



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

An econometric analysis of determinants of climate change attitudes and behaviour in Greece and Great Britain

*Viktoria Tsitsoni^{a*1}, Luiza Toma^b*

Abstract

This study examines the impact of some main determinants of environmental behaviour, a priori identified in the scientific literature, on the Greek and British citizens' perceptions about environmental protection and their actions to fight climate change. The study used Eurobarometer data and logistic regression and identified factors significantly influencing environmental perceptions and behaviour common in both countries. Perceptions of EU climate change policy and education significantly influence environmental perceptions of both Greek and British citizens. Access to information is the strongest determinant of environmental behaviour in both countries, followed by age, gender and occupation/purchasing power, and environmental attitudes and perceptions.

Keywords: *climate change, citizen behaviour, behavioural determinants, Greece, Great Britain.*

1. Introduction

During the past decades, there has been a lot of scepticism and uncertainty about climate change as a *phenomenon*, about its causes and potential magnitude of its effects within the scientific community and, as a consequence, among the policy makers and the general public. Only as from the last few years there has been a growing scientific consensus that climate change is a reality and that many human activities contribute to it in a negative way (Whitmarsh L., 2011; Doran and Zimmerman, 2009; Poortinga *et al.*, 2011). According to the IPCC (2007), climate change refers to a statistically significant variation in either the mean or the variability of its properties, persisting for an extended period (typically decades or longer). Climate change may be due to natural variability (internal processes or external forcing), or to human activities (anthropogenic changes in the composition of the atmosphere or in land-use). Rapid or abrupt climate change can be identified as a change resulting when the climate system is forced to a new state at rates faster than their known or suspected cause (through instabilities, threshold

^a EUROCONTROL, Rue de la Fusée 96, 1130 Brussels BELGIUM.
E-mail: viktoria.tsitsoni@eurocontrol.int

^{*} Corresponding author

¹ This research was initiated while the first author was affiliated with the University of Edinburgh for an MSc Programme in Ecological Economics.

^b Land Economy & Environment, SRUC Edinburgh Campus, King's Buildings, West Mains Road, Edinburgh, EH9 3JG, UK. E-mail: luiza.toma@sruc.ac.uk

crossings and other types of nonlinear behaviour of the global climate system) (Holmes J. *et al.*, 2011; Rahmstorf, 2003; Rial, 2004; Jousel *et al.*, 1994; Clark *et al.*, 1999). The evidence for rapid climate change is compelling: sea-level rise; global temperature rise; warming of oceans; shrinking ice sheets; declining Arctic sea ice; glacial retreat; ocean acidification (IPCC Fourth Assessment Report, 2007; Fussel, 2009; VijayaVenkataRaman *et al.*, 2012).

Policy makers and natural and social scientists have been increasingly looking into the multitude of factors responsible for the degradation of the environment and climate change, many of which being related to human activities. Subsequently, media and various other ways of communication have been used to convey findings to the general public in an attempt to influence their attitudes and potentially induce behavioural change. Currently, citizens in all European Union member countries and in many other parts of the world have been increasingly involved in a 'citizens' agenda' to fight environmental degradation and more specifically climate change. Fundamental studies into the ways in which people (without specialist knowledge) perceive climate change indicate that the plurality of the public is able to recognise some of the main causes of climate change. However, the amount of knowledge about the subject varies and, in general, there appears to be some confusion on the above issues (Bord *et al.* 1998; Lorenzoni and Langford 2001; DEFRA 2002; Lowe *et al.* 2005). Lorenzoni *et al.* (2007) suggest that it is not enough for individuals to be informed about climate change. In order to be truly interested in the issue, the public have to care about it, be encouraged and be able to take action. During the past decades there has been a lot of discussion concerning the role of people in fighting *phenomena* such as climate change. Several studies have examined the factors that influence and determine the environmental behaviour of people.

This paper first presents a brief review of determinants of attitudes and behaviour towards climate change, which is followed by a quantitative analysis of climate change attitudes and behaviours of Greek and British citizens.

2. Review of determinants of attitudes and behaviour towards climate change

Despite its significance, climate change is not usually perceived as the most important amongst the environmental problems or when compared with other social issues such as the economic crisis or criminality rate (Bord *et al.*, 1998). Moreover, it has been often confused with other environmental issues such as ozone depletion (Bostrom *et al.*, 1994). However, the attention paid to climate change by media, NGOs and local authorities (Bell, 1994; Mazur, 1998) has contributed to trigger people's stronger awareness of the issue and to its being classified amongst the other social problems (Hannigan, 1995).

