from interpersonal trust ratings 0-7, there is a significant difference between recession and non-recession green voting probabilities. However, at the high-end of interpersonal trust, there is no significant difference. This suggests that green voting behaviors of those with higher feelings of trust are less affected by hard economic times. For institutional trust, the opposite appears to be true. There is no significant difference between recession and non-recession voting behavior for those with low trust in

national parliament while there is a significant difference for those with high trust. Perhaps this represents those with high institutional trust believing in their national parliament to pass legislation to help them during a recession, and so change their voting behavior accordingly. Conversely, perhaps those with low institutional trust do not change their voting behavior as they don't believe it will lead to helpful stimulus legislation anyway.

Looking at Figure 4, those with low life satisfaction are less likely to vote green during a recession than outside one. As life satisfaction increases, the recession line converges toward the non-recession line. Those with the highest and lowest self-reported life satisfaction don't have significantly different probabilities whether in recession or not.

Figure 5 shows that those who are employed and unemployed (looking for a job) are the only groups to have their voting behaviors significantly negatively affected by the onset of a recession. From Table 7, outside of recession, unemployed respondents are 1.62% less likely to vote for a green party than their employed counterparts. During recessions, that effect is exacerbated to a 2.83% decrease in likelihood. In good economic times, those who are retired are 2.49% less likely to vote green than employed respondents and 1.39% less likely during recession.

Again, looking at Figure 5, the green vote probability of those who live in big cities is not significantly altered by a recession, while that of those who live in suburbs, villages, and on farms is significantly decreased. From Table 7, outside of recession suburban residents are 0.83% less likely to vote green than urban residents. That effect is more than doubled to 2.1% during recessions. Interestingly, in good economic times, there is no significant difference in green vote probability between those who live on farms and those who live in cities, but during

recessions, there is. When recession hits, those who live on farms are 2.84% less likely to vote for a green party than their urban counterparts.

From Table 7, when economic conditions are good, a 1-point shift to the right on political scale is associated with a 1.64% decrease in the likelihood of a green vote. This effect is diminished during recessions to 1.11%. As can be seen in Figure 6, those on the far right of the political spectrum don't change their green voting behavior at all when recession hits while those on the far left do so significantly. This suggests a reduction in polarization around environmental issues during times of recession as people focus more on immediate economic needs, regardless of political orientation. Furthermore, right-leaning respondents simply having lower and less variable environmental concern. Among respondents who answered extremely right-leaning (10) on the political scale, the standard deviation for the environmental vote variable is 0.242, while the standard deviation for those who answered extremely left-leaning (0) is 0.076.

From Table 7, income has no significant marginal effect whether in recession or not. Furthermore, looking at Figure 7 we can see that being in a recession has no significant impact on the slope of the income effect.

Looking at Figure 8, education has an exponential relationship with green voting outcomes. For those who have 0-18 years of education completed (about 93% of the sample), there is a significant difference in the probability of a green vote during and outside recession. Past 18 years of education, being in a recession no longer significantly decreases one's likelihood of voting for a green party. While the probabilities do shift downward during recessions, we can see that the effect of additional years of education doesn't significantly change whether in a recession or not. From Table 7, one additional year of education is

associated with a 0.68% probability increase outside of recessions and a 0.62% increase during recessions.

Table 7: Average Marginal Effects from Green Vote Interactions Logistic Regression

Recession dummy	
Total	-0.0165*** (0.0044)
Unemployment rate	
Total	-0.0023*** (0.0003)
Out of recession	-0.0027*** (0.0004)
During recession	-0.0005 (0.0008)
Real GDP per capita	
Total	0.0004*** (0.00009)
Out of recession	0.0005*** (0.0001)
During recession	0.0004 (0.0002)
Institutional trust	
Total	0.0005 (0.0005)
Out of recession	0.0009 (0.0006)
During recession	-0.0019 (0.0012)
Interpersonal trust	
Total	0.0069*** (0.0006)
Out of recession	0.0067*** (0.0006)
During recession	0.0076*** (0.0013)
Life satisfaction	
Total	0.0002

	(0.0006)
Out of recession	-0.00009 (0.0007)
During recession	0.0015 (0.0014)
Economic satisfaction	
Total	0.0006 (0.0006)
Out of recession	0.0001 (.0006)
During recession	0.0001 (0.001)
Education	
Total	0.0067*** (0.0003)
Out of recession	0.0068*** (0.0003)
During recession	0.0062*** (0.0006)
Income	
Total	-0.000016 (0.00007)
Out of recession	-4.33e-06 (0.00007)
During recession	-0.00008 (0.00018)
Political leaning	
Total	-0.0156*** (0.0005)
Out of recession	-0.0164*** (0.0006)
During recession	-0.0111*** (0.0011)
Employment status	
Baseline: Employed	
School	
Total	-0.0028 (0.0051)
Out of recession	-0.0028 (0.0055)

During recession	-0.0024 (0.01)
Unemployed, looking	
Total	-0.0181*** (0.0053)
Out of recession	-0.0162*** (0.0061)
During recession	-0.0283*** (0.0087)
Unemployed, not looking	
Total	0.0026 (0.01)
Out of recession	0.0033 (0.0114)
During recession	-0.0012 (0.0194)
Permanently sick or disabled	
Total	-0.0134* (0.0078)
Out of recession	-0.0113 (0.0091)
During recession	-0.0247** (0.0105)
Retired	
Total	-0.0232*** (0.0035)
Out of recession	-0.0249*** (0.0038)
During recession	-0.0139** (0.0067)
Community or military service	
Total	-0.0367 (0.0224)
Out of recession	-0.0389 (0.0261)
During recession	-0.0251 (0.0272)
Housework	
Total	-0.008**

	(0.0039)
Out of recession	-0.0096** (0.0042)
During recession	0.0001 (0.0103)
Community type	
Baseline: City	
Suburbs	
Total	-0.0103*** (0.0038)
Out of recession	-0.0083* (0.0043)
During recession	-0.021*** (0.0078)
Town or small city	
Total	-0.0158*** (0.0032)
Out of recession	-0.0162*** (0.0036)
During recession	-0.0137* (0.0072)
Country village	
Total	-0.0173*** (0.0033)
Out of recession	-0.0162*** (0.0037)
During recession	-0.0229*** (0.0074)
Farm or home in countryside	
Total	-0.0109* (0.0064)
Out of recession	-0.0075 (0.0073)
During recession	-0.0284** (0.0119)

*** p<0.01, ** p<0.05, * p<0.1

6. CONCLUSION

The Great Recession had an undermining effect on green voting outcomes in Europe. While we understand that green parties do not have a monopoly on environmentally inclined votes, this would still suggest at least some level of reduction in environmental concern. Even with economic indicators included in the model, the recession dummy remained significant. This suggests that the notion one's country is in a recession, independent of fewer job prospects and decreased wealth, has a detrimental impact on environmental concern.

