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ECONOMIC DEVELOPMENT AND EU CITIZENS' PRO- ENVIRONMENTAL ATTITUDES

Empirical
study

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JEL Classification

E03, O11, Q56

Abstract

The present paper aims to determine the influence of EU member countries' economic development on their citizens' pro-environmental attitudes, using a Cluster Analysis, a Principal Components Analysis and a series of multiple regressions. In this sense, we have used the results of the 2012 survey on the „Attitudes of Europeans towards building the single market for green products”, as well as the 2012 statistical information referring to EU member countries' economic development, provided by Eurostat. Using multiple regression analyses, we have outlined a significant influence of macroeconomic variables, such as: the employment rate, tertiary educational attainment, GDP per capita, human development index value, unemployment rate, share of gross value added in services and share of employment in services on European citizens' pro-environmental attitudes.

Introduction

Research on public opinion related to environmental issues has been a major area of inquiry in environmental studies for over three decades (Marquart-Pyatt, 2007). As environmental issues have become more global, environmental attitudes and behavior are being studied in a more global context.

At the individual level, the variables that have been most studied in relation to their impact on environmental concern are age, gender, education, income, and sociopolitical orientation (Corbett, 2006). Moreover, individuals' higher levels of income tend to be associated with higher levels of environmentalism (Fransson & Garling, 1999; Gelissen, 2007), although the precise relationship between wealth and environmental concern has been at the center of theoretical debate, and tends to vary across cultures (Ahern, 2012).

However, Freymeyer and Johnson (2010) suggest that country-level determinants may be more important predictors for environmental behavior than individual-level characteristics. Standard economic reasoning suggests that the protection of the environment is not only a public good, but also a normal good, whose demand increases with income (Franzen, 2003). Citizens in wealthier nations not only have a higher demand for a clean environment, but they also have less pressing economic problems and are therefore more willing and able to reduce their standard of living in order to devote more resources to global environmental protection while concern for local environmental problems is higher in poorer nations because of the more severe local environmental problems (Franzen, 2003). It is hardly surprising that citizens' views of the environment are linked to economic status, as there is often an open conflict between the pursuit of one's material self-interest through the exploitation of nature and the preservation of natural resources (Hardin, 1968 as cited in Kimmelmeier, Krol & Kim, 2002).

Knight and Messer (2012) suggested that future research should focus on constructing and refining better indicators and further exploring the relationships between economic affluence, environmental conditions, world society, and other potential macro-level factors. Considering these recommendations, the goal of this article is to contribute to the dialogue on macroeconomic factors which influence environmental concern in a cross-national framework. Based on the results of the 2012 survey on the „Attitudes of Europeans towards building the single market for green products”, as well as the 2012 statistical information referring to EU member countries' economic development, we have studied the influence of macroeconomic variables, such as: the employment rate, tertiary educational attainment, GDP per capita, human development index value,

unemployment rate, share of gross value added in services and share of employment in services, on European citizens' pro-environmental attitudes. The article starts with a review of the pro-environmental literature, followed by the research methodology. The third section of the paper is dedicated to data analysis and the final section presents a series of conclusions and the main limitations of this research.

Literature Review

The concern for the environment has been represented as a range of attitudes, behavioral intentions, and behaviors, including recycling, agreeing that environmental issues are important to address, expressed willingness to pay higher prices and/or taxes if a portion goes to environmental protection efforts, being a member of an environmental organization, and signing a petition pertaining to an environmental issue (Marquart-Pyatt, 2007).

A common assumption regarding environmental concern is that only those who are affluent enough to care about concerns beyond immediate survival are able to devote energy to environmental problems and to engage in actions that demonstrate such concerns (Givens & Jorgenson, 2011). Thus, certain researchers have shown interest in demonstrating whether people in poorer countries are less concerned about environmental quality than people in wealthier countries (Knight & Messer, 2012).