In a recent study, Semenza *et al.* (2008) found that almost all respondents included in their research were aware of the climate change and global warming. Whereas scientific studies continue to support and suggest conservation behaviours for individuals, only some of them have suggested which specific actions should the public adopt in order to best contribute to the mitigation of climate change (Whitmarsh, 2009). Read *et al.* (1994) suggest that decreasing driving, increasing political action, and recycling constitute some actions that people could adopt in order to contribute to the combat against

climate change.

There is a considerable number of studies that examine the factors that influence attitudes and behaviour towards climate change and other environmental issues. A number of surveys have focused on how much people know about climate change and how knowledge affects their attitudes and behaviour towards environmental issues. Surveys have showed that almost all people are aware of environmental issues but the amount of knowledge differs (Plontikoff *et al.*, 2004; Bord *et al.*, 1998). There is a broad literature suggesting that the more the people know about environment and its problems (causes, consequences, actions for protection), the more appropriately they will behave (Hines *et al.*, 1987; Schahn and Holzer, 1990). However, the majority of studies agree that only a small part of environmental behaviour can be linked to environmental knowledge (Kollmus and Agyeman, 2002).

Values and norms (personal and social) are considered responsible for shaping much of an individual's character. More specifically, Thøgersen (2006) examines the relationship between norms and four types of environmental behaviours: buying organic milk; buying energy saving light bulbs; separating waste according to source production; and taking public transport. According to his findings, personal norms are the most strongly correlated with environmentally responsible behaviour. Childhood experiences, role models (parents, friends, teachers) and education can also shape environmental values which may lead to environmental behaviour (Kollmus and Agyeman, 2002; Stern *et al.*, 1995).

Dunlap and Van Liere (1978) and Dunlap *et al.* (2000) use a value *continuum* which places biocentrism (or ecocentrism) at one end and anthropocentrism at the other. This scale is known as the New Environmental Paradigm (NEP). This concept is based on beliefs about the ability of humanity to perturb natural systems, the fact that natural resources are not unlimited and the discourse on whether people are superior to nature.

There are many scientists who focused on these aspects of environmental attitudes (Chandler and Dreger, 1993; Thompson and Barton, 1994; Kortenkamp and Moore, 2001) and most of them found that, in general, biocentrists/ ecocentrists tend to have a more environmentally responsible behaviour than anthropocentrists (Barr, 2003).

Socio-demographic characteristics constitute another group of factors that are considered to influence environmental behaviour. Gender, occupation, education, age, economic situation, political beliefs and the type of community that people live in, are some examples of factors considered to impact on environmental behaviour (McCright, 2010; Cottrell, 2003).

Economic factors can also have an influence on people acting more environmentally responsible. Dresner *et al.* (2006), in their research on environmental tax reform in the UK, found that people want their governments to adopt incentive measures in order to encourage a more environmentally friendly behaviour. It appears that citizens prefer to obtain some obvious benefits rather than be 'punished' for their energy use through environmental taxes, for instance.

Research interest in media products and practices with regard to environmental issues has grown over the last years (Smith, 2000; Trumbo, 1996; Burgess, 1990). Media contributes to shaping public perceptions and consequently plays an important role in policy making (Nelkin, 1987). The mass-media constitutes a fundamental factor in the recognition and understanding of environmental issues (Schoenfeld *et al.*, 1979). In

general, without media coverage it is less likely that an important problem will either enter the arena of public discourse or become part of political issues. Most people depend on the media to help them comprehend the information presented every day on television or in press, especially information about environmental risks, technologies, and initiatives (Hannigan, 1995).

3. Data and methodology

3.1 Data

The data used in this analysis was selected from the Eurobarometer database “Special Eurobarometer 300: Europeans’ attitudes towards climate change” (2008). This Eurobarometer survey was commissioned by the Directorate General for Communication of the European Commission, on behalf of the European Parliament and the European Commission. It was carried out by TNS opinion & social network between the 25th of March and the 4th of May 2008. The interviews were conducted among 30,170 citizens in the 27 Member States of the European Union (plus the three candidate countries for accession to the European Union; Croatia, Turkey and the Former Yugoslav Republic of Macedonia). The survey included data on socio-demographics, access to information, attitudes, behaviour and intentional behaviour towards climate change.

In this analysis we focused on Greece and Great Britain for the following reasons: (1) both are EU members and share the EU environmental legislation and policies, while maintaining some differences as regards country-specific legislation and policy; (2) the differences between their economy, culture, political system, *etc.* lead to different approaches to fighting climate change at policy making and general public levels; (3) their different geographical and climatic circumstances lead to different impacts of climate change; and (4) there are many differences between the responses of Greek and British citizens to a number of questions raised in the Eurobarometer survey, *e.g.*, while Greece is amongst the countries with the highest proportion of respondents who think that climate change is not an unstoppable process, Great Britain is at the opposite end of the scale; a similar position was shown from answers to other questions such as the perceptions of the “seriousness” of climate change, preparedness to pay more for green energy, preferred means to fight climate change (reducing water consumption in Greece and waste separation in Great Britain). This case study attempts to build on these differences and offer an interesting comparison as regards the impact of various determinants on the environmental attitudes and behaviour of the citizens of the two countries.

