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Post-materialism = Pro-environmentalism?

Study about post-materialisms effects on CO2 emissions and environmental everyday actions in member states of European Union

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Abstract

According to Ronald Inglehart, level of individual's environmental concern is linked with grade of post-materialism resulting from physical and economic security experienced. As post-materialist individuals are considered to prioritize environmental protection over economic benefit, this study raises a question whether this change in values can provide a long-lasting solution for environmental challenges human kind is facing in the near future? This study uses quantitative research method to investigate whether variation in carbon emissions between the member states of European Union can be explained by the level of post-materialism among the public. Three ordinary least squares regression models are constructed in order to answer the main research question and sub-question analysing if post-materialism is leading to increased amount of environmental everyday actions and further to lower carbon emissions.

The concluding results indicate that although there is no overall effect of post-materialism on carbon emissions, post-materialist values do have an impact on environmental actions at individual level. Furthermore, a share of highly educated citizens seems to be negatively correlated with the amount of CO2 emissions throughout the analysis, suggesting that increasing the educational level may benefit efforts to reduce carbon emissions caused by member states of European Union.

Key words: post-materialism, carbon emissions, VBN-theory, value change, regression analysis
Words: 9664

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1 Introduction

Debate over climate change is ironically said to divide the audience into two opposite poles of opinions. On the one pole, stereotypically educated and wealthy individuals are trying to attest the anthropocentric climate change as one of the biggest challenges facing humankind. In the meanwhile, individuals on the other pole from poor and uneducated backgrounds are in the wake of Trump-administration promoting for more jobs and economic security at the expense of environment. In order to melt these hypothetical poles of stereotypes this study wants to investigate if certain features linked with environmentalism are related to improved environmental performance at the national level as well. With the help of post-materialist theory this study will start investigating the possible operations fostering more environmental lifestyle among larger share of public. As this is considered to be a broad field of deep analysis this particular study can be observed as first steps of the longer research process – just to get our feet wet.

Post-materialist theory was first introduced in early 1970's by Ronald Inglehart suggesting that as material affluence spreads in industrialized societies, 'quality of life' issues tend to replace material ones such as economic and physical security. This leads to situation where incentives that once motivated the work force are becoming less effective than they were and that the policies that once gave rise to broad political support are no longer working as readily as they did (Inglehart, 1995 :61). This change in values is affecting social, political and economic life locally and globally in various ways as it is transforming entire lifestyles by affecting fertility rates, consumer patterns and the value people give to environmental protection (Inglehart, 1995 :61).

Inglehart's theory is based on assumption that when individuals in industrialised countries reach economic and physical security, they direct attention to demands regarding quality of life or post-material needs such as environmental quality (Carter, 2007 :94). This results in higher environmental concern among the public which in a country with well-functioning government should lead to sustainable politics and improved ecological outcome, such as decreasing carbon dioxide (CO2) emissions in the long run. The amount of CO2 emissions per capita caused by burning of fossil fuels and deforestation are used as dependent variable since as one of the major contributors to global warming they create a part of the biggest environmental challenge of our time (Carter, 2007 :249).

However, when we look at the member states of European Union[1]considered as a group of industrialised states with relatively long roots of democracy and well-functioning governance, we observe some significant variation in CO2 emissions per capita values (Figure 1, Appendix). Five countries with the lowest values in year 2013 were: Latvia, Romania, Croatia, Hungary and Portugal with lower than 5 metric tons of CO2 emitted per

[1]With member states, it is referred to all the current 28 member states in European Union in the beginning of the year 2017

capita respective five countries with highest values: Luxemburg, Estonia, Netherlands, Germany and Czech Republic with more than twice as high values.

As there seems to be no clear common feature or trend between the countries presented above, this paper will try to explain the variation in CO2 emissions with help of post-materialist theory and some alternative explanations. The main argument is that when the level of wealth and physical security in a country rises, people have time to concern more about environmental issues and through pro-environmental everyday actions try to diminish their own, but even the society's environmental impact as a whole. This is also the reason why this study will test environmental activity as an intervening variable between post-materialism and amount of CO2 emissions.

1.1 Purpose and research question

In the synthesis report on Climate Change published by IPCC (Intergovernmental Panel on Climate Change) in 2014, greenhouse gases are said to cause further warming and long lasting changes in all components of climate system. This will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems and therefore limiting climate change would require substantial and sustained reductions in greenhouse gas emissions (IPCC, 2014 :8). As these reductions play an essential role in order to tackle the global climate change, the sources and factors influencing the amount of emissions have been analyzed vastly in the previous research. In addition to some previous theories, this study will provide a new approach – share of citizens holding post-materialist values, explaining the amount of CO2 emitted.

The purpose of this thesis is thereby to see if further clarity can be brought to the field by introducing a new explanation for level of CO2 emissions in a country. Possible alternative explanations will be considered in the analysis as well, but since the two main variables, share of post-materialist citizens and CO2 emissions, are the ones of interest, the main research question of this study reads as follows:

What influence has post-materialism had on CO2 emissions in member states of European Union?

As shift to post-materialism is considered to lead to rise of post-materialist issues such as environmentalism (Inglehart, 1990 :259) the causal mechanism between the share of people holding post-materialist values and CO2 emissions needs a combining link. In this study this link is argued to be *environmental actions.* This measure tests if post-materialists also make more environmentally conscious choices in their everyday life and if this has had a significant effect on CO2 emissions in a country. With the intention of this way enabling more detailed assessment of post-materialisms effects on CO2 emissions, the following sub-question will also be explored:

How is post-materialism affecting environmental actions among the public and to what extend does this effect the national level of CO2 emissions?

Previous research about different factors affecting the amount of CO2 emissions will be analysed and used to create alternative explanations for the two hypotheses above. Taking previous results into account this way contributes to cumulative research and scientific relevance (Teorell & Svensson, 2012 :18).

The requirement for external relevance on the other hand is fulfilled when the topic is related to an accurate and interesting problem and the results can be generalised and used in further research (Teorell & Svensson, 2012 :69). As this research is related to an accurate problem – tackling anthropocentric climate change – and investigates the possible effect stable domestic conditions such as, economic and physical security can have on CO2 emissions in heterogenous group of industrialized countries – founding's of this study can be further used and applied on similar cases outside the European Union.

1.2 Structure

For the purpose of clarification, the structure of this study will be as follows: First the relevant theories, alternative explanations and previous research leading to the hypotheses of this study will be presented. Subsequently operationalization of main concepts and introducing of the quantitative research method as well as data sources and variables used in this study will be displayed.

In total three different OLS-regression models are conducted in order to assess the effects of post-materialism on CO2 emissions, after which the answers for the main research question and the sub-question of this study are provided. Finally, the statistical results are compared and discussed.

1.3 Case selection: Citizens of member states of European Union as sample

In this study, citizens of member states of European Union participating in Integrated Values Survey 1981-2014 are used as sample for the analysis. As European Union is a relatively large emitter of greenhouse gases accounting for around 10% of global emissions but also a key player in the global politics of climate change (Jordan et. al, 2010 :xv-xvi), it is highly motivated to investigate underlying factors such as public values affecting the amount of CO2 emissions particularly in this region.

The environmental laws, rules and procedures governing environmental policy in European Union encompasses some 500 legislative items and 'represents a substantial corpus of progressive and far-reaching environmental legislation.' (Carter, 2007 :283). The process of "Europeanisation" or the influence EU has had on domestic environmental policies of its member states can be clearly detected and previous research shows that member states have converged to produce a common European model of policy (Jordan & Liefferink, 2004). However, the effect of Europeanisation is varied

through the member states due to other factors, such as domestic pressure from pressure groups and public opinion (Carter, 2007 :287). As the environmental legislation and regulations of European Union are contested to affect the domestic environmental policies and thereby the level of CO2 emissions in member states, it is justified to only focus on this particular group of countries in this research.

2 Theoretical framework

2.1 Modernization vs. Post-Modernization

Modernization theory was from the beginning introduced by Marx whose core idea was that economic, political and cultural change go together in coherent patterns, which makes the change in societies predictable in the long run (Inglehart, 1997 :7). Modernization itself refers to process that starts with the increase in capacity for social change in a society (Roxborough,1988 :756). This capacity arises from structural differentiation and an increase in formal rationality of social actions, which leads forward to increased transformative potential and further to transformation (Roxborough, 1988 :756). Industrialization, for example tends to bring urbanization, increasing wealth and higher levels of education into societies.