The view that poorer countries may have lower levels of environmental concern has largely been stated by two theoretical perspectives: postmaterialism theory and the affluence hypothesis. First, the theory of postmaterialism, developed out of the work of Inglehart (1977, 1990, 1997), is partly based on the scarcity hypothesis that people most highly value those things in short supply. While materialist values mainly refer to the economic aspects of people's lives, concern with civic order and stability, postmaterialist values refer to higher order values based on abstract principles of humanitarianism, civil liberties, democratic participation, and an enhanced quality of life (Inglehart, 1990).

The second perspective, the economic affluence hypothesis, also developed out of challenges to postmaterialism and assumed a more direct link between affluence and concern. Based on rational choice theory and behavioral economics, this perspective argues that environmental quality is a public good for which demand rises with income (Diekmann & Franzen, 1999; Franzen, 2003; Franzen & Meyer, 2010; Kimmelmeier et al., 2002). Franzen and Meyer's (2010) multilevel analysis of the International Social Survey Programme (ISSP) data found a positive cross-national association between

affluence and environmental concern, net of environmental conditions and post material values.

As a measure of affluence, Givens and Jorgenson (2011) used gross domestic product (GDP) per capita. This research examines individual - and national-level predictors of individual-level environmental concern, and multilevel analysis allows us to focus on national-level context while controlling for individual-level variables. The findings are counter to affluence hypotheses and partially in support of degradation hypotheses at the national level. Another key finding of this study is the opposite effects of national levels of affluence and rates of economic growth on individual-level environmental values; GDP per capita is negatively correlated with levels of environmental concern, whereas GDP growth is positively associated with levels of environmental concern. Although higher rates of individual affluence are associated with higher rates of environmental concern, Givens and Jorgenson (2011) found, counter to Inglehart, that national-level affluence is associated with lower levels of environmental concern, in line with the results of Gelissen (2007) as well as some of the findings of Dunlap and Mertig (1997) and Dunlap and York (2008).

Focusing on between-country variation, Diekmann and Franzen (1999) and Franzen (2003) demonstrated a pattern in support of the affluence hypothesis, where mass publics of wealthier nations (i.e., Switzerland, Canada, Netherlands) tended to have higher mean levels of environmental concern. Countries having lower mean levels of environmental concern included Russia, Czech Republic, Bulgaria, and Philippines.

Other research investigating between-country variations in environmental concern generally conveyed similar findings. Dekker et al., (1997) and Kemmelmeier et al. (2002) also demonstrated some support for the affluence hypothesis, differentiating between advanced industrialized countries, which tended to cluster near the upper echelons, and former communist countries in East Central Europe and Russia and developing countries.

Multination studies of environmental concern also included approaches that emphasize country-based or within-country studies. Weaver (2002), for example, compared within-country variation in five countries (the United States, Great Britain, West Germany, Russia, and Japan) with regard to the sources of pro-environmental attitudes.

In a series of papers, Dunlap and colleagues used cross-national data from the Health of the Planet (HOP) Survey (Dunlap et al, 1993; Dunlap & Mertig, 1995) and World Values Survey (WVS) (Dunlap & Mertig, 1997; Dunlap & York, 2008) and found evidence that postmaterialism and

economic affluence are not consistently positively correlated with environmental concern and in some cases are negatively correlated. Concurrently, others (e.g., Diekmann & Franzen, 1999; Franzen, 2003) have found evidence supporting the affluence hypothesis that environmental concern rises with affluence. One of the latest studies to find evidence contradictory to the postmaterialism and affluence hypotheses is Dunlap and York's (2008) analyses of three waves of the WVS. Knight and Messer (2012) first replicate this study's bivariate correlation analysis with data from the latest wave of the WVS, 2004–2008. They also go a step further by testing alternative explanations of global environmental concern posited by world society theory and the environmental degradation hypothesis. They test these three theories with a multivariate panel analysis using data from four waves of the WVS (1990–2008).

The general socioeconomic development is important in various ways (Haller & Hadler, 2008). Problems such as unemployment, poverty, or security might be more relevant and outshine the environmental concerns (Haller & Hadler, 2008).