Table 1 presents the name of the indicators, the corresponding statements, values & labels and type of variables and Table 2 presents the descriptive statistics for the variables included in the models.

In some of the models described below, an additional variable ‘access to information’ was created based on three variables, namely ‘access to information on causes of climate change’; ‘access to information on how to fight climate change’; and ‘access to information on consequences of climate change’, using factor analysis. The loadings of the three variables on the same factor were very high (above 90%) and the total variance explained was 83.02% for the Great Britain sample and respectively, 80.5% for the Greece sample. Cronbach alpha values were 89.8% for the Great Britain sample and respectively, 87.9% for the Greece sample.

Table 1: Description of variables and their corresponding indicators

Indicator (where relevant, questionnaire statement included in parentheses)	Value & label	Variable type
Socio-demographics characteristics		
Age	1 = 15-24 years old; 2 = 25-39 years old; 3 = 40-54 years old; 4 = 55+ years old	categorical
Gender	1 = male; 2 = female	dichotomous
Number of people living in the household	1 = one person; 2 = two persons; 3 = three persons; 4 = four or more persons	categorical
Education ('How old were you when you stopped full-time education?')	0 = no full-time education; 1 = 15 or younger; 2 = 16-19; 3 = 20+; 4 = still studying	categorical
Occupation	1 = self-employed; 2 = managers; 3 = other white collars; 4 = manual workers; 5 = house persons; 6 = unemployed; 7 = retired; 8 = students	categorical
Purchasing power during the past 5 years	1 = improved; 2 = stayed about the same; 3 = got worse	ordinal
Political beliefs ('In political matters people talk of "the left" and "the right". How would you place your views?')	1 = left; 2 = centre; 3 = right	categorical
Type of community	1 = rural area or village; 2 = small or middle sized town; 3 = large town	categorical
Access to information on climate change		
Access to information (causes of climate change/ how to fight climate change/ consequences of climate change) ('Personally do you think that you are well informed or not about..?')	variable created using factor analysis	continuous
Access to information on how to fight climate change ('Personally do you think that you are well informed or not about..?')	1 = very well informed; 2 = fairly well informed; 3 = not very well informed;	ordinal

<i>Indicator (where relevant, questionnaire statement included in parentheses)</i>	<i>Value & label</i>	<i>Variable type</i>
	4 = not at all informed	
Internet access at home	0 = not mentioned; 1 = have internet connection at home	dichotomous
Climate change attitudes/perceptions/intentions		
Climate change - unstoppable process ('Climate change is an unstoppable process, we cannot do anything about it')	1 = totally agree; 2 = tend to agree; 3 = tend to disagree; 4 = totally disagree	ordinal
Perceived level of climate change activity - citizens	1 = doing too much; 2 = doing about the right amount; 3 = not doing enough	ordinal
Perceived level of climate change activity - industries	1 = doing too much; 2 = doing about the right amount; 3 = not doing enough	ordinal
Perceived most serious world problems -climate change/ global warming	0 = not mentioned; 1 = mentioned	dichotomous
Perceptions of environmental protection importance ('What do you think are the most important issues facing your country at the moment?')	0 = not mentioned; 1 = mentioned	dichotomous
Perceptions of EU economic impact of climate change (Fighting climate change can have a positive impact on EU economy)	1 = totally agree; 2 = tend to agree; 3 = tend to disagree; 4 = totally disagree	ordinal
Perceptions of EU focus on environmental issues ('European integration has been focusing on various issues in the last years. In your opinion, which aspects should be emphasized by the European Institutions in the coming years, to strengthen the European Union in the future?')	0 = not mentioned; 1 = mentioned	dichotomous
Pay more for climate friendly energy ('In average how much in per cent would you be ready to pay more for energy produced from sources that emit less greenhouse gases in order to fight the climate change?')	0 = no; 1 = 1-5%; 2 = 6-10%; 3 = 11-20%; 4 = 21-30%; 5 = 31-40%; 6 = 41-50%; 7 = 50% +	categorical
Climate change behaviour		
Personal action taken in order to fight climate change ('You personally have taken actions aimed at helping to fight climate change')	1 = yes; 2 = no	dichotomous

Table 2: Statistical descriptives of the variables included in the Great Britain and Greece models