Understanding the various drivers behind environmental concern, specifically economic conditions, is important for public policy. Public opinion affects which legislation is passed. This paper suggests that environmental policies are more likely to be implemented during good economic times. It also indicates that high levels of interpersonal trust and education can ameliorate the negative effect of recessions. The environmental concern of those who are politically right-leaning is lower but less variable and less negatively affected by recession than their left-leaning counterparts. This suggests that if trying to get an environmental policy passed during more difficult economic conditions, appealing to left-leaning citizens by, for example, including green-spending (Anderson et al. 2019), may give the best chance.

Efficiency and equity are important but provide no value if the policies they are incorporated into do not pass. Reduced likelihood of environmental legislation must be accounted for to realize the full cost of recessions. During difficult economic times, we must be cautious of and curb the deterioration of environmental concern. Understanding how

macroeconomic and sociodemographic variables influence environmental preferences provides insights into prospects for environmental policy and how to maximize political feasibility.

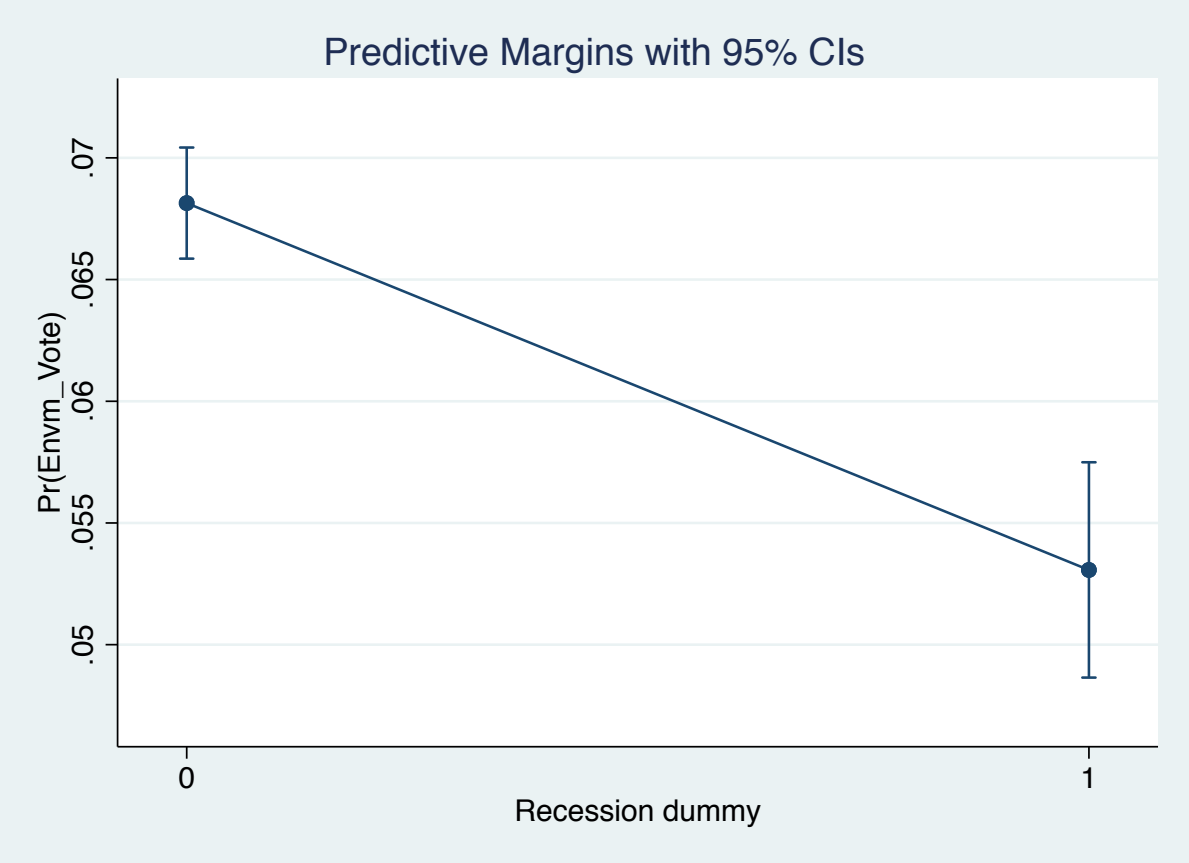


Figure 1

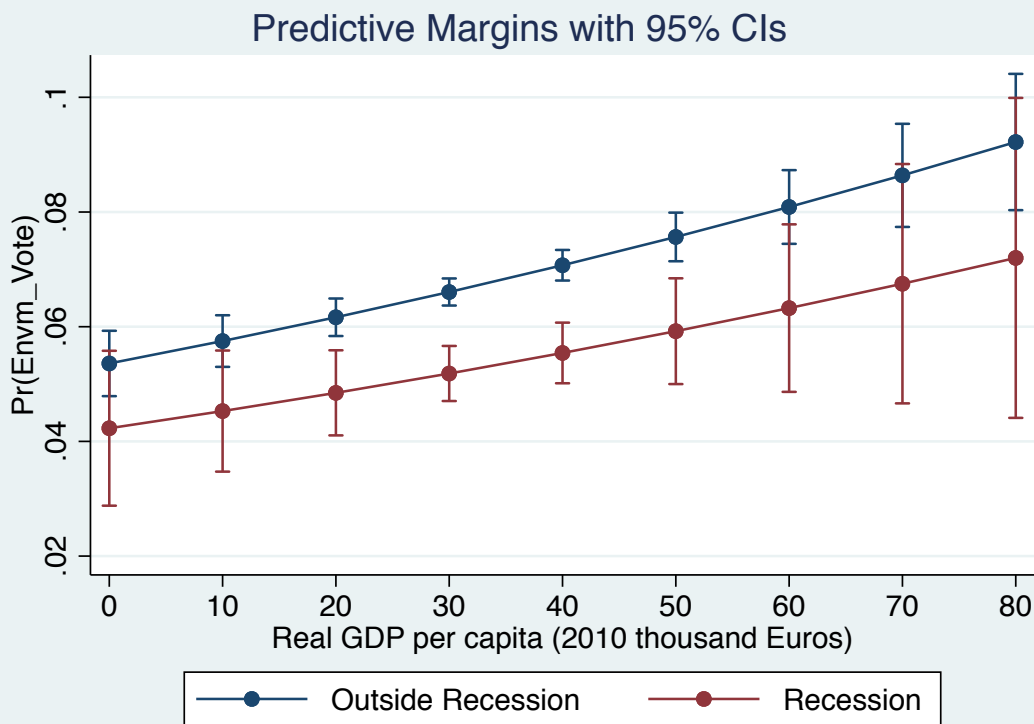
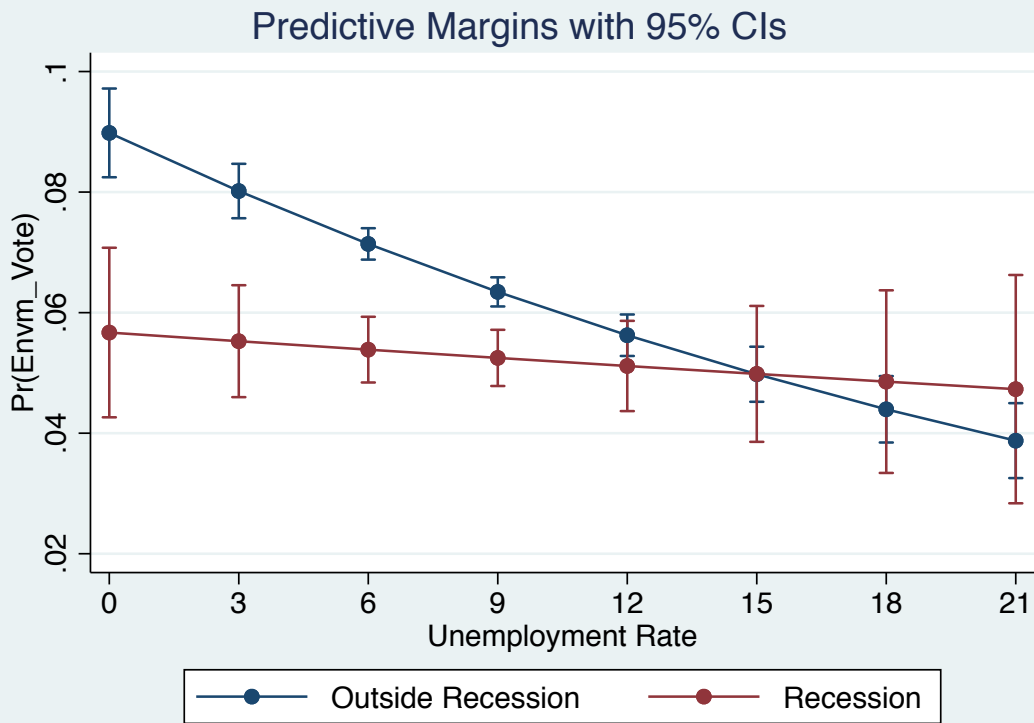