In his famous presentation "The Silent Revolution of Europe" (1971) Ronald Inglehart introduced an idea that the publics of post-industrial societies are experiencing value shift from prioritising the material goals such as economic and physical security towards giving more value for post-material goals that emphasise self-expression and quality of life (Inglehart, 1971). As response to Modernization theory, Inglehart claims that during the past decades industrialized societies have reached an inflection point and started to move towards, what he calls *Post-Modernization* (Inglehart, 1997 :8).
With Post-Modernization, a new world view is gradually replacing the old one that has dominated in industrialized societies since the beginning of Industrial Revolution. According to Inglehart, both Modernization and Post-Modernization are strongly linked with economic development, but as a later stage of this development, Post-Modernization reflects very different kind of values and beliefs from those linked with Modernization (Inglehart, 1997 :8). He also points out that although Post-Modernization does reflect a great change it grows out of Modernization, which means that post-materialist values would be difficult to sustain without a thriving industrial and technological infrastructure (Inglehart, 1997 :399).

2.2 Theory of post-materialism

Value change from material to post-material goals originates from the change in individual's priorities. In developed societies, economic and physical security can be valued lower in priority than before thanks to increased wealth and welfare (Inglehart, 1977 :3). Post-modern societies emerged because of Modernization, which eventually made it possible for larger segments of the public to experience a high level of affluence

and physical security during their formative years in post-war Europe (Inglehart, 1997 :339) Thanks to stable economic and political atmosphere, everyday survival and basic needs can be secured for most of the people and economic growth and emergence of the welfare state have created the conditions under which values such as self-expression and free choice can be prioritised.

Inglehart's theory about post-materialism has been criticized as the tests of his thesis have primarily taken place at national macro-level (Davis, 2000 :455). Influence of micro-level factors such as gender, shifts in political ideology, income and social class of the respondent are ignored or left for less attention. Instead, the type of values the individuals are holding is explained solely at national macro-level with factors such as economic growth or wealth of the nation (Davis, 2000 :457).

Post-materialist theory has also been criticized because during the time the first analysis was conducted[2] the results could not take the life-cycle effects[3] into account (Inglehart, 2006 :685). The critics suggested that differences in values were merely linked with respondent's age and would therefore eventually shift in the long run as respondents used in the study got older. Nonetheless, when testing this hypothesis again in year 2000 with cohort analysis data covering three decades, it was found that the respective birth cohorts remained fully as post-materialist as they had been in 1970 (Inglehart & Wezel 2005 cited by Inglehart 2006 :685).

In this study, the micro-level phenomenon; post-materialism is believed to influence macro-level variable CO2 emissions. Because of this, micro-level factors affecting post-materialism such as gender and shifts in political ideology can be put aside as irrelevant for this research. In the same way, as life-cycle effects in this context are proved to be non-existent, the age of respondents will not be included as a control variable in this study either.

As this paper is viewing post-materialism as a source of change in macro-level variable CO2 emissions instead of an outcome, the critique faced by Inglehart in previous research can be tackled. Of course, out of pure curiosity and for the sake of an interesting study, the link between some micro-level factors used in previous research and CO2 emissions will be tested in this analysis as well. However, the main argument is that the increasing grade of post-materialism among the citizens should eventually become visible at macro-level as decreasing amount of CO2 emissions in this case.

2.2.1 Post-materialists and the environment

Post-materialists are more likely to be concerned about the environment than materialist are (Abrahamson & Inglehart, 1995 :10). It follows, that post-materialists are even more supportive of environmental issues, while for materialists the use of scarce resources is

[2] Survey data from six European countries was collected in year 1970
[3] The young respondents would eventually become just as materialists as their elders in the long run (Inglehart, 2006

desirable as far as it is leading to economic growth and employment opportunities (Davis, 2000 :459). Besides this, post materialists have more cosmopolitan sense of identity, which means that they are more concerned about political and environmental issues that transcend national boundaries than materialist are (Inglehart, 1977 :57-58)

The same logic applies on political skills and political activity of the public in general. When economic and physical conditions are secured a larger proportion of public is having time to engage themselves in national and international politics.
In his analysis Inglehart argues that consequently for this development the change in values is supposed to affect individual's orientation towards political issues, change the social bases of politics and affect the support for national institutions (Inglehart, 1977 :14). He also argues that the change in values is creating potential political counter-elites that are distributed more widely among the public than ever before at the same time challenging the traditional decision-making structures (Inglehart, 1977 :3-4). This the change in values will result in increased demand of participation in decisions that affect one's life, whether it is in welfare agencies, schools, factories, offices, universities or church (Inglehart 1977, :13). The same demand of participation is bringing completely new or maybe less addressed issues into the political arena. Related to this, Inglehart argues that the Materialist/Post-materialist dimension has played a crucial role in the rise of the wave of new or less popular social movements such as environmental movement (Inglehart, 1990 :372). Although conservation of natural resources has been on the table for many decades already, the fact that environmental interests are valued higher than economic ones is something that is argued to occur because of increasing share of post-materialists in societies (Inglehart, 1977 :13).

Regardless of the prominent amount of scientific evidence for anthropocentric climate change, it is questionable if the increasing environmental concern among the public is simply due to the fact that the environment is in a worse condition than ever before (Inglehart, 1990 :372). It is argued that this widespread concern and awareness has partly taken place because of the more environmentally sensitive public, but also because of the gradually rising level of political skills and education in post-material societies (Inglehart, 1990 :372-373). It follows that the increased environmental concern can be viewed as a side-effect for higher level of economic and physical security related to value change from material to post-material goals.

Combining these two ideas that (1) new issues emerge the political arena as level of political skills and interest rises among the mass public and (2) value shift from material to post-material goals will lead to increasing environmental concern, this study will test the correlation between post-material values and CO2 emissions per capita by using *environmental actions* as an intervening variable explaining the causal relationship analysed in the main model. In previous research, public support for environmental actions and politics is strongly related to environmental awareness of the citizens (Kokkinen, 2013 :7). As environmental awareness, can be considered to be higher among those individuals who make more environmentally conscious choices in their everyday life this variable is better and more concrete indicator for environmentalism than grade of *environmental awareness* itself. This way we get to know if people act based on their values and if this leads to visible results at national-level.

2.3 VBN-Theory

The linkages between the individual and the system are complex. Thus, it cannot be taken for granted that a political system in a country with larger percentage of people with given values would automatically adopt policies reflecting those values (Inglehart, 1977 :6). This paper uses a Value-Belief-Norm (VBN) theory (Stern et. al, 1999) to explain the causal mechanism between post material values, environmental actions and CO2 emissions in member states of European Union. More precisely, the theory explains how pro-environmental values will eventually lead to environmentally significant actions. The causal model the theory introduces is presented as follows:

Value Change → New Ecological Paradigm →Awareness of Consequences →Ascription of Responsibility → Pro-environmental Personal Norm → Environmental Actions[4]

The VBN theory suggests that environmental actions occur in response to change in personal norms that are formed in a process that leads from value change to awareness of consequences and ascription of responsibility. Awareness of consequences denotes that individuals believe environmental conditions posing threats to other species and biosphere likewise ascription of responsibility means that actions individuals initiate could avert those consequences (Stern et. al, 1999 :85).

Previous research comparing environmental concern among post-materialists and materialists has shown some inconsistent results (Dietz et. al, 2005 :360). In some studies, the hypotheses that environmental concern would reflect post-material values gets barely or no support (Brechin & Kempton, 1994; Grendstad 1997; Davis, 2000) while in other studies post-materialism is linked with for example willingness to pay for improvement in both global and local environmental problems (Gökşen & Zenkinobuz, 2002).

Based on VBN-theory, this paper will test if individual's different value base has significant effect on everyday life environmental actions and further on CO2 emissions per capita at national level. The causal mechanism in this paper is seeking to address is that these environmental actions will lead to improved environmental performance either through pressure on political decision-makers or through a change in individual behaviour such as consuming patterns, improved recycling or increased demand for sustainably produced renewable energy.