	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>
Great Britain - perceptions regarding the importance of environmental protection			
Education	991	1.96	.869
Political beliefs	834	1.96	.708
Access to information	963	.00	1.000
Perceptions of EU economic impact of climate change	761	2.27	.818
Perceptions of EU focus on environmental issues	1006	.31	.461
Perceptions of environmental protection importance	1006	.06	.237
Valid N (listwise)*	631		
Greece - perceptions regarding the importance of environmental protection			
Education	1000	2.03	1.001
Type of community	995	2.25	.916
Access to information on how to fight climate change	1000	2.55	.772
Climate change - unstoppable process	997	3.15	.907
Perceptions of EU focus on environmental issues	1000	.37	.484
Perceptions of environmental protection importance	1000	.06	.245
Valid N (listwise)*	992		
Great Britain - personal action taken in order to fight climate change			
Age	1006	3.05	1.080
Gender	1006	1.56	.497
Number of people living in the household	1006	2.27	1.112
Education	991	1.96	.869
Occupation	1006	5.16	2.124
Access to information	963	.00	1.000
Perceptions of EU focus on environmental issues	1006	.31	.461
Perceptions of environmental protection importance	1006	.06	.237
Personal action taken in order to fight climate change	1006	1.26	.439
Valid N (listwise)*	948		
Greece - personal action taken in order to fight climate change			
Age	1000	2.87	1.079
Gender	1000	1.53	.499
Education	1000	2.03	1.001
Purchasing power during the past 5 years	999	2.54	.707

	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>
Access to information on how to fight climate change	1000	2.55	.772
Internet access at home	1000	.22	.414
Perceived level of climate change activity - industries	997	2.97	.179
Perceived level of climate change activity - citizens	999	2.77	.441
Climate change - unstoppable process	997	3.15	.907
Perceived most serious world problems-climate change/global warming	1000	.90	.304
Perceptions of environmental protection importance	1000	.06	.245
Pay more for climate friendly energy	859	1.59	1.143
Personal action taken in order to fight climate change	1000	1.28	.449
Valid N (listwise)*	853		

* The samples consist of 1,006 observations in Great Britain and 1,000 observations in Greece. The valid sample size varies in our models as we treated the 'do not know' responses as missing data and discarded those observations.

3.2 Methodology

We use multiple logistic regression to analyse the impact of various determinants on attitudes and (intentional) behaviour towards climate change. Logistic regression is useful for situations in which one wants to be able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables. It is similar to a linear regression model but is suited to models where the dependent variable is dichotomous. Logistic regression coefficients can be used to estimate odds ratios for each of the independent variables in the model (Field, 2009). Logistic regression computes the probability (log-odds) that a case will belong to one of the two categories, given a set of predictor variables (Hosmer and Lemeshow, 2000). The model is presented in equation (1):

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 X_{1i} + b_2 X_{2i} + \dots + b_n X_{ni})}} \quad (1)$$

Where: $P(Y)$ is the probability of Y occurring; e is the base of natural logarithms; b_0 is the constant; b_n are regression coefficients of the corresponding predictor variables X_n . The model is estimated with the maximum-likelihood method.

The interpretation of the results of logistic regression analysis is done using statistical tests, namely log likelihood value, which shows the overall goodness-of-fit of the model; Chi-square, which is used to test for the reduction in the log likelihood values; Wald statistic, which is used to provide the statistical significance for each coefficient estimated, with the significance coefficient indicating the significance level of the Wald statistic; and Cox & Snell R-square and Nagelkerke R-square, which measure the overall significance of the regression. Cox & Snell R-square is presented in equation (2):

$$R_{CS}^2 = 1 - \left(\frac{l(0)}{l(\hat{\beta})} \right)^{\frac{2}{m}} \quad (2)$$

Where $l(\hat{\beta})$ is the likelihood of the current model and $l(0)$ is the likelihood of the initial model and m is the sample size.

Nagelkerke R -square is presented in equations (3) and (4):

$$R_N^2 = \frac{R_{CS}^2}{\max(R_{CS}^2)} \quad (3)$$

Where

$$\max(R_{CS}^2) = 1 - \{l(0)\}^{\frac{2}{m}} \quad (4)$$

The next section discusses the results of the regression analyses.

4. Results and discussion

4.1 Determinants of perceptions and attitudes as regards the importance of environmental protection

This section presents the results of the logistic regressions performed for Great Britain and Greece concerning the factors that affect individuals' perceptions regarding the importance of environmental protection.

4.1.1 Great Britain

The dependent variable in this model is a dichotomous variable 'perceptions of environmental protection importance'. The independent variables included in the model for Great Britain are presented in Table 3.