Figure 2

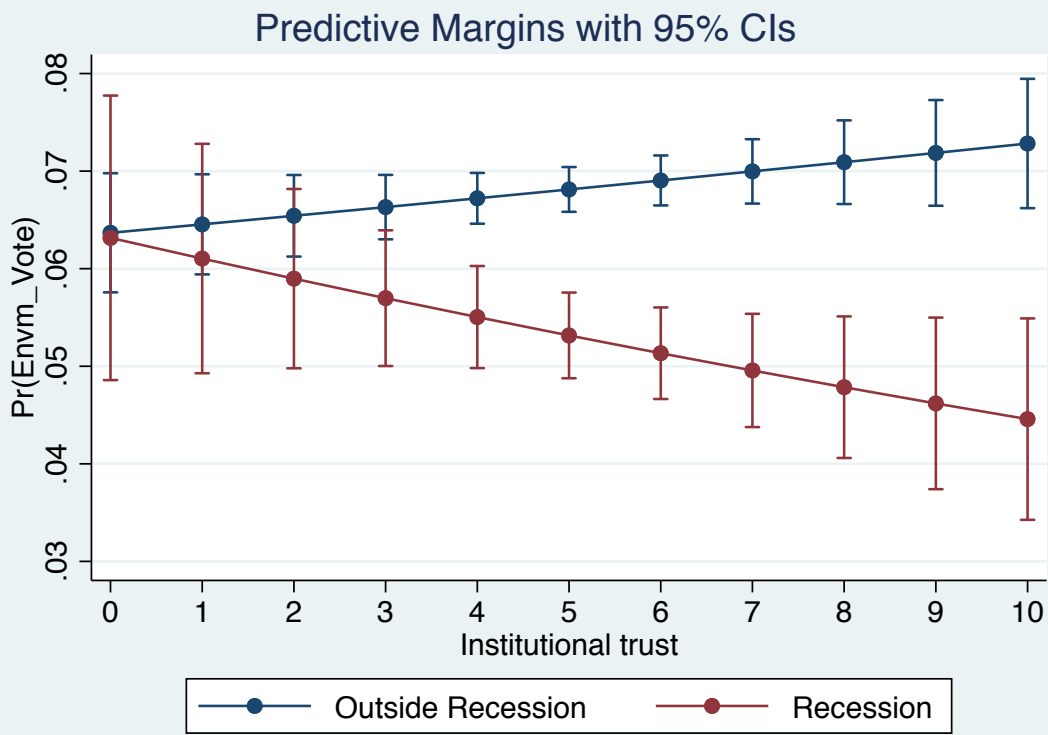
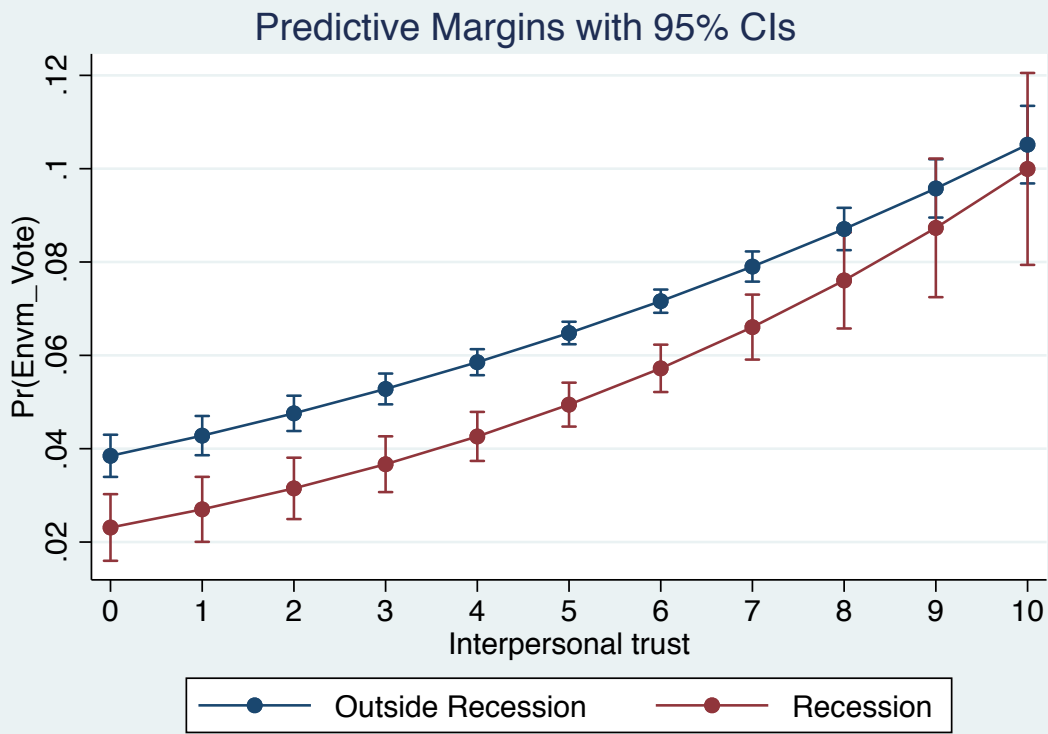