Haller and Hadler (2008) used two indicators and captured a country's level of socioeconomic development: "the GNP" (gross national product) and "the HDI" (Human Development Index). The latter is a more sociological measure since it includes the spread of higher education, life expectancy, and the purchasing power of the population. At the macro level, after controlling individual-level effects, they found that pro-environmentalist attitudes are quite strong in Western countries, but that these values are still quite weak in the postcommunist countries of Eastern Europe. They have also outlined that a higher level of development increases the readiness to make sacrifices and that in postcommunist countries, willingness to cut back one's lifestyle is particularly low.

Methodology

In order to analyse the influence of macroeconomic variables on European citizens' pro-environmental attitudes and behaviour, we have considered two types of secondary data. On one hand, we have studied the information included in the 2012 Flash Eurobarometer 367 „Attitudes of Europeans towards building the single market for green products" and we have extracted 11 items referring to respondents' pro-environmental attitudes and behaviours (from EU 27 countries), which we have further on used as dependent variables. Thus, the items 1 to 4, 6 and 8 to 11 refer to the respondents' attitudes, the item 5 refers to the actual buying behavior, and the item 7 refers to behavioral intention of respondents (see table no. 2). On the other hand, we have collected a series of macroeconomic indicators as independent variables

from the 2012 statistical data provided by Eurostat: tertiary educational attainment, GDP/capita, the Human Development Index, employment rate, unemployment rate, gross added value in services and the employment rate in services), which we considered relevant for the economic development of EU 27' countries.

We have computed this data using the SPSS 12.0 package and performed three types of analyses: Cluster, Pincipal Component and Multiple Regression. First, we have classified the studied countries using the Cluster analysis in order to find if there were significant differences between them considering their citizens' pro-environmental attitudes and behaviours. Two clusters resulted which are different from the economic development perspective. Second, in order to reduce the number of depend variables collected from the Flash Eurobarometer 367, we have performed a Principal Component analysis and obtained three factors (factor 1, factor 2 and factor 3). Third, we have operated a series of Multiple Regression analyses in order to determine the macroeconomic variables that exert a significant influence on EU 27 citizens' pro-environmental attitudes and behaviours. These analyses have considered both the factors resulted from the Principal component analysis and the clusters resulted from the Cluster analysis. We have considered using each factor as a dependent variable for all the studied countries (EU 27) and for each cluster.

Data Analysis

In order to investigate whether there were differences between citizens from 27 European countries according to their pro-environmental attitudes and behaviours and to attempt to classify them, a cluster analysis of the data was undertaken. Cluster analysis is a technique that is used by social scientists in order to clasify individuals into a manageable set of groups (Gilg et al, 2005). The procedure is based on the premise that at the beginning of the analysis, all individuals in the sample can be paired into clusters. Before the data were clustered, the structure of the data set was analyzed. This was done by computing hierarchincal clustering solutions for variables, giving us an indication about the extent and nature of structure in the data set.

In the context of the current research, two clusters were chosen considering the following independent variables: tertiary educational attainment, GDP per capita, the Human Development Index value, employment rate, unemployment rate, gross value added in services and the share of employment in services. The first cluster includes 11 countries and the second cluster includes 16 countries (table no. 1).

The first cluster includes developed European countries while the second cluster includes mainly emerging countries, especially from the South-Eastern Europe (e.g. Bulgaria, Estonia, Lithuania, Latvia, Romania, Greece, Cyprus).

Further on, data were analyzed using the Principal component analysis in order to reduce the number of variables which define European citizens' pro-environmental attitudes and behaviours. Direct Oblimin with Kaiser Normalization rotation was performed. Prior to performing the factor analysis a Kaiser-Meyer-Oklin value was calculated. A value of 0,623 was observed; this exceeded the minimum requirement of 0.6, suggested by Kaiser (1970, 1974) as cited in Halpenny (2010). Additionally, Bartlett' s Test of Sphericity (Bartlett, 1954, as cited in Halpenny, 2010) reached statistical significance, supporting the factorability of the correlation matrix. By using the Principal Component Analysis, for each country we derived three factors with eigenvalues larger than 1. A principal component analysis of the 11-item pro-environmental attitudes and behaviours responses provided support for the existence of three factors.