Table 3: Factors that affect individuals' perceptions regarding the importance of environmental protection (Great Britain)

	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>Sig.</i>	<i>Exp(B)</i>
Education	.633	.196	10.411	1	.001	1.884
Political beliefs	-.527	.252	4.378	1	.036	.590
Access to information	-.362	.204	3.142	1	.076	.696
Perceptions of EU economic impact of climate change	-.751	.254	8.752	1	.003	.472
Perceptions of EU focus on environmental issues	2.196	.433	25.745	1	.000	8.990
Nagelkerke R Square	.311					

The results (Table 3) show that variables 'perceptions of EU focus on environmental

issues', 'education', 'perceptions of EU economic impact of climate change', 'political beliefs' and 'access to information' have a significant influence on the dependent variable 'perceptions of the importance of environmental issues'. This may suggest that the stronger the citizens' perceptions of the emphasis given by the EU institutions to environmental issues the more likely people are to perceive these issues as important. Moreover, the results confirm findings from the literature that more educated and better informed citizens tend to have stronger environmental attitudes and that political beliefs might also influence environmental attitudes (*e.g.*, members/supporters of green parties). Perceptions about the potential impact of climate change on the European economy also significantly influence British citizens' perceptions of the importance of environmental protection. This is in line with the current economic crisis as a main concern of the European citizens and the number of green initiatives with a focus on energy-saving and climate-change related measures. The overall fit of the model is good as the independent variables included in the regression explain about a third of the variance of the dependent variable.

4.1.2 Greece

The model replicates the Great Britain model with the same dependent variable 'perceptions of environmental protection importance' however not all the independent variables included in the two models are the same. The independent variables included in the model for Greece are presented in Table 4.

Table 4: *Factors that affect individuals' perceptions regarding the importance of environmental protection (Greece)*

	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>Sig.</i>	<i>Exp(B)</i>
Education	.244	.136	3.234	1	.072	1.276
Type of community	.403	.177	5.174	1	.023	1.496
Access to information on how to fight climate change	-.260	.183	2.013	1	.156	.771
Climate change - unstoppable process	.403	.180	4.989	1	.026	1.496
Perceptions of EU focus on environmental issues	.857	.275	9.721	1	.002	2.356
Nagelkerke R Square	.215					

Table 4 shows that variables 'perceptions of EU focus on environmental issues', 'type of community', 'climate change - unstoppable process' and 'education' have a significant influence on the Greek respondents' perceptions about the importance of the environment. Similarly to British citizens, Greek citizens' environmental perceptions are most strongly influenced by their perceptions of the emphasis given by the EU institutions to environmental issues. Confirming findings from the literature, type of community is a significant factor, which suggests that people from urban areas might have different perceptions about the importance of the environment as compared with people from rural areas. Perceptions about climate change to be an unstoppable process significantly influence perceptions of the importance of the environment. Just as for British

citizens, Greek citizens' education has a significant influence on their environmental perceptions. The overall fit of the model is good as the independent variables included in the regression explain about a fifth of the variance of the dependent variable.

4.2 Determinants of personal action taken in order to fight climate change

While the previous section analysed the impact of various determinants on environmental perceptions and attitudes, this section looks into determinants of environmental behaviour, namely it presents the results of the logistic regressions performed for Great Britain and Greece concerning the factors that affect personal action taken in order to fight climate change.

4.2.1 Great Britain

This subsection presents the results of the logistic regression of factors influencing personal environmental actions of British citizens. The dependent variable in the model is 'personal action taken in order to fight climate change', which is a dichotomous variable, taking value 1 for personal action taken in order to fight climate change and value 0 otherwise. The independent variables included in the model for Great Britain are presented in Table 5.

Table 5: *Factors influencing personal action taken in order to fight climate change (Great Britain)*

	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>Sig.</i>	<i>Exp(B)</i>
Age	-.221	.094	5.550	1	.018	.801
Gender	-.318	.162	3.849	1	.050	.727
Number of people living in the household	-.100	.085	1.411	1	.235	.904
Education	-.096	.112	.726	1	.394	.909
Occupation	.135	.042	10.164	1	.001	1.145
Access to information	.473	.081	33.847	1	.000	1.604
Perceptions of EU focus on environmental issues	-.793	.201	15.528	1	.000	.453
Perceptions of environmental protection importance	-.654	.501	1.705	1	.192	.520
Nagelkerke R Square	.152					

The results (Table 5) show that variables 'access to information', 'perceptions of EU focus on environmental issues', 'occupation', 'age' and 'gender' have a significant influence on the behaviour of British citizens. Access to environmental information has the strongest impact on behaviour. Being well informed on environmental issues (causes, actions, and consequences) is considered to be one of the most important determinants of environmental behaviour. There is an established concept that the more aware someone is of the condition of the environment, the more appropriately they will act. Perceptions of the emphasis given by the EU institutions to environmental issues significantly influence the behaviour just as they did the environmental importance per-

ceptions. Again confirming findings from the literature, occupation, age and gender significantly influence behaviour. As occupation is often used as a proxy for income, this might suggest that people with higher income are more likely to take action in order to fight climate change. The overall fit of the model is acceptable as the independent variables included in the regression explain about a sixth of the variance of the dependent variable.