Figure 3

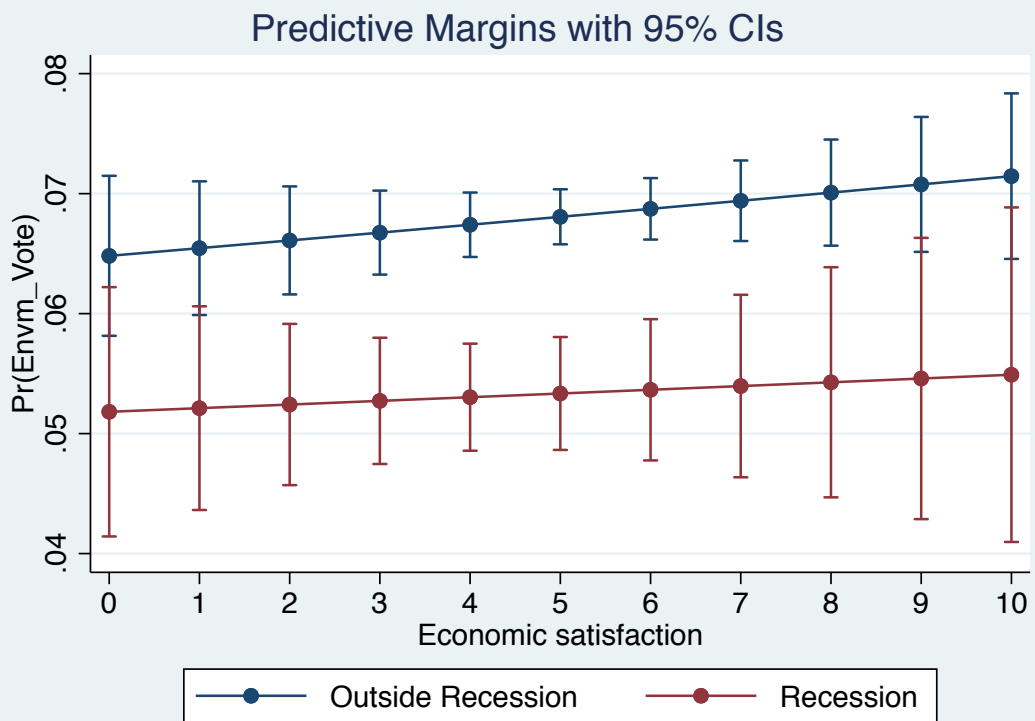
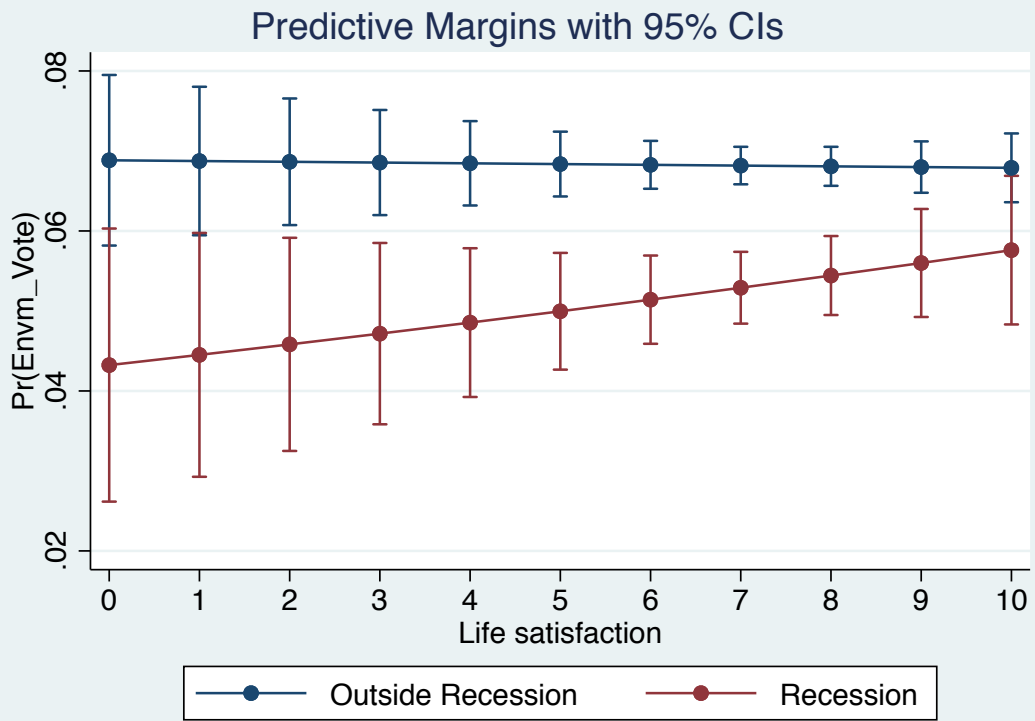