A three-factor solution yielded clearly interpretable results. The three resulting factors accounted for an acceptable 67.93% of the original variance in subjects' importance ratings (table no. 2). Factor 1 explained 33.07%, factor 2 contributed with 20.92% while factor 3 explained 13.95% of the variance of European citizens' pro-environmental attitudes and behaviours. The component correlation matrix confirmed a negative relationship between factors 1 and 2 ($r = -0.053$) and a positive one between factors 1 and 3 ($r = 0.148$) and between 2 and 3 ($r = 0.026$). Table no. 2 shows the factor loadings of the dependent variables on the three factors after rotation. The variables no. 1-6 correlated highly with the first factor. The second factor summarizes the variables no. 7-9 and the variables no. 10 and 11 loaded highly on the third factor.

Further on, the cluster analysis and Principal component analysis have been used to perform several multiple regression analyses. The main purpose was to determine the extent to which the macroeconomic variables (tertiary educational attainment, GDP per capita, the Human Development Index value, employment rate, unemployment rate, share of gross value added in services and the share of employment in services) exert a significant influence on European citizens' pro-environmental attitudes and behaviours.

Correlations between the chosen predictors were calculated to allow removal of correlated predictors. This was useful because correlated predictor variables can cause trouble in estimating whether the macroeconomic variables

exert a significant influence on European citizens' pro-environmental attitudes and behaviours. The highest positive and significant correlation was observed between Share of gross value added in services and Share of employm. in services ($r = 0.849$), GDP per capita and Human Development Index value predictors ($r = 0.730$), Human Development Index Value and Share of employment in services ($r = 0.698$) and GDP per capita and Share of employment in services ($r = 0.692$) (table no. 3). Unemployment rate was negatively and significantly related to Employment rate ($r = -0.694$), and insignificantly related to GDP per capita ($r = -0.365$), Human Development Index value ($r = -0.253$), Share of employment in services ($r = -0.041$) and Tertiary Educational Attainment ($r = -0.018$).

The multiple regression models were constructed with the three factors extracted from the Principal Component analysis as dependent variables (taking into consideration each analysed country and each cluster) and the macroeconomic variables as independent.

Table no. 4 presents the results of the multiple regression of the macroeconomic variables on the pro-environmental attitudes and behaviors. A Stepwise procedure was used to select significant predictors. When comparing the 7 regression models we found that the employment rate explained 18% of the variance in factor 1 ($F(6, 26)=5.495$, $p<0.05$) for MR1, 29.9 % of the variance in factor 1 for cluster 2 ($F(6, 15)=5.959$, $p<0.05$) for MR2 and (together with Tertiary Educational Attainment) 41.3% of the variance in factor 2 ($F(3, 26)=8.459$, $p<0.05$) for MR3. Tertiary educational attainment explained 75.7% of the variance in factor 2 for cluster 1 ($F(3, 10)=28.000$, $p<0.05$) in MR4. The share of gross value added in services explained 37.7% of the variance in factor 2 for cluster 2 ($F(3, 15)=8.466$, $p<0.05$) in MR5 and 59.2 % of the variance ($F(2, 10)=13.073$, $p<0.05$) for factor 3 (cluster 1) in MR6. Finally, the Human Development Index value explained 48.8% of the variance in factor 3 (cluster 2) for MR7 ($F(2, 15)=13.353$, $p<0.05$). Only the Human Development Index value made a significant contribution to the regression model MR7 ($\beta=18.801$) while tertiary educational attainment had the lowest contribution in MR3 ($\beta=-0.046$).