4.2.2 Greece

This subsection presents the results of the logistic regression of factors influencing personal environmental actions of Greek citizens. The dependent variable in the model is ‘personal action taken in order to fight climate change’, which is a dichotomous variable, taking value 1 for personal action taken in order to fight climate change and value 0 otherwise. The independent variables included in the model for Greece are presented in Table 6.

Table 6: *Factors influencing personal action taken in order to fight climate change (Greece)*

	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>Sig.</i>	<i>Exp(B)</i>
Age	-.349	.104	11.153	1	.001	.706
Gender	-.541	.171	10.006	1	.002	.582
Education	-.249	.117	4.511	1	.034	.779
Purchasing power during the past 5 years	-.239	.118	4.121	1	.042	.787
Access to information on how to fight climate change	.390	.117	11.112	1	.001	1.477
Internet access at home	-.443	.236	3.530	1	.060	.642
Perceived level of climate change activity - industries	-1.101	.447	6.061	1	.014	.332
Perceived level of climate change activity - citizens	.696	.223	9.723	1	.002	2.006
Climate change - unstoppable process	-.217	.090	5.783	1	.016	.805
Perceived most serious world problems - climate change/ global warming	-.484	.266	3.310	1	.069	.616
Perceptions of environmental protection importance	-.374	.415	.813	1	.367	.688
Pay more for climate friendly energy	-.166	.079	4.458	1	.035	.847
Nagelkerke R Square	.148					

The results (Table 6) show that variables ‘access to information on how to fight climate change’, ‘age’, ‘gender’, ‘perceived level of climate change activity – citizens’, ‘perceived level of climate change activity – industries’, ‘climate change - unstoppable process’, ‘education’, ‘pay more for climate friendly energy’, ‘purchasing power during the past 5 years’, ‘internet access at home’ and ‘perceived most serious world problems

-climate change/ global warming' have a significant influence on behaviour. As shown in the Great Britain model, being informed about how to fight climate change strongly influences behaviour and this might suggest that the more Greek citizens are informed about climate change and the possible ways to fight it the more likely they are to adopt actions to fight climate change. This is supported by the fact that having access to internet at home, as a potential source of information on climate change issues, was also found to influence behaviour. Perceptions of how much industries and people do to fight climate change significantly influence behaviour. Namely, Greek citizens who state to take action against climate change are less convinced that the industry is doing enough to fight it, however they are more willing to adopt environmental actions when they are convinced that other citizens are doing the same. Just as shown to influence Greek citizens' perceptions of the importance of environmental issues, perceptions about climate change being an unstoppable process is strongly related also to Greek people's actions to fight climate change. Willingness to pay more for energy produced from sources that emit less greenhouse gases is a significant determinant of behaviour and this might suggest that the more Greek citizens are willing to pay for environmental friendly energy the more likely they are to adopt other actions to fight climate change. Perceptions of global warming/climate change as serious world problems significantly influence behaviour. This might suggest that individuals who consider the warming of the planet and climate change to be serious problems are more likely to take personal action in order to fight climate change. Confirming findings from the literature, socio-economic factors (age, gender, education and purchasing power during the past 5 years) significantly influence behaviour. Just as occupation in the Great Britain model, purchasing power can be used as a proxy for income and suggests that Greek citizens with higher income are more likely to take action to fight climate change. Similarly, age and gender are significant factors influencing behaviour in both countries. The overall fit of the model is acceptable as the independent variables included in the regression explain about a sixth of the variance of the dependent variable.

5. Conclusions

The purpose of this study was to examine the impact of some main determinants of environmental behaviour, *a priori* identified in the scientific literature, on the Greek and British citizens' perceptions about environmental protection and their actions to fight climate change. Some significant findings emerged from this research.

Perceptions of EU focus on environmental issues and education are significant factors influencing perceptions about the importance of environmental protection of both British and Greek citizens. While British citizens' environmental attitudes are also influenced by how they perceive the impact of climate change on the EU economy, Greek citizens' attitudes are influenced by their perceptions of climate change being an unstoppable process. As regards the impact on attitudes of other demographic factors, British citizens are influenced by their political beliefs, while type of community is more relevant for Greek people.

As regards the impact on environmental behaviour, access to information, followed by a number of demographic factors (age, gender and occupation/purchasing power) are

main determinants in both countries. Similarly, environmental attitudes and perceptions have a significant impact on behaviour in both countries. Namely, while British citizens' actions to fight climate change are influenced by their perceptions of environmental issues at the EU level, Greek citizens are influenced by their perceptions of climate change activities at public and industry levels, and of climate change being an unstoppable process and a serious world problem.