Figure 4

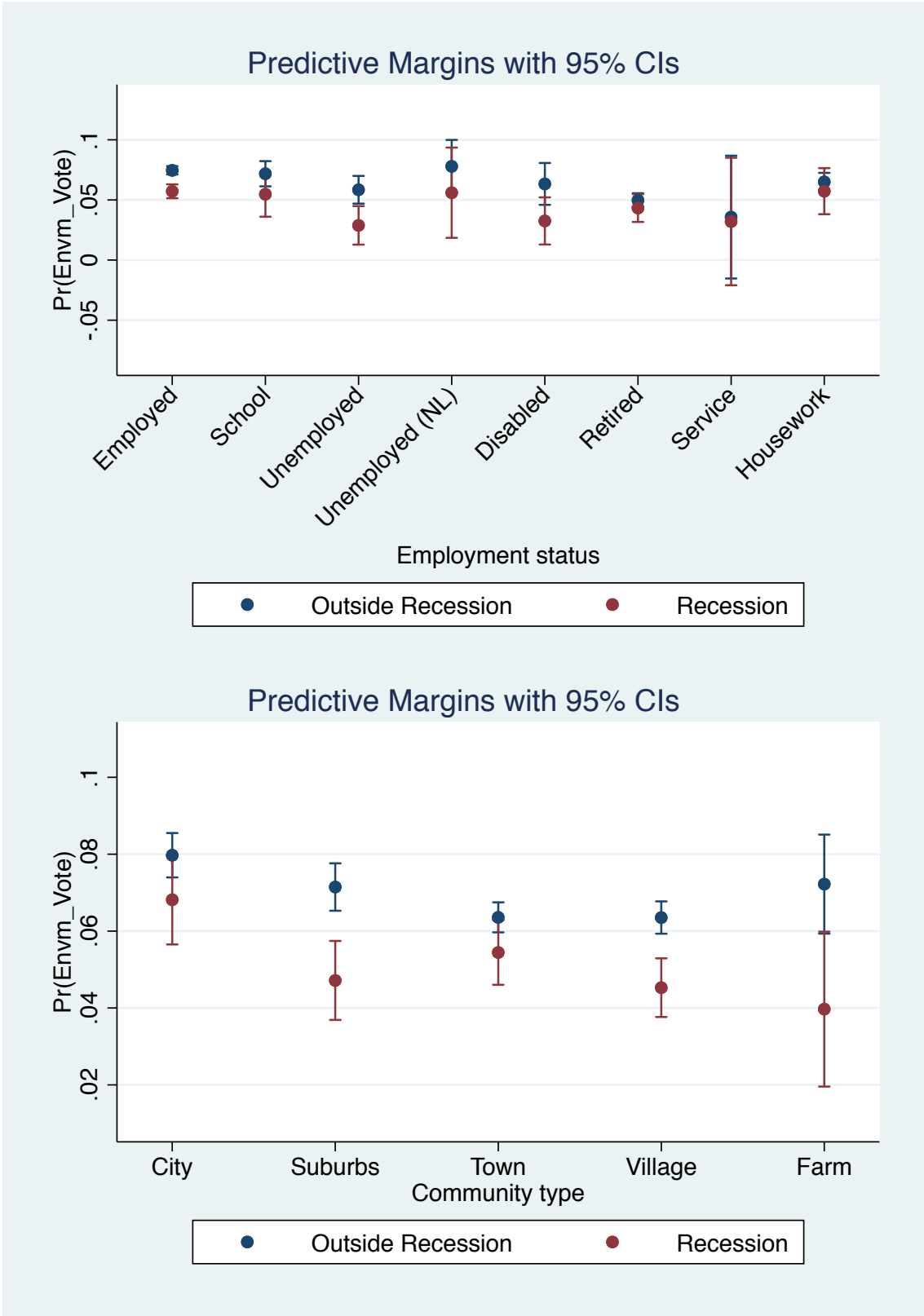


Figure 5

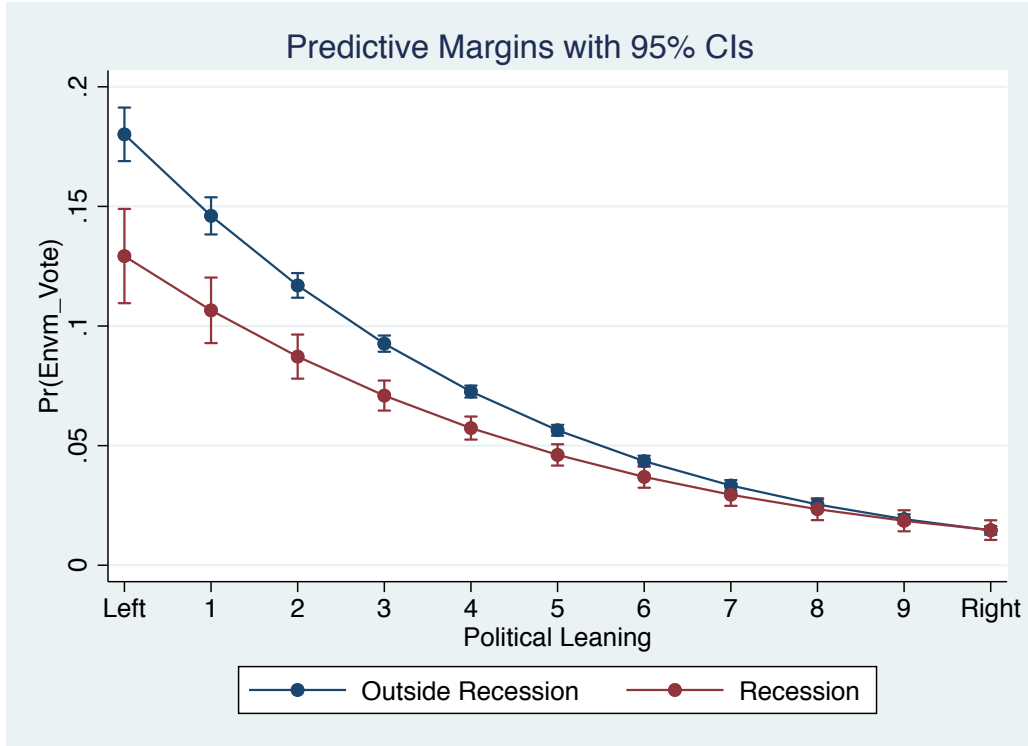


Figure 6

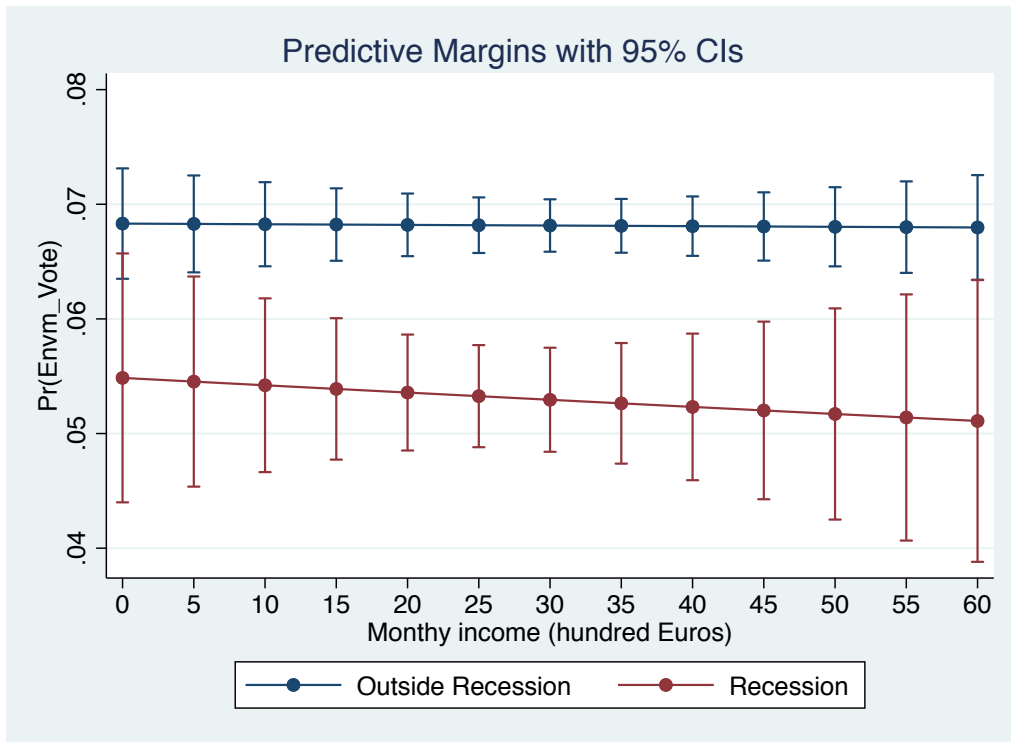


Figure 7

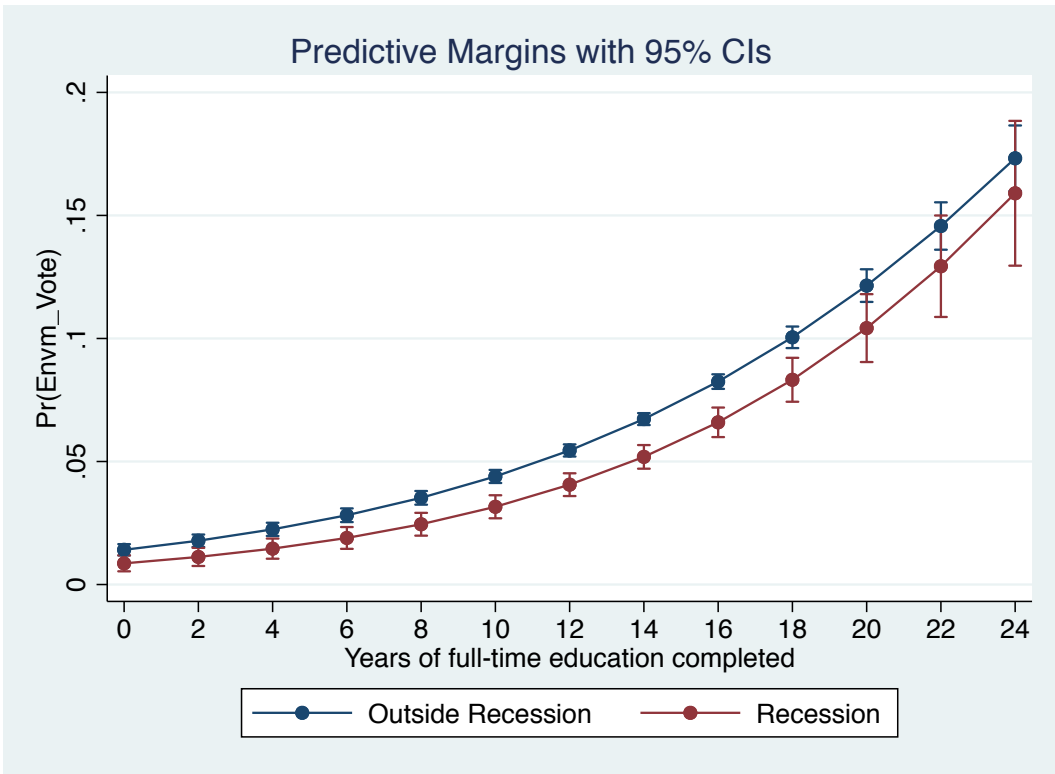


Figure 8

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8. APPENDIX

Table A1 shows a breakdown of unemployment rate disaggregation by country and round, where 0 indicates national-level, 1 indicates NUTS 1, and 2 indicates NUTS 2. N/A indicates that country was not administered the ESS that round. About 67% of the unemployment data is NUTS 2, 20% NUTS 1, and 13% national. All regional unemployment data is from Eurostat.

Table A2 similarly shows a breakdown of real GDP per capita disaggregation. About 28% of real GDP per capita data is NUTS 3, 42% NUTS 2, 20% NUTS 1, and 10% national. All real GDP per capita data is from Eurostat except for France, Netherlands, Norway, and Poland, which is from OECD.

Table A1: Unemployment NUTS Breakdown

	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
Austria	2	2	2	N/A	N/A	N/A	2	2
Belgium	1	1	1	1	2	2	2	2
Bulgaria	N/A	N/A	2	2	2	2	N/A	N/A
Switzerland	0	2	2	2	2	2	2	2
Cyprus	N/A	N/A	0	0	0	0	N/A	N/A
Czechia	2	2	N/A	2	2	2	2	2
Germany	1	1	1	1	1	1	1	1