2.4 Hypotheses

Figure 2 in Appendix shows that similarly to amount of CO2 emissions per capita the share of post-materialists in EU member states has fluctuated over time without any clear and consistent trend or pattern. However, figure 3 displays that there exists some variation when the total number of post-materialist respondents is compared between the countries.

[4] Stern et. al, 1999 :84

These findings and theories discussed above lead to three different hypotheses. The first and the main hypothesis of this paper aiming to answer the research question claims that the level of CO2 emissions of a country is affected by the percentage of citizens holding post-materialist values and reads as follows;

H1: Countries with larger share of people holding post-material values emit smaller amount of CO2 per capita

Thus, if the relationship between the percentage of post-materialists and CO2 emissions appears to be negative, H1 gets support.

The second hypotheses have been derived to answer the sub-question of this study and predict that the level of CO2 emissions of a country is not solely affected by percentage of post-materialists among the public but also by how environmentally active these individuals are. The second and the third hypotheses are thereby defined accordingly:

H2: Countries with larger share of people holding post-material values have higher percentage of environmentally active citizens

H3: Countries with larger share of environmentally active citizens emit smaller amount of CO2 per capita

In line with theoretical arguments presented by VBN-theory, H2 and H3 address the possible causal mechanism between the main variables of this research; percentage of post-materialists in a country and the amount of CO2 emitted per capita. If the relationship between post-materialism and environmental actions is positive H2 gets support. Similarly, if the relationship between the larger share of environmental actions and the amount of CO2 emissions is negative H3 gets support.

2.5 Alternative Explanations

Values alone do not determine political outcomes for they interact with economic and political forces (Abramson & Inglehart, 1995 :3). As this study is examining the influence post-material values have on environmental factor such as the amount of CO2 emissions per capita, a set of control variables must be included. This way the effect of high percentage of individuals holding post-material values on CO2 emitted can be analysed isolated from the influence of other possible factors. This section will introduce control variables used in this study; size of industrial sector, size of energy sector, GDP per capita and level of education as well as level of income at individual level.

2.5.1 The size of industrial sector

Ecological Modernization is a theory suggesting that environmental protection and natural conservation are not only compatible with economic growth but also provide growth in the long-term (Murphy & Gouldson, 2000). The theory suggests that for example regulation can help to solve environmental problems by encouraging companies to invest in new

industrial innovations and this way promote the increased economic competitiveness (Murphy & Gouldson, 2000; Mol, 2001). Another way to benefit simultaneously the environment as well as economic growth is a more economically efficient use of natural inputs and reduction of negative outputs (Warner, 2010 :540). In that sense, ecological modernization theory wishes to reshape industrial as well as consumption and production structures without necessarily challenging the very core of capitalism (Hovardas, 2016 :1). However, this approach is widely argued and the idea that reshaping capitalism would lead to improved environmental performance is even criticized and strongly questioned in previous research (Murphy & Gouldson, 2000; Vlachou, 2004). Theory also analyses how industrialised societies manage environmental problems and offers some analysis about environmental reforms in social practices, political discourse and institutional design (Mol & Sonnenfeld, 2000 :5-6).

Since successful industrialization is an essential part of Ecological Modernization theory as well as Post-Modernization theory, it is justified to include 'the size of industrial sector' in this analysis as a control variable. Not only, does industrial success effect the hypothetic percentage of post-materialist among the mass public, the large industrial sector should simultaneously increase the CO2 emissions per capita. In year 2014, 8,5 percent of all the greenhouse gases in Europe originated from industrial activity composed by CO2 as the most emitted gas (Eurostat, 2017). Large industrial sector might even affect the environmental activity of the citizens in a country, if the industrial sector is experienced as a threat for the local environment and nature.

2.5.2 GDP per capita

Environmental Kuznets Curve (EKC) is a model suggesting that environmental damage first increases with income, then declines (Stern et. al, 1996 :1151). The short-term harm caused by economic growth befalls in the wake of inefficiencies, insufficient funds, inappropriate policies, weak state capacity and low political and societal will (Clapp & Dauvergne, 2005 :91). Thereby, EKC suggests that there is a U-shape relation between environmental degradation and income per capita, so that growth reduces the environmental impact of economic activity in the long term (Stern et. al 1996 :1151). Critics argue that the economic growth in the modern consumer society with greater affluence and an ever-increasing range of available goods is solely leading to increased consumption of environmentally harmful products. Therefore, the assumption of economic growth resulting in reducing environmental impact of EKC model is considered problematic (Carter, 2007 :94). It is also shown that with respect to some indicators – such as municipal waste and CO2 emissions – problems virtually increase with income (Clapp & Dauvergne, 2005 :91).

Previous research about the relationship between national wealth and environmental concern among the public has provided some inconsistent results. According to some scholars, national wealth is more likely to be negatively than positively related to citizens' environmental concern and awareness. (Brechin & Kempton, 1994; Dunlap & Mertig, 1995) However, especially post-materialists are distinguished as more concerned about the environment than those who identify as materialists regardless of the economic state of the nation (Kidd & Lee, 1997). On the other hand, some results point out that cross-national as well as individual differences in environmental concern are distinctly related to wealth and income respectively (Franzen & Meyer, 2009 :220).

Assumptions of the possible impacts national wealth is having on environmental concern at individual level are questioned similarly to Inglehart's theory of post-materialism. Franzen and Meyer argue that it is problematic to link macro-level variable such as national level of economic growth to environmental concern often observed and analysed at individual level (Franzen & Meyer, 2009 :220). On the other hand, the restriction of the analysis merely to the individual level leaves out other potentially important determinants related to environmental concern such as a nation's environmental quality, its distribution of wealth or its population density (Franzen & Meyer, 2009 :220).

Taking these findings into account, GDP per capita will be included as a control variable in this study. For EKC model and some previous research suggest that economic growth is distinctly linked with environmental impact, the effect that post-materialism has on CO2 emissions in European Union must thereby be analysed in isolation from this possible influence. Since economic affluence is claimed to be one of the prerequisites not only for emerge and distribution of post-material values, but also for some other control variables analysed, it is justified to try to control this factor in this research. This way the possible correlations between independent variables causing skewness in the results can be addressed prior the analysis.

2.5.3 Size of energy sector

In year 2014, 55,1% of all greenhouse gas emissions in European Union originated from fuel combustion and fugitive emissions from fuels exclusive fuels used in transport and international aviation (Eurostat, 2017). Energy sector is largely dominated by the direct combustion of fuels and most of the electricity worldwide is produced by combustion of oil, coal and natural gas releasing distinct amount of CO2 (Quadarelli & Peterson, 2007 :5939). In developing economies growth in energy use and energy sector is closely linked with growth in the modern sectors such as industry, motorized transport and urban areas, but can also be related to economic and climatic factors such as relative price of energy (World Bank, 2017).

This study will use the size of energy sector or primary energy production as a control variable, since according to statistics it should have a significant influence on the amount of CO2 emissions per capita in member states of European Union. As this variable is in all likelihood correlated with at least GDP per capita and the industrial size of the country the importance of correlation control prior the interpretation of results is once again highlighted.

2.5.4 Level of education

Instead of measuring economic security with respondent's current occupation Inglehart wants to analyze the economic security among respondents already during their formative years. This is done by using level of education as an explanatory factor in his analysis (Inglehart, 1977 :72). Consequently, Inglehart concludes that the type of the values the individual holds is not solely a reflection of one's educational level, but also a result of the birth-cohort the individual represents (Inglehart, 1977 :82).

Experience of higher education is one of the key variables often linked with increased environmental concern and level of environmental actions (Eckersley, 1989 :206-207). Reason behind this is presumably the fact that the higher level of education allows people to process more information, enhances their material security and job prospects, and encourages a wider critical perspective (Eckersley, 1989 :207).

In order to reach a broad capture of overall conditions in member states of European Union effecting the level of CO2 emissions, both micro and macro-level variables must be included in this research. This way the critique directed to studies focusing merely on macro-level variables causing micro-level phenomenon and vice versa, can be tackled. In this study, individual's educational level will be included as a micro-level control variable in the model between post-materialism and the amount of CO2 emissions per capita. Later, the possible impact the level of education has on environmental activity will be tested as well.