From a policy perspective the findings of this study can have some important implications. First of all, the study proves that access to information and education matter. The more we know about the world we live in the more likely we are to care about it and the more motivated we can be in order to protect it (Maloney and Ward, 1973; Borden and Schettino, 1979; Becker, 1978; Katzev and Johnson, 1984; Schahn and Holzer, 1990). However, just being informed is not enough to change behaviour (Kollmus and Agyeman, 2002; Lorenzoni *et al.*, 2007). As our study has shown, access to information is the strongest among a multitude of interrelated factors, which significantly influence behaviour. As it is, information can be an important policy tool, which, if properly targeted and combined with other measures, may lead to behavioural change. As climate change is a complex subject, access to information should be more focused on specific topics (*e.g.* causes, scientific characteristics, policies *etc.*) and specific methods. Younger and older people, women and men, people with different education and income levels, people living in urban and rural areas, people with different political beliefs have different perceptions of the environment and therefore need a different approach in order to understand and protect it. It is also important for policy makers to take into consideration the different characteristics of countries, their mentality and way of life, in order to design appropriate climate change policies.

Acknowledgements

The data used in this study was provided by GESIS. SRUC receives grant funding from the Scottish Government.

References

- Barr, S. (2003). Strategies for sustainability: citizens and responsible environmental behaviour. *Area*, 35(3), pp. 227-240.
- Becker, L. J. (1978). Joint effect of feedback and goal setting on performance: a field study of residential energy conservation. *Journal of Applied Psychology*, 63(4), pp. 428-433.
- Bell, A. (1994). Climate of opinion: Public and media discourse on the global environment. *Discourse & Society*, 5(1), pp. 33-64.
- Bord, R. J., Fisher, A., O'Connor, R. E. (1998). Public perceptions of global warming: United States and international perspectives. *Climate Research*, 11, pp. 75-84.
- Borden, R. J., Schettino, A. P. (1979). Determinants of environmentally responsible behaviour. *Journal of Environmental Education*, 10(4), pp. 35-39.
- Bostrom, A., Morgan, M.G., Fischhoff, B. and Read, D. (1994). What Do People Know About Global Climate Change? 1. Mental Models. *Risk Analysis*, 14(6), pp. 959-970.
- Burgess, J. (1990). The production and consumption of environmental meanings in the mass media: a research agenda for the 1990s. *Transactions of the Institute of British Geographers*, 15(2), pp.139-161.

- Chandler, E.W., Dreger, R.M. (1993). Anthropocentrism: Construct validity and measurement. *Journal of Social Behavior & Personality*, 8(2), pp. 169-188.
- Clark, P.U., Alley, R.B., Pollard, D. (1999). Northern Hemisphere Ice-Sheet Influences on Global Climate Change. *Science*, 286(5442), pp. 1104-1111.
- Cottrell, S.P. (2003). Influence of socio-demographics and environmental attitudes on general responsible environmental behavior among recreational boaters. *Environment and behavior*, 35(3), pp. 347-375.
- DEFRA (2002). Survey of Public Attitudes to Quality of Life and to the Environment: 2001. Department for Environment, Food and Rural Affairs London UK.
- Doran, P.T., Zimmerman, M.K. (2009). Examining the Scientific Consensus on Climate Change. *EOS: Transactions American Geophysical Union*, 90(3), pp 22-23.
- Dresner S., Jackson, T., Gilbert, N. (2006). History and social responses to environmental tax reform in the United Kingdom. *Energy Policy*, 34, pp. 930-939.
- Dunlap, R. E., & Van Liere, K. D. (1978). A proposed measuring instrument and preliminary results: The 'New Environmental Paradigm'. *Journal of Environmental Education*, 9(1), 10-19.
- Dunlap R.E., Van Liere K.D., Mertig A.G., Jones, R.E. (2000). Measuring endorsement of the New Ecological Paradigm: a revised NEP scale. *Journal of Social Issues*, 56(3), pp. 425-442.
- Field, A. (2009). *Discovering Statistics Using SPSS*. Third Edition, SAGE Publications, London.
- Füssel, H-M. (2009). An updated assessment of the risks from climate change based on research published since the IPCC Fourth Assessment Report. *Climatic Change*, 97(3-4), pp 469-482.
- Hannigan, J.A. (1995). *Environmental Sociology*. Routledge: New York, 1995.
- Hines, J. M., Hungerford, H. R., Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *Journal of Environmental Education*, 18(2), pp. 1-8.
- Holmes, J., Lowe, J., Wolff, E., Srokosz, M. (2011). Rapid climate change: lessons from the recent geological past. *Global and Planetary Change*, 79(3-4), pp. 157-162.
- Hosmer D.W., Lemeshow, S. (2000). *Applied logistic regression*. John Wiley & Sons.
- IPCC AR4 SYR (2007), Core Writing Team; Pachauri, R.K; and Reisinger, A., (eds.), Climate Change 2007: Synthesis Report, Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC, ISBN 92-9169-122-4.
- Jousel, J., Lorius, C., Johnsen, S., Grootes, P. (1994). Climate Instabilities: Greenland and antarctic records. *C.R. Acad. Sci. Paris t. 319 serie II*, pp. 65-77.
- Katzev, R. D., Johnson, T. R. (1984). Comparing the effects of monetary incentives and foot-in-the-door strategies in promoting residential electricity conservation. *Journal of Applied Social Psychology*, 14(1), pp. 12-27.
- Kollmuss, A., Agyeman, J. (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behaviour. *Environmental Education Research*, 8(3), pp. 239-260.
- Kortenkamp, K.V., Moore, C.F. (2001). Ecocentrism and anthropocentrism: moral reasoning about ecological commons dilemmas. *Journal of Environmental Psychology*, 21(3), pp. 261-272.
- Lorenzoni, I., Langford, I. H. (2001). Climate Change Now and in the Future: A Mixed Methodological Study of Public Perceptions in Norwich (UK). CSERGE Working Paper ECM 01-05.

