Radboud Universiteit Nijmegen

The Economics of Environmental Attitudes: Absolute Wealth, Relative Wealth, or Both?

G.J. SWENNEN

"We are the first generation to be able to end poverty, and the last generation that can take steps to avoid the worst impacts of climate change. Future generation will judge us harshly if we fail to uphold our moral and historical responsibilities."

(Ban-Ki Moon, Leuven, 28 May 2015)

Master's thesis

Title:	The Economics of Environmental Attitudes: Absolute Wealth, Relative Wealth, or Both?
Supervisor:	Dr. A.A.J. van Hoorn
Name:	G. J. Swennen
Student number:	s4238478
Study:	Master of Science Economics
Specialisation:	International Economics & Development
Institute:	Radboud University Nijmegen
Faculty:	School of Management
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Abstract

What causes people to have environmental concerns? This study adds relative wealth concerns as an explaining factor for environmental concerns to the objective-problems subjective-values thesis of Ronald Inglehart. Previous studies focused on personal income and local environmental problems as factors to explain environmental concerns, where this study investigates a person's subjective position in society as an essential factor. Using an OLS regression model, the empirical results confirm this hypothesis, with a positive relationship between relative wealth concerns and environmental concerns. Deviating results in robustness checks call, however, for further research on this topic.

Keywords: environmental concerns; postmaterialism; objective-problems subjective-values; relative wealth concerns

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CHAPTER 1.

- INTRODUCTION -

Concerns about the state of the environment are nowadays rising. In response to the Paris Agreement, and as part of the Sustainable Development Goals, climate change policy has become an essential part of the economic agenda of countries. Adaptation and mitigation to climate change bring enormous economic challenges and changes inside countries. It is important to know why citizens are concerned about rising environmental problems, as this is an essential part of the legitimisation and efficiency of economic climate change policies. These attitudes towards environmental concerns are especially of interest as climate change adaptation and mitigation can be considered as a global public good (Tjernström & Tietenberg, 2006). No country can take full advantage of the benefits in counteracting climate change while helping counteracting climate change mitigates the risks of it. Citizens' attitudes in this matter can play an essential role in the decision of countries to invest in the global public good of climate change mitigation.

Current literature on environmental attitudes sees its starting point in the 'Objective-Problems Subjective-Values' (OP-SV thesis) of Ronald Inglehart (1971). Objective-Problems refers to citizens faced with severe local environmental problems, which are consequently more likely to be concerned about the environment. These problems include drought, rising sea levels and extreme weather conditions. The second part of the hypothesis stems from postmaterialism. This theory suggests that people have basic needs, like food and health. People will prioritise their actions in covering these basic needs first (Ahonen, 2017). Once these needs have been met, postmaterialist values like respect and aesthetic pursuits will become part of their daily lives. Also, concerns about the environment are possible postmaterialist values, values that do not get emphasised until basic economic needs are secured. In this context, economic prosperity and concern with the environment are expected to have a positive correlation. Higher wealth

makes it possible to overcome the basic needs and therefore, wealthier citizens can be more concerned about climate change.

The expected positive relationship between wealth and environmental concern is, however, not unambiguously clear in empirical studies about the subject. This is seen in both studies at the country level and the individual level for environmental concerns. For example, the cross-national study of Sandvik (2008) shows a negative relationship between GDP per capita and the part of the population that sees climate change as a severe problem. Also, the study of Tjernstrom and Tietenberg (2008) shows that a lower household income leads to a positive greenhouse attitude, i.e. the attitude that the greenhouse effect is hazardous for the environment. At last, some studies show climate change scepticism has become of prominence in the wealthiest countries (Climate Institute, 2012).

This has lead to a heavily theoretical debate about the either negative or positive relationship between personal income and environmental concern, but a consensus seems absent. This study will contribute to this theoretical gap by providing relative wealth concerns as an alternative explanation for environmental attitudes. The main argument is that welfare of citizens does not solemnly depend on absolute material wealth, but also is heavily dependent on an individual's concern about its relative wealth towards others in society (Hopkins, 2008). The postmaterialism theory states that citizens have economic and physical security as their basic needs before they start thinking about other needs (Inglehart, 1995). A citizen in a high-income country could perceive economic and physical security differently than a citizen in a low-income country. Citizens who perceive themselves in the bottom part of a country's society could be less concerned about the environment, as these individuals' priority would to improve their economic situation relative to other individuals living in the same country. From this argument, the following research central question is derived:

What is the influence of relative wealth concerns on the environmental attitudes of citizens?

The research question is scientifically relevant as it contributes to the theoretical gap in the OP-SV thesis with the relationship between wealth and environmental concerns. Also, the economic literature on climate change focuses mainly on the financial aspect of climate change policy, where attitudes of citizens only recently have received more attention. From a societal perspective, this is important, as national policies on climate change are increasing rapidly, due to the Paris Agreement. To legitimately implement climate change policies, a thorough understanding of citizens' attitude towards climate change is essential. Active participation of citizens in climate change policy is needed as it becomes the central part of the economic agenda in countries nowadays.