2.5.5 Level of individual income

In previous research, it is without further questioning assumed that the level of national wealth would directly be reflected in higher incomes at individual level as well (Brechin & Kempton, 1994). In their research about post-materialism and environmental concern among the public, Brechin and Kempton came to conclusion that the level of income is a poor predictor of the level of environmental concern thus repealing Inglehart's argument that individuals experiencing economic security tend to be more environmentally concerned. However, as they solely used GDP per capita as a proxy for post-materialism (Brechin & Kempton, 1997 :18) instead of examining the actual values or the economic security individuals personally are experiencing, the results can be viewed as problematic and even misleading.

In addition to the size of industrial sector, GDP per capita, the size of energy sector and the level of education, this study will use the level of personal income as a control variable. This way the level of individual economic security experienced and its possible impacts on environmental activity as well as on the amount of CO2 emissions per capita at national level can be measured. Since both, the level of national[5] and individual wealth are measured in this study, the effects of for example unequal wealth distribution in member states of European Union are easier to recognize.

[5] GDP per capita

3 Quantitative Method

3.1 Operationalization

In order to study the material collected, the way the concepts used in this analysis are measured must be introduced first. In other words, the variables need to be operationalized (Teorell & Svensson, 2012 :39). Operationalization is supposed to minimize both, the risk of random as well as systematic errors in the research.

3.1.1 Post-material values

In this study, post-materialist values will be measured by using Ronald Inglehart's post-material 4-item index. Index consists of series of questions designed to indicate which values an individual would rank highest when forced to choose between economic and physical security and life quality issues or in other words between *materialist* goals and *post-materialist* goals (Inglehart, 1977 :28). The respondents are asked the following questions:

If you had to choose among the following things, which are the two that seem most desirable to you?

A. Maintaining order in the nation
B. Giving people more say in important political decisions
C. Fighting rising prices
D. Protecting freedom of speech

(Inglehart, 1977 :28)

Alternatives A and C are considered as materialist answers, while alternatives B and D represent the post-materialist thinking. After this, based on answers given, an index value indicating how the grade of post-materialism is counted for every individual.

Inglehart's 4-item index has been a popular tool as an independent variable in previous research (Gökşen et. al, 2002; Kemmelmeier et. al, 2002; Uhlaner & Thurik, 2007). However, it has even been criticised for drawing too simplistic conclusions about underlying value dimensions and polarizing the materialism and post-materialism too much (Davis & Davenport, 1999 :651).

Another problem is the variation in answers that different backgrounds can cause in the survey situation. Some people might experience difficulties indicating exactly how they feel while extreme value-related opinions tend to be more common among those who are more educated or discuss politics relatively often (Inglehart, 1977 :26). Lack of clear opinion might also indicate that the problem has not been present in respondent's life and thereby leads to a random choice between the alternatives. Furthermore, there exists a possibility that people who are more interested in politics in general and demand for participation in decisions that affect one's life, are more likely to participate in mass surveys. As Integrated Values Survey 1981-2014 used as material in this study uses random sample selection and have large sample size, these risks should however be minimized.

Mass surveys with questions including "attitude-scales" are often in the risk of random errors (Teorell & Svensson, 2012 :56). The same risk is present in this question-item, as it only offers four options for individuals to choose from. Two respondents with similar backgrounds might experience same amount of dissatisfaction about the physical security of the country but due to unknown external factors they however choose to prioritize the different options in the question introduced above. This might depend on various factors such as difficulties to differ between the alternatives offered or misleading translation of the question (Teorell & Svensson, 2012 :56-57). As survey data used in this study is collected from different countries there is a strong likelihood of random errors due to language differences for each survey is completed in respondent's mother tongue. However, as long as this is the situation for all the individuals, satisfied or dissatisfied with the state of physical security in a country, it will not lead to systematic distortion of the results (Teorell & Svensson, 2012 :57).

3.1.2 CO2

CO2 emissions in this study will be measured in metric tons per capita and including carbon dioxide originating from the burning of fossil fuels, the manufacture of cement as well as carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring (World Bank, 2017).

The possible disadvantage of such measurement choice is that it fails to recognize the emissions originating from international trade in the sense of emissions embodied in goods that have been produced elsewhere (Peters et. al, 2011 : 8903). Nonetheless, as the only data found and provided on such measurement is limited to cover years 1995-2011[6], this study will use World Banks data on emissions originating from production. This way more broad period of time can be covered and more reliable comparison and results together with our independent and control variables are can be provided. Despite this, the possible consequences of this choice have to be considered and critically analyzed when interpreting the results of this study.

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[6] *OECD production- and consumption-based CO_2 emission estimates*, based on IEA *CO_2 emissions from fuel combustion, 2015*.

3.1.3 Environmental Actions

The grade of environmental actions used as an intervening variable will be measured with help of an index computed from five environmentally related questions used in Integrated Values Survey 1981-2014 (see Appendix 1). These questions are focusing on everyday situations in respondent's life during the past 12 months and deal with environmentally conscious consumer decisions as well as political and economic support for environmental organisations. By answering five yes/no questions related to these environmental actions, each respondent is given a value that has been calculated by adding the separate values of each of the respondent's answers together. In this kind of question-item there exists always a risk that respondents over- or underestimates the amount of actions during the time period of last 12 months. Another common risk is the so called telescoping effect. Telescoping effect is a memory error in temporal placement of events; that is, the date of the event is remembered inaccurately. This uncertainty leads respondents to report events taking place later or earlier than they actually occurred and leads to error in survey results (Lavrakas, 2008 :67). However, as this risk of telescoping effect is the same for every respondent regardless of the country and the interviewer, this will not lead to systematic errors in the survey results.

3.2 OLS-regression model

Ordinary Least Squares Regression method is a generalizing modelling technique representing the relationship between two variables (X) and (Y) in linear form (Moutinho et. al, 2011 :224). The relationship between the variables is described using the equation of the line of the best fit with α indicating the value of dependent variable Y when independent variable X is holding value zero.

$$Y = \alpha + \beta x + \varepsilon$$

The slope of the regression is defined with the coefficient β, which is the value of interest in the OLS-regression analysis (Teorell & Svensson, 2012 :219) This value shows how the value of dependent variable is influenced when independent variable changes with one unit. Error term ε includes all the other possible factors affecting the regression.

Some of the main problems that need to be accounted for in this analysis are:

- Faulty model assumptions; when relevant variables are excluded from the regression, there is a risk of drawing faulty conclusions about the relationship between the independent and dependent variable (Håkansson Schmidt, 2016 :13).

- Multicollinearity; risk for multicollinearity rises when several variables are included in the regression and are referring to relationship among the independent variables (Pallant,

2013:157). This makes it difficult to isolate the effects the different variables are bringing to the model and might cause unpleasant over- or underestimations in the results.

- Endogeneity; no other causes should eliminate the relation between *x* and *y* (Antonakis et. al 2014 :5) In other words changes in *x* should produce changes in *y* considering other things equal. Furthermore, if *x* depended on some unmodeled causes that also affect other variables in the model *x* would said to be endogenous (Antonakis et. al 2014 :6)

The problem of faulty model assumption is tackled by introducing a set of relevant control variables that might affect the relationship between the independent and the dependent variable in the model. By holding the value of control variable(s) constant it is possible to analyze the influence of independent variable on dependent variable in isolation (Teorell & Svensson, 2012 :185). Furthermore, in this study faulty model assumptions are minimized using the previous research in addressing which factors might be correlated with the amount of CO2 emissions and by using these as control variables. Moreover, statistical R-square value indicating the percentage of variation in y that can be explained by x will be presented and analyzed after every regression model.

A useful tool when dealing with multicollinearity is a correlation matrix that shows how much the dependent variables used in analysis are correlated with each other. By doing this it is easier to interpret the results of the analysis in more critical terms. As there are several independent variables that might be correlated with each other, it is important to conduct a correlation matrix and interpret it carefully in this research.