- Lorenzoni, I., Nicholson-Cole, S., Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17(3-4), pp. 445-459.
- Lowe, T., Brown, K., Dessai, S., De Franca Doria, M., Haynes, K., Vincent, K. (2005). Does tomorrow ever come? Disaster narrative and public perceptions of climate change. Tyndall Centre for Climate Change Research, Working Paper 72.
- Maloney M. P., Ward M. P. (1973). Ecology: Let's hear from the people: An objective scale for the measurement of ecological attitudes and knowledge, *American Psychologist*, 28(7), pp. 583-586.
- Mazur, A. (1998). Global environmental change in the news. 1987-90 vs 1992-6. *International Sociology*, 13(4), pp. 457-472.
- McCright, A.M. (2010). The effects of gender on climate change knowledge and concern in the American public. *Population & Environment*, 32(1), pp. 66-87.
- Nelkin, D. (1987). *Selling science: How the press covers science and technology*. New York: W.H. Freeman.
- Plotnikoff R.C., Wright, M-F., Karunamuni, N. (2004). Knowledge, attitudes and behaviours related to climate change in Alberta, Canada: implications for public health policy and practice. *International Journal of Environmental Health Research*, 14(3), pp. 223 – 229.
- Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., Pidgeon, N.F., (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change*, 21(3), pp. 1015-1024.
- Rahmstorf, S. (2003). Timing of abrupt climate change: A precise clock. *Geophysical Research Letters*, 30(10), pp. 17-1 – 17-4.
- Read D., Bostrom A., Morgan M. G., Fischhoff B., Smuts T. (1994). What do people know about global climate change? 2. Survey studies of educated lay-people. *Risk Analysis*, 14(6), pp. 971-982.
- Rial, J.A. (2004). Abrupt climate change: chaos and order at orbital and millennial scales. *Global and Planetary Change*, 41(2), pp. 95-109.
- Schahn, J., Holzer, E. (1990). Studies of individual environmental concern: the role of knowledge, gender, and background variables. *Environment and Behaviour*, 22(6), pp. 767-786.
- Schoenfeld, A.C., Meier, R.F., GriYn, R.J. (1979). Constructing a social problem: the press and the environment. *Social Problems*, 27(1), pp. 38-61.
- Semenza J.C., Hall, D.E., Wilson, D.J., Bontempo, B.D., Sailor, D.J., George, L.A. (2008). Public Perception of Climate Change: Voluntary Mitigation and Barriers to Behavior Change. *American Journal of Preventive Medicine*, 35(5), pp. 479-487.
- Smith, J. (Ed.) (2000). *The Daily Globe: Environmental Change, the Public and the Media*. London: Earthscan.
- Special Eurobarometer 300 (2008). Europeans' attitudes towards climate change. European Commission, Brussels.
- Stern P.C., Dietz T., Guagnano, G.A. (1995). The new ecological paradigm in social-psychological context. *Environment and Behavior*, 27(6), pp. 723-743.
- Thøgersen, J. (2006). Norms for environmentally responsible behaviour: An extended taxonomy. *Journal of Environmental Psychology*, 26(4), pp. 247-261.
- Thompson, S. C. G., Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14(2), pp. 149-157.
- Trumbo, C. (1996). Constructing climate change: Claims and frames in US news coverage of an environmental issue. *Public Understanding of Science*, 5(3), pp. 269-283.

- Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology*, 29(1), pp. 13-23.
- Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: Dimensions, determinants and change over time. *Global Environmental Change*, 21(2), pp. 690-700.
- VijayaVenkataRaman, S., Iniyan, S., Goic, R. (2012). A review of climate change, mitigation and adaptation. *Renewable and Sustainable Energy Reviews*, 16(1), pp. 878-897.