This question is answered using quantitative research methods. The International Social Survey Program (ISSP) provides survey data on 32 countries worldwide. This study uses the Environment module, which focuses specifically on attitude questions about the environment. The last module has been conducted in 2010, which provides recent data that can be used in this study.

The remainder of this thesis is structured as follows. The next chapter (Chapter 2) provides a theoretical background to current literature about environmental concerns. This background is followed by the hypothesis about relative wealth and environmental concerns. The subsequent chapter (Chapter 3) gives an overview of the data and methods used for the analysis. Also, the key variables are described in this chapter. The next chapter (Chapter 4) presents the results of the empirical model and provides robustness checks with it. At last, a general conclusion is presented where the research question is answered, and recommendations for further research are given (Chapter 5).

CHAPTER 2.

- THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT -

The literature regarding the factors that influence environmental attitudes sees its starting point in the work of Ronald Inglehart (1995). He gives two main explanations for environmental concerns: postmaterialist values and local environmental effects. This is known in the literature as the 'Objective Problem and Subjective Value' (OP-SV) thesis. Postmaterialism is constructed from subjective values that lead to environmental concerns, where local environmental problems are physical effects that cause environmental concerns. Where effects of local environmental problems are widely accepted as an explanation for environmental concerns, postmaterialist values have been heavily debated as an explaining factor (Dunlap, Gallup and Gallup, 1993; Johnson, Brace and Arceneaux, 2005). This study will take the OP-SV thesis as the starting point for this literature review and follows with relative wealth as an alternative explanation for environmental concerns.

2.1. Economic scarcity, postmaterialism, and environmental attitudes

Postmaterialism stems from *The Silent Revolution in Europe: Inter-Generational Change,* where Inglehart (1971, p. 991) formulates his postmaterialism thesis as follows: "[I]ndividuals pursue various goals in hierarchical order giving maximum attention to the things they sense to be the most important unsatisfied needs at a given time." In other words, the values of citizens change, along with economic development. Citizens will first give value to economic and physical security, i.e. materialist values. Once the necessary conditions of living are met, postmaterialist values, i.e. freedom and quality of life, are the new priority in the citizen's life. The right to vote and freedom of speech are examples of postmaterialist values.

Also, concerns about the environment, the state of the planet and the consequences of climate change can be seen as postmaterialist values. People with higher standards of living are therefore expected to have more concerns about the environment. The link between postmaterialist values and environmental attitudes was further developed by Inglehart (1995) in his work *Public Support for Environmental Protection: Objective Problems and Subjective Values*. Inglehart used the World Values Survey with data from 43 countries to show that people with postmaterialist values tend to be more concerned about the environment.

Postmaterialism as an explanation for environmental concerns has been heavily debated in empirical studies. First, studies have found a positive relationship between the two variables. For example, Lee and Kidd (1997) constructed a measurement index for postmaterialism using the World Values Survey and found that citizens who perceive themselves as postmaterialist are more concerned about the environment. Lengfeld and Gerhards (2008) focused on EU countries only and found a similar positive result. On the other hand, Davis (2000) conducted 56 tests on the relationship between postmaterialist values and attitudes and found no relationship with environmental concerns.

The link between postmaterialist values and environmental concerns remains ambiguous, which can be explained by the type of measurement. All the studies mentioned above use different subjective measurement indexes for postmaterialism, that led to different results. Scholars, therefore, used national wealth instead as an objective measure of postmaterialism. A higher GDP per capita for citizens would lead to physical and economic security (i.e., lower economic scarcity) for citizens in the country, which makes room for postmaterialist values like environmental concerns. The effect is, in this case, also ambiguous. Dunlap and York (2008) and Israel and Levinson (2004) see no relationship between environmental concern and national wealth. Other studies even see a negative relationship between national wealth and environmental concern (Brechin & Kempton, 1997; Dunlap & Mertig, 1997; Gelissen,

2007; Givens and Jorgenson, 2011). Studies that see a negative relationship between the variables are giving local environmental problems as a more likely factor for climate change concerns.

2.2. Postmaterialism, personal income and environmental attitudes

Above mentioned studies take into account the effects of national wealth at the country level and not at the individual level, which would be more precise. The effects of an individual's income have been researched less, mainly due to the lack of data on personal income. Several studies, however, still researched the effects of personal income, which led to mixed results. Tjernstrom and Tietenberg (2008) have taken into account individual household income in their cross-national survey on environmental concerns and found a negative relationship. The author is also referring to the direct environmental degradation part of Inglehart's theory, with the addition that citizens living further away from environmental degradation are even more likely to be less concerned about climate change. Second, a study of Whitmarsh (2011) investigated the scepticism of citizens towards climate change and found that citizens with an increasing household income were far more sceptical towards the change in the environment.

Other cross-national studies about the effect of individual household income on environmental concerns are absent, most likely due to the lack of data on personal income in value surveys. This study tries to explain why the studies mentioned above did find a negative relationship between personal income and environmental concerns. The postmaterialist part of Inglehart's OP-SV thesis expects people with a more personal income to have more environmental concerns. The negative relationship in the empirical data requires, therefore, more scrutiny. A possible explanation is the role of relative wealth in this matter.