In this study the risk of endogeneity is particularly high as previous research as well as theories presented suggest that both variables – amount of CO2 emission per capita as well as the percentage of people holding post-material values are clearly dependent on the economic factors such as the size of GDP per capita. Thus, it is justified to argue that this study is of endogenous nature already from the beginning and that this possibility is acknowledged and even predicted. To be clear, the aim of this study is not to explain the variation in amount of CO2 emissions per capita completely with the share of post-materialists in society but to examine if this relationship exists in the first place. Thereby, the chance of endogeneity is not considered as a major risk for this research but a factor that will help creating discussion about the results.

4 Data material

Data for the independent variable and some of the control variables is collected from Integrated Values Survey covering years 1981-2014. As this dataset with observations from different member states of European Union consists of a random sample of individuals in every country, this data can be observed as a representative sample of the population of the member state as a whole.
Another dataset from World Bank covering the same time frame will be used for measuring the dependent variable – the amount of CO2 emissions per capita. In this section, data sources for dependent, independent, intervening and control variables will be introduced.

Data related problems that might have influence on the results of this study are few. Integrated Values Survey 1981-2014 dataset does not include observations systematically from every year but instead uses *waves* with intervals from 3 to 5 years to indicate the time the observations were collected. This results easily in *outliers* in data as the value change might have been large between two different observations. These outlier values are illustrated in a box-blot diagram (Figure 4) in Appendix. Also, as data for macro-variables is manually transferred and matched to Integrated Values Survey there is always a small chance of random errors caused by typos or other mistakes that have occurred during the manual work.

4.1 Inglehart's 4-item index

To analyse post-material values in member states of European Union, two different data sets must be combined. The trend values in European Values Survey and World Values Survey have been harmonized by using a common dictionary agreed by both institutions. This way constructed *Integrated Values Survey 1981-2014* is including the six waves of WVS[7] and four waves of EVS[8] (GESIS, 2017). Both datasets measure post-materialism with Inglehart's 4-item index.

Integrated Values Survey 1981-2014 is a representative multi-stage random sample of the adult population of the country 18 years old and older (except Finland 18 to 74 years). Interviews are conducted face-to-face with a standardized questionnaire provided in respondent's mother tongue. The net sample size (in the sense of completed interviews) is around 1500 respondents per country per wave (GESIS, 2017).

[7] 1981-2014
[8] 1981-2008

Inglehart argues that the public opinion survey is not the ideal instrument with which to study basic attitudes and values, yet it provides certain advantages such as large number of cases and ability to make intergenerational comparisons or control for social background (Inglehart, 1977 :27). Mass surveys can provide representative national samples, which is extremely useful when analysing phenomena in cross-national perspective or wishing to know what is happening to a society as a whole (Inglehart, 1977 :27). Large number of observations is also contributing to more reliable research, as the overall distribution of responses is more representative sample of the population analysed and helps to recognize possible outliers or extreme observations.

4.2 CO2 emissions per capita

Data for the dependent variable CO2 emissions per capita is collected from World Banks databank where the information is gathered from Carbon Dioxide Information Analysis Center (CDIAC), Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States (World Bank 2017). Annual anthropogenic emissions are calculated from data on fossil fuel consumption and world cement manufacturing. Fuels supplied to ships and aviation in international transport are excluded from the data because of the difficulty of apportioning the fuels among benefiting countries (World Bank, 2017). Data is provided for each member state of European Union starting from 1960. However, data from only year 1980 and further is used in the analysis.

4.3 Environmental activity index

Environmental activity will be measured with help of an index conducted from Longitudinal Values Survey questions related to environmental everyday actions. Unfortunately, the number of respondents answering to these questions is much lower (10 805) than the total number of European respondents that have provided valid answers in post-materialist questions in the data set (93 308). Although, the number of observations is still large and thereby valid to use in this research, such a big decrease in number of observations may have significant influence on the results. Thus, the results should be interpreted carefully and reference to this change in observation should be mentioned and kept in mind.

4.4 Control Variables

Control variables in this study form a diverse set of micro as well as macro-level factors with possible influence on amount of CO2 emissions per capita. This way, more realistic picture of conditions in member states of European Union can be investigated. Furthermore, including variables from both levels makes this particular study more interesting when observed from broader perspective of Political Science (Teorell &

Svensson, 2012 :259). Summary of all the variables used in this study inclusive their descriptions and data sources is presented below.

Table 1: Variables included in analysis

Variables	*Description*
Independent Post-material values index (4-item index)	Index measuring level of post-materialism based on individual's priorities[9]
Intervening Environmental actions	Index measuring individual's everyday environmental behaviour constructed from five questions used in Integrated Values Survey 1981-2014 dataset (See Appendix).
Dependent CO2 emissions per capita (metric tons per capita)	Carbon dioxide emissions stemming from the burning of fossil fuels and the manufacture of cement divided by midyear population of the country.[10]
Control	
GDP per capita	GDP per capita is gross domestic product divided by midyear population. Data are in current U.S. dollars.[11]
Size of industrial sector	Value added from industrial activity as a % of GDP[12]
Size of energy sector	Primary Production of Energy (all products) in a country measured in thousand tons of oil equivalent (TOE)[13]
Level of income	Country-specific income scales labelled by national currency. Score running from 1 to 11 where lower values represent lower income levels.[14]

[9] Integrated Values Survey 1981-2014

[10] World Bank, 2017a (1960-2013)

[11] World Bank, 2017b (1960-2013)
[12] World Bank, 2017c (1960-2015)
[13] Eurostat, 2017a (1990-2015)
[14] Integrated Values Surveys 1981-2014

Education Level (Individual)	Highest Educational Level attained. Scores running from 1 to 8 where lower values represent lower level of education[15]

[15] Integrated Values Surveys 1981-2014

5 Results

Table 2: Results – Post-materialism and CO2 emissions

Variables	(1)	(2)	*Beta*
Post-materialism	0,403***	0,092***	0,021
	(0,013)	(0,018)	
GDP per capita		0,00***	0,714
		(0,00)	
Size of industrial sector		0,045***	0,082
		(0,002)	
Level of education		-0,058***	-0,046
		(0,005)	
Level of income		-0,002	-0,002
		(0,005)	
Size of energy sector		-0,000002843***	0,054
		(0,00)	
R2	0,010	0,119	
N	93 308	62 670	

*****=p<0,01, **=p<0,05, *=p<0,1**
N = Number of observations
R_2= the percentage of variation in y that can be explained by x.

Results show that the share of post-materialists is positively correlated with CO2 emissions when no control variables are included. This means that contrary Inglehart's theory societies with the larger percentage of post-materialist citizens have stand for higher amount of CO2 emissions per capita as well. However, when the control variables are included, correlation stays positive but decreases. After controlling the value for GDP per capita, the size of industrial sector, level of education, level of income and size of energy sector, the share of post-materialists is still positively correlated with amount of CO2 emissions per capita. With this said, the first hypotheses – *countries with larger share of people holding post-material values emit smaller amount of CO2 per capita* – gets no support.

The other results display that GDP per capita and size of industrial sector are positively correlated with CO2 emissions per capita while the relation between level of education, size of energy sector and CO2 emissions per capita is negative. The only relation that did not reach statistical significance is between level of income and CO2 emissions.

Beta-coefficients or standardized regression coefficients remove the unit of measurement of predictor and outcome variables by estimating the variances of dependent and independent variables to 1 (Sweet & Grace-Martin, 2011). This way beta coefficients allow the relative effects of independent variables on CO2 emissions per capita to be compared at the same time ignoring the different scale units of the variables. Beta-coefficients in the first model illustrate that out of the significant correlations, GDP per capita has the strongest relative effect on CO2 emissions (0,714) while the level of income has the weakest relative effect (0,021).

Table 3: Results – Post-materialism and Environmental Actions

Variables	**(1)**	**(2)**	*Beta*
Post-materialism	0,572*** (0,019)	0,175*** (0,021)	0,084
GDP per capita		0,00004608*** (0,00)	0,392
Size of industrial sector		0,028*** (0,004)	0,071
Level of education		0,070*** (0,006)	0,113
Level of income		0,024*** (0,005)	0,043
Size of energy sector		0,000001675*** (0,284)	0,062
(CO2 emissions per capita)		0,014*** (0,004)	0,031
R2	0,076	0,246	
N	10 527	9 441	

*****=p<0,01, **=p<0,05, *=p<0,1**
N= Number of observations
R_2= the percentage of variation in y that can be explained by x.