The Stepwise selection of statistically significant macroeconomic predictors outlined the following equations:

$$\text{MR1: } \hat{Y} = 4.342 - 0.068 * \text{Employment rate}$$

$$\text{MR2: } \hat{Y} = 8.183 - 0.133 * \text{Employment rate}$$

$$\text{MR3: } \hat{Y} = -4.835 + 0.102 * \text{Employment rate} - 0.046 * \text{Tertiary educational attainment}$$

$$\text{MR4: } \hat{Y} = 7.076 - 0.159 * \text{Tertiary educational attainment}$$

$$\text{MR5: } \hat{Y} = 3.056 - 0.047 * \text{Share of gross value added in services}$$

$$\text{MR6: } \hat{Y} = 12.069 - 0.163 * \text{Share of gross value added in services}$$

$$\text{MR7: } \hat{Y} = -15.583 + 18.801 * \text{Human Development Index Value}$$

In the case of MR1, the regression equation outlines that an increase of one percent in the EU 27' employment rate determines a decrease of 6.8 standard deviations of factor 1. For MR2, the regression equation outlines that an increase of one percent in the EU 27' employment rate determines a decrease of 13.3 standard deviations of factor 1 (cluster 2). For MR3, the regression equation outlines that an increase of one percent in the EU 27' employment rate determines an increase of 10.2 standard deviations of factor 2, while an increase of one percent in the EU 27' tertiary educational attainment determines a decrease of 4.6 standard deviations of factor 2. Likewise, for MR4, the regression equation outlines that an increase of one percent in the EU 27' tertiary educational attainment determines a decrease of 15.9 standard deviations of factor 2 (cluster 1). For MR5, the regression equation outlines that an increase of one percent in the EU 27' gross value added in services determines a decrease of 4.7 standard deviations of factor 2 (cluster 2). For MR6, the regression equation outlines that an increase of one percent in the EU 27' gross value added in services determines a decrease of 16.3 standard deviations of factor 3 (cluster 1). Finally, for MR7, the regression equation outlines that an increase of one unit in the EU 27' Human Development Index determines a decrease of 1.88 standard deviations of factor 3 (cluster 2).

Conclusions

The present research aimed to carry out an analysis of the influence of macroeconomic variables of the countries of the European Union on the pro-environmental attitudes and behaviors of its citizens. In this regard, we carried out three types of analyses, such as: a Cluster Analysis with the aim to group the 27 countries, a Principal Components Analysis, with the aim of reducing the 11 items to a smaller number of factors, and a series of multiple regression analysis, which took into account the macroeconomic variables which exert a significant influence on the pro-environmental attitudes and behaviors of the EU citizens.

Macroeconomic variables that the multiple regression analyses has retained in the model, exerting a significant influence on the pro-environmental attitudes and behaviors of EU citizens were: employment rate, tertiary educational attainment, the share of gross value added in services and Human Development Index value. Thus, the employment rate had a significant

influence on factor 1 for all countries, but also for cluster 2, and factor 2 for all countries. Tertiary educational attainment had a significant influence on factor 2 for all countries and for cluster 1. Share of gross value added in services exerts a significant influence on factor 2 for cluster 2 and factor 3 for cluster 1. Human Development Index Value exerts a significant influence on factor 3 for cluster 2.

Although this study provides useful information for environmental management and planning decision-makers, it has a series of limits. First, we have only analysed 27 countries included in the EU. Future research may consider other countries worldwide and compare them considering their economic development. Second, other statistical methods (e.g. Hierarchical Multiple Regression analysis) might be very useful in outlining the influence of macroeconomic variables on consumers' pro-environmental attitudes and behaviours. Third, we have only selected 7 macroeconomic variables which we considered relevant for the economic development of the analysed countries. However, researchers might find other macroeconomic indicators which can exert significant influences on consumers' pro-environmental attitudes and behaviours.