Denmark	0	0	0	2	2	2	2	N/A
Estonia	N/A	0	0	0	0	0	0	0
Spain	2	2	2	2	2	2	2	2
Finland	0	0	0	0	2	2	2	2
France	1	1	1	1	2	2	2	2
United Kingdom	1	1	1	1	1	1	1	1
Greece	2	2	N/A	1	2	N/A	N/A	N/A
Croatia	N/A	N/A	N/A	2	2	N/A	N/A	N/A

Hungary	1	1	1	1	2	2	2	2
Ireland	2	2	0	0	2	2	2	2
Iceland	N/A	0	N/A	N/A	N/A	0	N/A	0
Italy	2	N/A	N/A	N/A	N/A	2	N/A	2
Lithuania	N/A	N/A	N/A	N/A	0	2	2	2
Luxembourg	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	2	2	2	2	2	2	2	2
Norway	2	2	2	2	2	2	2	2
Poland	2	2	2	2	2	2	2	2
Portugal	2	2	2	2	2	2	2	2
Sweden	2	2	2	2	2	2	2	2
Slovenia	2	2	2	2	2	2	2	2
Slovakia	N/A	2	2	2	2	2	N/A	N/A
Turkey	N/A	1	N/A	1	N/A	N/A	N/A	N/A

Table A2: Real GDP per capita NUTS Breakdown

	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
Austria	2	2	2	N/A	N/A	N/A	2	2
Belgium	1	1	1	1	2	2	2	2
Bulgaria	N/A	N/A	3	3	3	3	N/A	N/A
Switzerland	0	0	0	2	2	2	2	2
Cyprus	N/A	N/A	0	0	0	0	N/A	N/A
Czechia	3	3	N/A	2	3	3	3	3
Germany	1	1	1	1	1	1	1	1
Denmark	0	0	0	2	2	2	2	N/A
Estonia	N/A	3	3	3	3	3	3	3
Spain	2	2	2	2	2	2	2	2
Finland	0	0	0	0	3	3	3	3
France	1	1	1	1	2	2	2	2
United Kingdom	1	1	1	1	1	1	1	1
Greece	2	2	N/A	1	2	N/A	N/A	N/A
Croatia	N/A	N/A	N/A	2	2	N/A	N/A	N/A
Hungary	1	1	1	1	3	3	3	3
Ireland	3	3	0	0	3	3	3	2

Iceland	N/A	0	N/A	N/A	N/A	0	N/A	0