The second OLS- regression model displays that when analyzed alone, post-materialism seems to have a strong influence on environmental actions (0,572). However, when other

control variables are included – this influence decreases – though stays still statistically significant. Post-material values can therefore argue to lead to more environmental actions among individuals and the second hypothesis – *countries with larger share of people holding post-material values have higher percentage of environmentally active citizens* – gets support.

Other results in this model illustrate that both micro and macro-variables have statistically significant influence on individual's behavior. With the first look these influences might seem very small, but if we again pay attention to beta-coefficients, it can be observed that GDP per capita (0,392) and level of education (0,113) play the most essential role when it comes to environmental grade of everyday actions at individual level.

CO2 emissions were included as a control variable in this regression to analyze a possible spurious relationship between this variable and environmental actions as that might cause false interpretation of the results. Unfortunately, there is a statistically significant relationship between these variables, which means that the risk of spurious relationship exists. However, the beta-coefficients indicate that of all the variables controlled, this relationship seems to have least influence on environmental actions (0,031). Results should anyway be interpreted carefully with this factor in mind.

Table 4: Results – Environmental Actions and CO2 emissions

Variabels	**(1)**	**(2)**	*Beta*
Environmental Actions	0,419*** (0,022)	0,075*** (0,024)	0,035
GDP per capita		0,00003983*** (0,00)	0,158
Size of industrial sector		0,199** (0,009)	0,235
Level of education		-0,075*** (0,013)	-0,056
Level of income		0,071*** (0,012)	0,060
Size of energy sector		0,0000007885*** (0,00)	0,136
(Post-materialism)		0,305*** (0,048)	0,068
R2	0,034	0,140	
N	10 805	9 441	

*****=p<0,01, **=p<0,05, *=p<0,1**
N= Number of observations
R_2= the percentage of variation in y that can be explained by x.

The last results show some different values from the first analysis between the share of post-materialist citizens and amount of CO2 emissions per capita. This time, environmental actions is included in the model as an independent variable and there seems to be a statistically significant relationship between this variable and the amount of CO2 emissions per capita (0,419). Although this correlation decreases again (0,075) when other control variables are included in the analysis. As this relationship is positive instead of negative, indicating that in countries with larger share of environmentally active citizens CO2 emissions per capita are higher, it means that the third hypothesis – *countries with larger share of environmentally active citizens emit smaller amount of CO2 per capita* – gets no support. Post-materialism is significantly correlated with environmental actions but this is not leading further to decreasing amount of CO2 emissions per capita.

Once again, we see that other control variables are significantly linked with CO2 emissions in this regression and that all the other relationships are positive except the one between level of education and CO2 emissions (-0,075). Beta-coefficients indicate that this time, instead of GDP per capita the biggest influence on CO2 emissions per capita comes from the size of industrial sector (0,235) and that the smallest influence originates from environmental actions (0,035). The relationship between the share of post-materialists and CO2 emissions per capita has also changed in this last regression though is still positive and statistically significant (0,305). This means that countries with higher share of post-materialist citizens are emitting more CO2 accordingly even this last model.

6 Discussion

Results presented in the previous chapter illustrate that the first hypotheses H1 and the third hypothesis H3 got no support. Nonetheless, the second hypothesis H2 got statistical support from the analysis and is thereby declared as correct. Instead of decreasing environmental impact, societies with larger share of post-materialist seem to stand for more CO2 emissions than the societies where the share is lower. According to Inglehart's theory this somehow makes sense. Wealthy and industrialized societies are supposed to provide large percentage of environmentally concerned citizens with post-materialist values when the individuals start experiencing economic and physical security. However, the results also illustrate that economic variables such as GDP per capita and the size of industrial sector are positively associated with higher levels of emissions and public environmental concern and thereby confirming previous research.

Unexpectedly the influence that the size of energy sector is having on the amount of CO2 emissions per capita in stays relatively low and shows even negative relationship to emissions in the first model. As the size of energy sector in this study measures the total amount of all forms of energy production in a country this might have influenced the low correlation with the level of CO2 emissions. Including energy production forms such as nuclear power and energy production from renewable sources, countries with large energy supply originating from these sectors result in lower than countries that use fossil fuels as their primary energy source.

Level of education and level of income are both having significant influence on the grade of environmental actions in member states of European Union. Nonetheless, at the national level it is only level of education that seems to have a negative effect on CO2 emissions per capita. This means that in European countries where education is well distributed among the citizens the level of emissions is also lower.

Results in all three models show relatively low R2-values, which indicates that the causal relationship in the model cannot be explained to the full with the variables chosen. Although the R2 value increases every time the control variables are included, it stays below 25% which indicates that less than fourth of the variation in the dependent variable can be explained with the help of variables used in the model. In this regard, the variables used in this particular study should be problematized and re-evaluated before using in the further research.

Correlation matrixes (Tables 5-7, Appendix) conducted from the regression models illustrate that multicollinearity between the independent variables exists to a varying extent. From the tables, it reads that for example level of income is less than 5 percent correlated with GDP per capita. This points out that high GDP per capita is not equal to high individual income level or wealth distribution in member states of European Union. In the first regression, post-materialist index is highly correlated with GDP per capita (-0,166) and level of education (-0,203). This means that GDP per capita and level of

education affect share of post-materialist citizens negatively. This leads to overestimation of the actual influence of post-materialism when these two values are controlled and thereby calls for extreme deliberation before jumping into conclusion touching this regression model. The same multicollinearity trend repeats in other models as well showing that GDP per capita is often correlated with the size of industrial sector but also that level of income and level of education are strongly correlated in every model. Although none of these correlations between independent variables exceeds 50 percent they might still have significant impact causing skewness in the results.

One more data related problem influencing the results, is the lower number of observations in models analysing environmental actions. Although the number of observations is still almost 10 000 this does not include the same sample as used in the first regression. Thus, results are not fully comparable.

In addition to critique above, one of the weak points of this research is the lack of reliable measurement for CO2 emissions originating from international trade and embodied in consumption of goods and services. Since major part of everyday environmental actions consists of consumer decisions this lack of measurement might have a significant effect in at least the relationship between environmental actions and CO2 emissions. In defence of this study, it can however be argued that environmental actions of the public should also result in closing down pollutant industries and shift the energy production towards renewable energy sources in the long term.

7 Conclusion

The focus of this study has been to examine the impact the increasing share of post-materialists has on level of carbon dioxide emitted per capita in European Union. In addition, the aim of this study is to investigate whether post-materialism can be statistically related to higher grade of environmental actions and whether these actions are resulting in lower amount of CO2 emissions per capita. With a quantitative research method, the relationship between the share of citizens holding post-materialist values and CO2 emissions has been examined to answer the main research question: *What influence has post-materialism had on CO2 emissions in member states of European Union?* In order to provide more information, the following sub-question was formed: *How is post-materialism affecting environmental actions among the public and to what extend does this effect the national level of CO2 emissions?*

From previous research and scientific theories three hypotheses were derived stipulating the expectations that 1) Countries with larger share of people holding post-material values are having lower value in CO2 emissions per capita 2) In countries where larger share of people is holding post-material values the public is more environmentally active and 3) Countries with larger share of environmentally active citizens emit smaller amount of CO2 per capita.

Based on the findings of this study there is a statistically significant relationship between share of citizens holding post-material values and amount of CO2 emitted per capita. On the contrary the first hypothesis, this relationship is positive meaning that post-materialism is linked with higher amount of emissions. Nevertheless, when including the control variables and attempting to answer the sub-question the true answer seems to be much more complex.

Results show that the amount of CO2 emissions per capita in member states of European Union is affected by many other factors besides the share of post-materialist citizens. Such factors are GDP per capita, the size of industrial sector and the size of energy sector. However, post-materialism seems to affect positively grade of environmental everyday actions but this does not [yet] lead to lower level of emission. Nonetheless, the results of this study indicate that promoting higher education can benefit measures to reduce the emissions of carbon in industrialized countries. Though in order to investigate the casual mechanism behind this relationship in more detail a change in perspectives might be needed.

Due to data related problems such as low R2-values, multicollinearity between the independent variables and significantly lower number of observations in the later models, results should be interpreted carefully and seen as rather inspiring guidelines for the future research than absolute truths about the reality.