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Table no. 1
Cluster analysis results

CLUSTER 1	CLUSTER 2
BELGIUM	CZECH REP.
DENMARK	BULGARIA
GERMANY	ESTONIA
FRANCE	GREECE
IRELAND	SPAIN
LUXEMBOURG	ITALY
HOLLAND	CYPRUS
AUSTRIA	LITHUANIA
FINLAND	LATVIA
SWEDEN	HUNGARY
UNITED KINGDOM	MALTA
	POLAND
	PORTUGAL
	ROMANIA
	SLOVENIA
	SLOVAKIA

Table no. 2
Factor loadings after Direct Oblimin with Kaiser Normalization rotation

Items	Factor		
	1	2	3
1. I strongly agree that buying environmentally-friendly products can make a real difference to the environment.	0,84		
2. Buying environmentally-friendly products sets a good example.	0,82		
3. When I make a decision on what products I buy, the product's impact on the environment is very important.	0,82		
4. I feel that using environmentally-friendly products is 'the right thing to do'.	0,73		
5. I often buy environmentally-friendly products.	0,62		
6. I think that companies should be obliged to publish reports on their overall environmental performance and the environmental performance of their products.	0,54		
7. I would be willing to pay for products if I was confident that they were more environmentally friendly.		0,79	
8. I think that lower taxes on environmentally-friendly raw material and products can play a role in reducing our impact on the environment.		-0,68	
9. I am fully confident that when I buy a product labelled or otherwise indicated as environmentally friendly it will cause less damage to the environment than other products.		-0,52	
10. I strongly agree that concerns about the environment are exaggerated.			0,89
11. I know a lot about the environmental impact of the products I buy and use.			0,58
Eigenvalue	3.64	2.30	1.53
Explained variance	33.07	20.92	13.95

Note. Only the factor loadings higher than 0.5 are presented

Table no. 3
Bivariate correlations between the independent variables

	TEA	GDP	HDI	ER	UR	GVAS	ES
TEA	1.000						
GDP	0.530**	1.000					
HDI	0.388**	0.730**	1.000				
ER	0.348	0.505**	0.516**	1.000			
UR	-0.018	-0.365	-0.253	-0.694**	1.000		
GVAS	0.447*	0.635**	0.421*	0.129	0.019	1.000	
ES	0.556**	0.692**	0.698**	0.355	-0.041	0.849**	1.000

Note. TEA means Tertiary Educational Attainment, GDP means GDP per capita, HDI means Human Development Index value, ER means employment rate, UR means unemployment rate, GVAS means share of gross value added in services, ES means share of employment in services

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table no. 4
Regression of the macroeconomic variables on the pro-environmental attitudes and behaviors (N=27)

Models/ Variables entered in the model	β^a	t	R Square	Adj.R Square	df	F
MR1 Employment rate	-0.068	-2.344	0.180	0.147	26	5.495
MR2 Employment rate	-0.133	-2.441	0.299	0.248	15	5.959
MR3 ^b Employment Rate Tertiary Educational Attainment	0.102 -0.046	3.832 -2.735	0.413	0.365	26	8.459
MR4 Tertiary Educational Attainment	-0.159	-5.291	0.757	0.730	10	28.000
MR5 Share of gross value added in services	-0.047	-2.910	0.377	0.332	15	8.466
MR6 Share of gross value added in services	-0.163	-3.616	0.592	0.547	10	13.073
MR7 Human Development Index value	18.801	3.654	0.488	0.452	15	13.353

Note. MR1: Multiple regression with Factor 1 as a dependent variable for all countries; MR2: Multiple regression with Factor 1 as a dependent variable for Cluster 2; MR3: Multiple regression with Factor 2 as a dependent variable for all countries; MR4: Multiple regression with Factor 2 as a dependent variable for Cluster 1; MR5: Multiple regression with Factor 2 as a dependent variable for Cluster 2; MR6: Multiple regression with Factor 3 as a dependent variable for Cluster 1; MR7: Multiple regression with Factor 3 as a dependent variable for Cluster 2

^aUnstandardized coefficients

^bPredictors: (Constant), Employment rate, Tertiary Educational Attainment