Italy	2	N/A	N/A	N/A	N/A	2	N/A	2
Lithuania	N/A	N/A	N/A	N/A	3	3	3	2
Luxembourg	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	2	2	2	2	2	2	2	2
Norway	2	2	2	2	2	2	2	2
Poland	2	2	2	2	2	2	2	2
Portugal	2	2	2	2	2	2	2	2
Sweden	2	2	2	2	3	3	3	3
Slovenia	3	3	3	3	3	3	3	3
Slovakia	N/A	3	3	3	3	3	N/A	N/A
Turkey	N/A	1	N/A	1	N/A	N/A	N/A	N/A

Table A3: Environmental Concern Binary Variable - Odds Ratios

	(1) Individual characteristics	(2) (1) + recession dummy	(3) (1) + (2) + economic indicators	(4) (1) + (2) + (3) + PM2.5
Recession dummy	-	0.949 (0.0332)	0.958 (0.0338)	0.951 (0.0336)
Unemployment rate	-	-	0.996** (0.00204)	0.996** (0.00204)
Real GDP per capita (2010 thousand Euros)	-	-	1.004*** (0.000862)	1.003*** (0.000872)
PM2.5 emissions (gigagrams)	-	-	-	1.002* (0.00107)
Institutional trust	0.997 (0.00390)	0.997 (0.00390)	0.997 (0.00390)	0.997 (0.00390)
Interpersonal trust	1.019*** (0.00400)	1.019*** (0.00400)	1.019*** (0.00400)	1.019*** (0.00400)
Life satisfaction	1.028*** (0.00458)	1.028*** (0.00458)	1.028*** (0.00458)	1.028*** (0.00458)
Economy satisfaction	0.974*** (0.00422)	0.974*** (0.00423)	0.972*** (0.00428)	0.972*** (0.00429)
Female	1.167*** (0.0196)	1.167*** (0.0196)	1.167*** (0.0196)	1.167*** (0.0196)