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Appendix

8.1 Figures

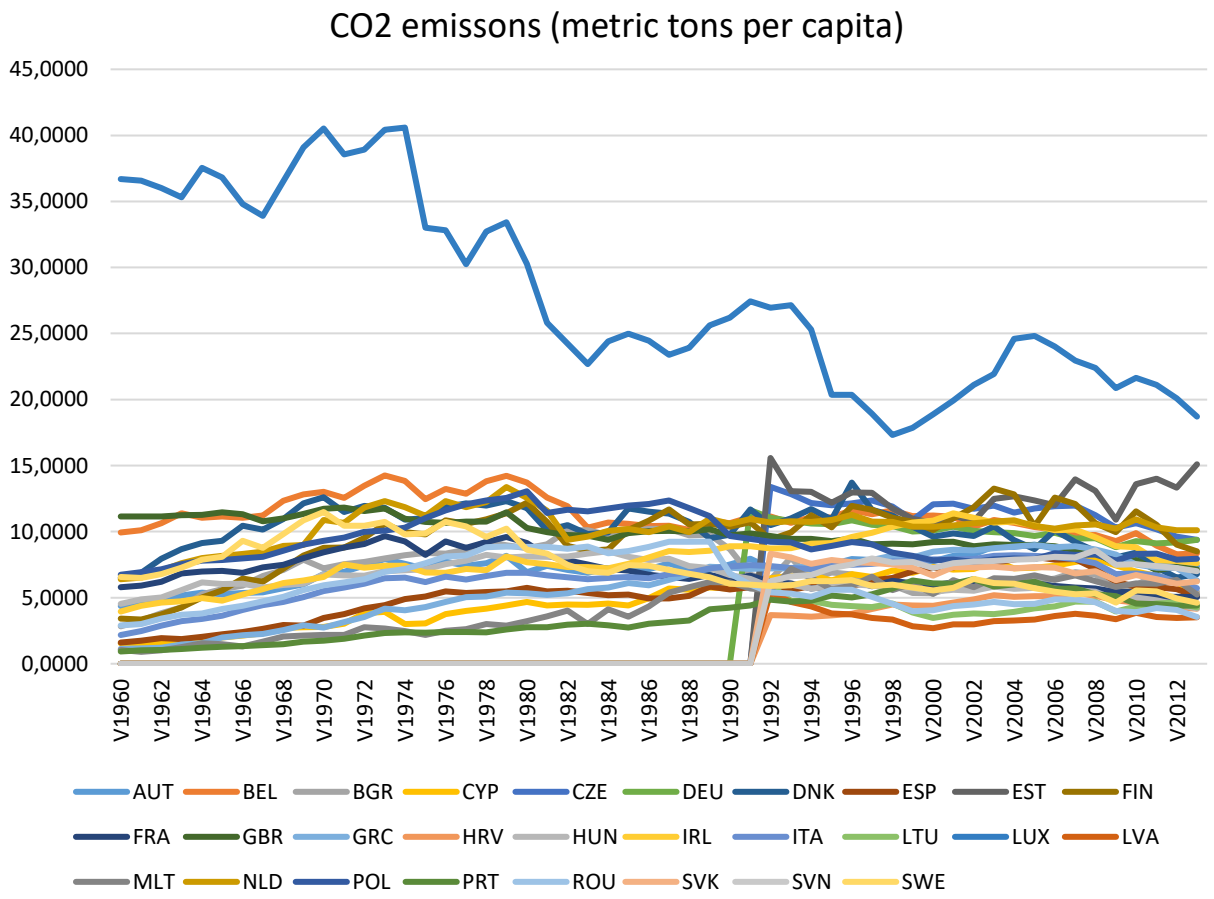

Figure 1: CO2 emissions in European Union 1960-2013

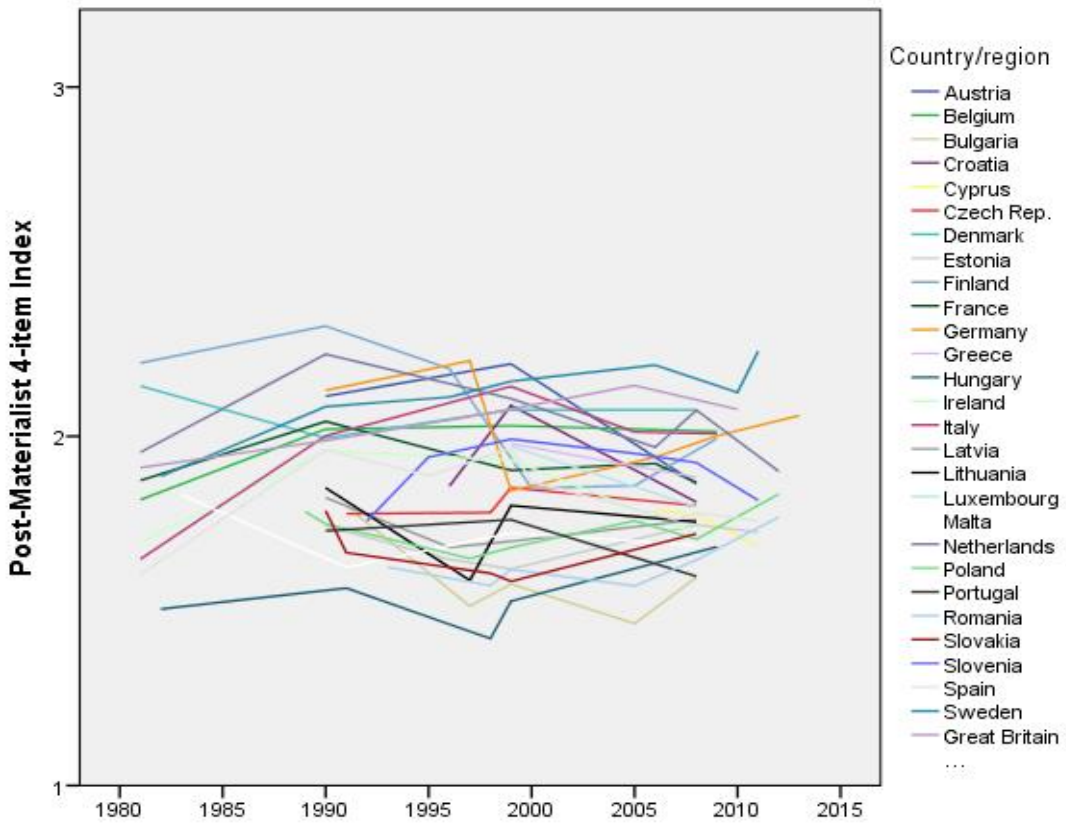

Figure 2: Post-materialism in European Union 1981-2014

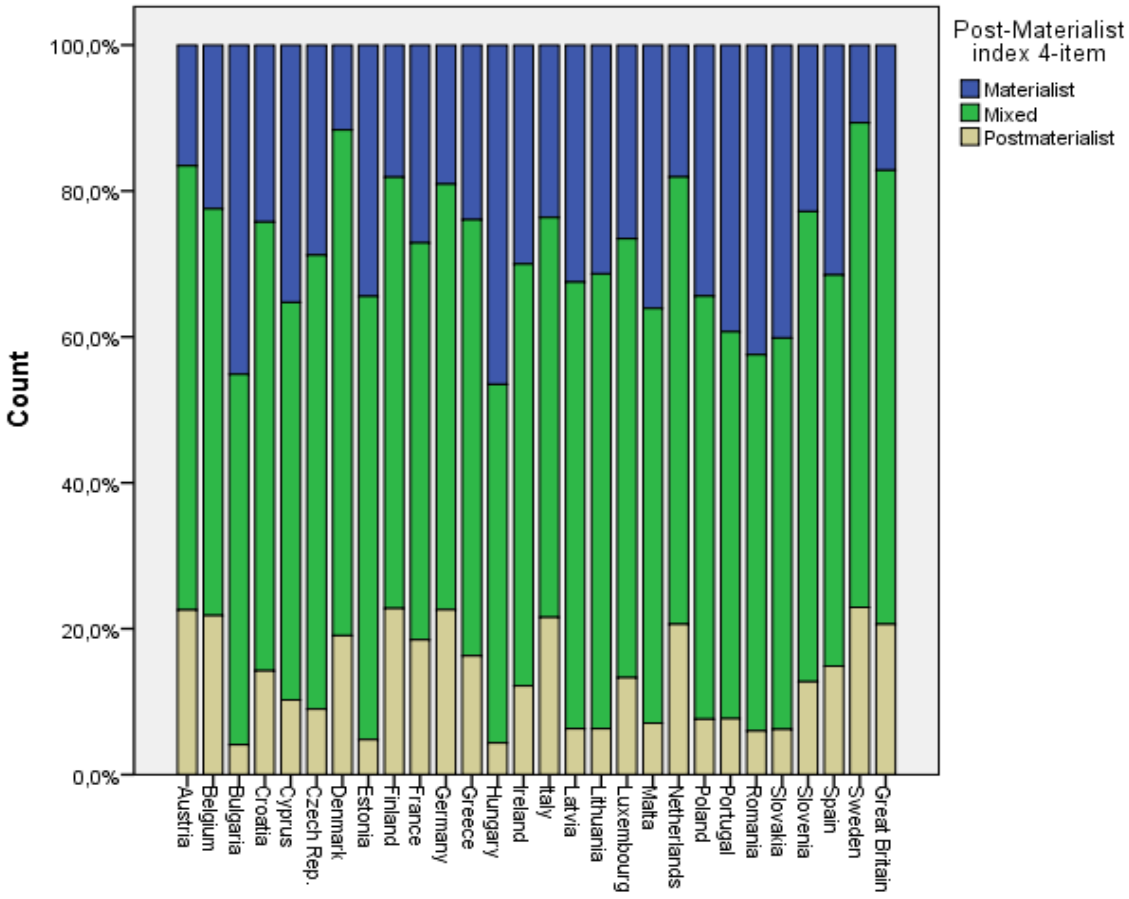

Figure 3: Share of post-materialists in European Union Countries

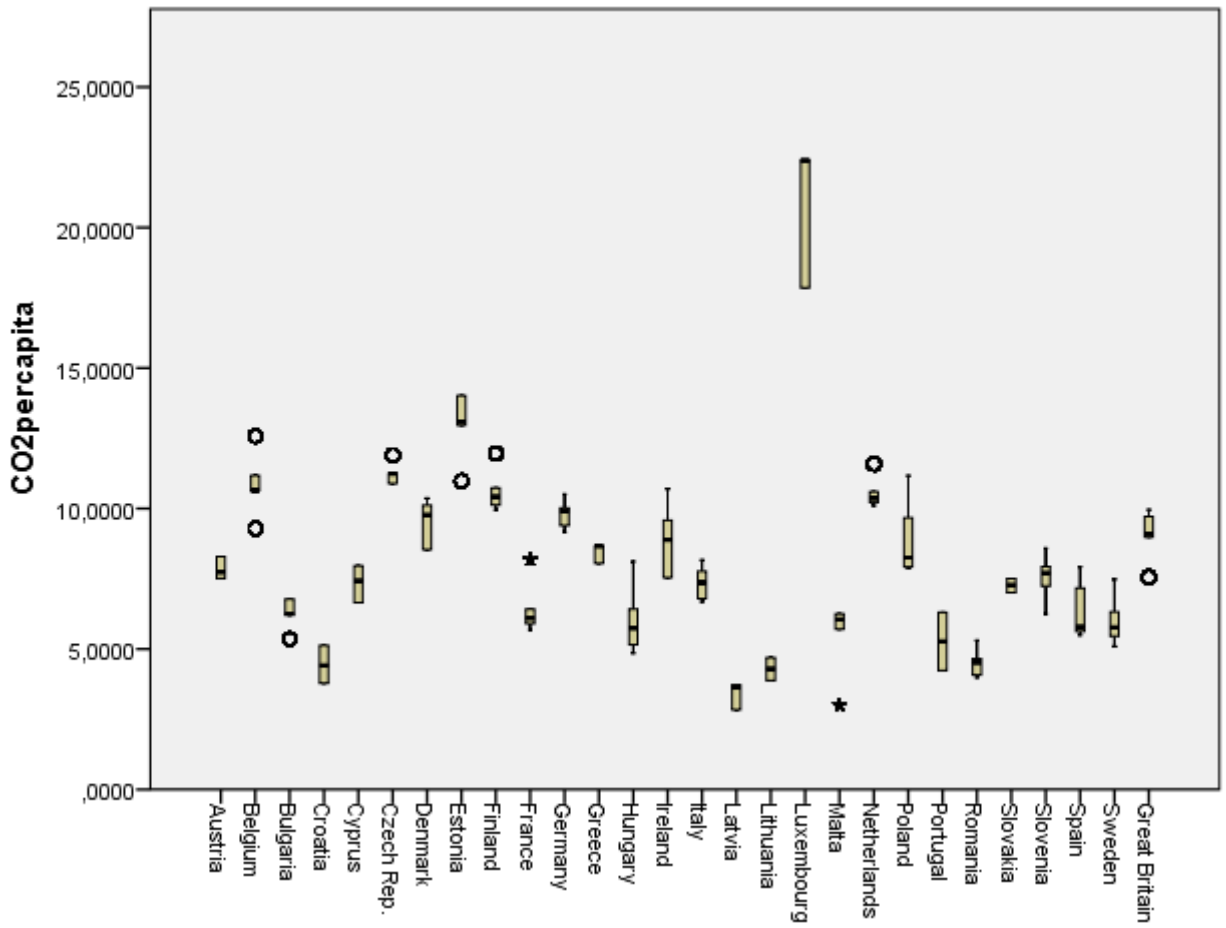

Figure 4: Box-plot diagram of CO2 per capita values

8.2 Tables

Table 5: Correlation Matrix - Post-materialism and CO2 emissions per capita

	Highest educational level attained	GDP per capita	Post-Materialist index 4-item	Income Level	Primary Energy Production	Industry size
Highest educational level attained	1,000					
GDP per capita	,034	1,000				
Post-Materialist index 4-item	-,166	-,203	1,000			
Income Level	-,312	-,048	-,063	1,000		
Primary Energy Production	,120	-,340	-,046	-,016	1,000	
Industry size	,064	,436	-,064	,012	-,049	1,000

Table 6: Correlation Matrix - Post-materialism and Environmental Actions

	Post-Materialist index 4-item	Industry size	Highest educational level attained	Primary Energy Production	CO2percapita	Income level	GDP per capita
Post-Materialist index 4-item	1,000						
Industry size	-,030	1,000					
Highest educational level attained	-,170	-,066	1,000				
Primary Energy Production	-,031	-,171	,056	1,000			
CO2 per capita	-,069	-,233	,053	-,130	1,000		
Income level	-,053	,249	-,248	-,078	-,061	1,000	