Age	1.016*** (0.000845)	1.016*** (0.000845)	1.016*** (0.000845)	1.016*** (0.000845)
Years of education	1.031*** (0.00233)	1.031*** (0.00233)	1.031*** (0.00233)	1.031*** (0.00233)
Monthly income	0.996*** (0.000596)	0.996*** (0.000596)	0.996*** (0.000604)	0.996*** (0.000605)
Political leaning	0.961*** (0.00369)	0.961*** (0.00369)	0.961*** (0.00369)	0.961*** (0.00369)
Household size	0.991 (0.00895)	0.991 (0.00895)	0.992 (0.00896)	0.992 (0.00896)
Children at home dummy	1.058** (0.0250)	1.058** (0.0250)	1.058** (0.0250)	1.058** (0.0250)
Religious attendance	1.006 (0.00603)	1.007 (0.00603)	1.005 (0.00602)	1.005 (0.00602)
Employment status				
Employed	Baseline	Baseline	Baseline	Baseline
School	1.017 (0.0418)	1.017 (0.0418)	1.021 (0.0420)	1.022 (0.0420)
Unemployed, looking	1.209*** (0.0499)	1.209*** (0.0499)	1.218*** (0.0503)	1.217*** (0.0503)
Unemployed, not looking	1.050 (0.0693)	1.049 (0.0693)	1.055 (0.0697)	1.055 (0.0697)
Permanently sick or disabled	1.364*** (0.0711)	1.364*** (0.0710)	1.365*** (0.0710)	1.365*** (0.0710)
Retired	0.955 (0.0270)	0.956 (0.0270)	0.957 (0.0271)	0.957 (0.0271)
Community or military service	0.755 (0.219)	0.755 (0.219)	0.765 (0.222)	0.767 (0.223)
Housework	1.009 (0.0310)	1.009 (0.0310)	1.008 (0.0309)	1.007 (0.0309)
Community type				
City	Baseline	Baseline	Baseline	Baseline
Suburbs	0.932** (0.0280)	0.932** (0.0280)	0.934** (0.0280)	0.935** (0.0281)
Town or small city	0.955** (0.0225)	0.955** (0.0225)	0.969 (0.0230)	0.969 (0.0230)
Country village	0.965 (0.0229)	0.965 (0.0229)	0.981 (0.0234)	0.981 (0.0234)
Farm or home in countryside	1.117***	1.118***	1.140***	1.139***

	(0.0479)	(0.0479)	(0.0490)	(0.0490)
Marital status				
Married	Baseline	Baseline	Baseline	Baseline
Separated	0.969 (0.0750)	0.971 (0.0750)	0.968 (0.0749)	0.968 (0.0749)
Divorced	1.142*** (0.0337)	1.142*** (0.0337)	1.138*** (0.0336)	1.138*** (0.0336)
Widowed	0.911*** (0.0311)	0.911*** (0.0311)	0.909*** (0.0310)	0.909*** (0.0310)
Never married	1.033 (0.0260)	1.033 (0.0260)	1.030 (0.0260)	1.030 (0.0259)
Constant	0.146*** (0.0144)	0.146*** (0.0145)	0.135*** (0.0141)	0.127*** (0.0137)
Country fixed effects	Included	Included	Included	Included
Year fixed effects	Included	Included	Included	Included
Observations	204,605	204,605	204,605	204,605

Table A4: Green Vote Logit Interaction Effects - Odds Ratios

	(1)
Recession dummy	0.344** (0.165)
Unemployment rate	0.953*** (0.00634)
Unemployment rate*Recession	1.038** (0.0193)
Real GDP per capita (2010 thousand Euros)	1.008*** (0.00179)
Real GDP per capita*Recession	0.999 (0.00530)
PM2.5 emissions (gigagrams)	1.008*** (0.00286)
Institutional trust	1.016 (0.0110)
Institutional trust*Recession	0.945** (0.0263)
Interpersonal trust	1.127*** (0.0125)

Interpersonal trust*Recession	1.048 (0.0316)
Life satisfaction	0.998 (0.0127)
Life satisfaction*Recession	1.035 (0.0342)
Economy satisfaction	1.012 (0.0118)
Economy satisfaction*Recession	0.995 (0.0272)
Female	1.455*** (0.0591)
Age	1.006*** (0.00197)
Years of education	1.129*** (0.00635)
Years of education*Recession	1.015 (0.0140)
Income	0.9999 (0.0012)
Income*Recession	0.9987 (0.0041)
Political leaning	0.747*** (0.00766)
Political leaning*Recession	1.050* (0.0263)
Household size	0.945** (0.0222)
Children living at home dummy	1.332*** (0.0755)
Religious attendance	0.943*** (0.0145)
Employment status	
Employed	Baseline
School	0.954 (0.0893)
Unemployed, looking	0.746** (0.0910)
Unemployed, not looking	1.055 (0.190)
Permanently sick or disabled	0.820 (0.140)
Retired	0.617*** (0.0494)
Community or military service	0.424

	(0.345)
Housework	0.847** (0.0644)
Employment status*Recession	
Employed*Recession	Baseline
School*Recession	0.997 (0.220)
Unemployed, looking*Recession	0.622 (0.210)
Unemployed, not looking*Recession	0.925 (0.407)
Permanently sick or disabled*Recession	0.646 (0.248)
Retired*Recession	1.177 (0.201)
Community or military service*Recession	1.228 (1.515)
Housework*Recession	1.183 (0.261)
Community type	
Big city	Baseline
Suburbs or outskirts of big city	0.874* (0.0609)
Town or small city	0.759*** (0.0454)
Country village	0.758*** (0.0469)
Farm or home in countryside	0.885 (0.107)
Community type*Recession	
Big city*Recession	Baseline
Suburbs or outskirts of big city*Recession	0.747* (0.130)
Town or small city*Recession	1.013 (0.148)
Country village*Recession	0.823 (0.130)
Farm or home in countryside*Recession	0.608 (0.199)
Marital status	
Married	Baseline
Separated	1.069

	(0.204)
Divorced	0.918
	(0.0637)
Widowed	0.694***
	(0.0813)
Never married	1.162***
	(0.0660)
Constant	0.0172***
	(0.00394)
Observations	106,518