GDP per capita	-,328	,245	,025	-,386	-,150	-,011	1,000

Table 7: Correlation Matrix – Environmental Actions and CO2 emissions

	Highest educational level attained	Industry size	Primary Energy Production	Post-Materialist index 4-item	Income level	Environmental Actions	GDP per capita
Highest educational level attained	1,000						
Industry size	-,044	1,000					
Primary Energy Production	,071	-,202	1,000				
Post-Materialist index 4-item	-,155	-,040	-,034	1,000			
Income level	-,238	,245	-,084	-,053	1,000		
Environmental Actions	-,121	-,084	-,067	-,089	-,048	1,000	
GDP per capita	,073	,233	-,363	-,289	-,002	-,351	1,000

8.3 Questionnaire

EVS+WVS Variables B011-B015 Environmental Action

"Which, if any, of these things have you done in the last 12 months, out of concern for the environment?"

Variable	Questionnaire	Value = 0	Value = 1
B011	Have you chosen household products that you think are better for the environment?	Have not	Have done
B012	Have you chosen *for environmental reasons* to reuse or recycle something rather than throwing it away?	Have not	Have done
B013	Have you tried to reduce water consumption *for environmental reasons?*	Have not	Have done
B014	Have you attended on meeting or signed a letter or petition aimed at protecting environment?	Have not	Have done
B015	Have you contributed to an environmental organization?	Have not	Have done

Reference: World Values Survey Codebook 1995-1996. Institute for Social Research; the University of Michigan