2.3. Relative wealth concerns and environmental attitudes

The specific relationship of an individual's relative wealth concerns with environmental attitudes has not been examined yet, but general literature about relative wealth concerns exists. Relative wealth concerns refer to an individual living in a society, where this individual is concerned about her/his relative position towards others in society. The individual's well-being depends in this context on the relative position towards others, not its absolute wealth. Relative wealth concerns have only recently been more investigated in economics, as before most economists connected utility to an individual's endowment, not its relative position (Solnick & Hemenway, 1998).

Envy is seen as the most important reason why a citizen would care about its relative income. The words of Bannerjee (1990) describe this as: "it seems unquestionable that, for some people at least, the pleasure they get out of a particular consumption bundle will be less if they feel that everybody around them has more than (they), than if they feel that they are pretty much on a par with the rest of their group." A person who earns €30.000, in this case, would be less satisfied if people in its environment would earn €40.000. When these people earn only €20.000, however, the person would be more satisfied.

In the relative concerns literature, *Choosing the Right Pond,* written by Robert Frank (1985), is considered as the contemporary work in economics on this subject. He argues that persons try to gain a relative advantage towards others and therefore, all people will stay in their relative position. Also, according to Frank, positional concerns can explain many world-phenomena. An example is a relatively higher income for low-productivity workers, to compensate for their low socio-economic status.

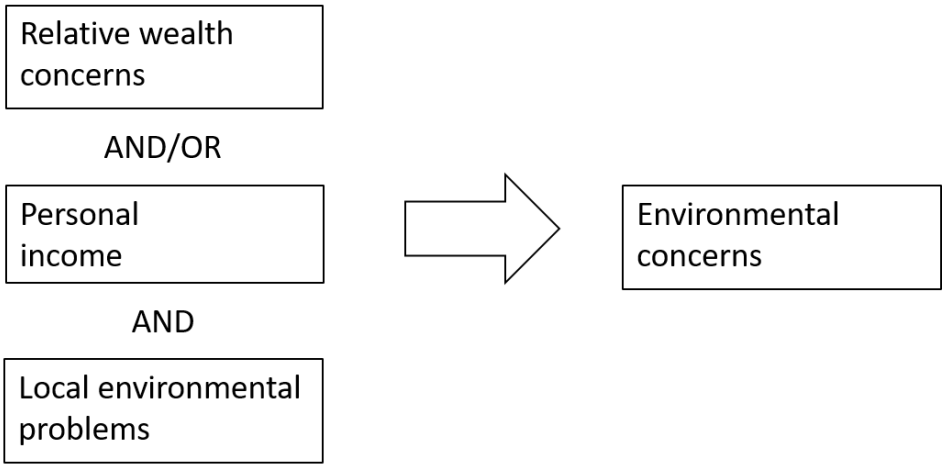
The relative wealth concerns of a person can be linked to someone's concern about the environment. The argument is related to the postmaterialism part of Inglehart's OP-SV thesis. A person can feel that she/he is in a position that is relatively worse than the people in its surroundings. Concerns about their social status can be of such priority that it feels as economical and physical insecurity. This feeling of insecurity can even hold if the person's absolute income leads to security in other parts of the

world. The citizen will, therefore, prioritise to improve its relative wealth, and values this above other postmaterialist values. Relative income concerns can even be a more critical factor for materialist values, instead of absolute income. This would explain the negative relationship between absolute personal income and environmental concerns in empirical studies. Therefore, if a person's relative wealth position improves, it can focus more attention to other postmaterialist values, like environmental concerns. This argument leads to the following central hypothesis of this study:

Hypothesis 1 *The higher a person's relative wealth is to his/her peers, the more concerned about the environment his/her attitudes are.*

The relationship in this hypothesis is conceptualised in figure 1. The first branch shows that either a higher personal income or more relative wealth concerns lead to environmental concerns; which is seen as a postmaterialist value. Also, local environmental problems are given as a cause for more environmental concerns. The main focus of the analysis will be on the role of relative wealth concerns.

Figure 1. Conceptual model for factors influencing environmental concerns (Author's design)



CHAPTER 3.

- DATA AND METHOD -

3.1. Data sources and sample

This study uses the International Social Survey Programme (ISSP) to answer the research question. The ISSP is a cross-national survey programme, established in 1984 by the countries Germany, Great Britain and the United States. Since the establishment, several other countries have joined the program, and nowadays 43 countries are part of the ISSP. In the past years, over a million respondents have participated in the ISSP. It conducts surveys on several topics, including citizenship, social inequality and the environment.

This study uses the Environment module of the ISSP, which looks specifically at the environmental attitudes of citizens. The dataset includes questions about attitudes towards the environment, the most critical issues in the respondent's country and socio-demographic questions. So far, three Environment modules have been executed, where the most recent module was conducted in 2010. To have the closest view in current attitudes towards the environment, the 2010 module is used as the dataset for this study. Another module is expected to be released in 2020, which can be used for further research about this topic.

The 2010 environment module contains data from 32 countries, with a total of 45199 respondents. This includes both lower-income countries like the Philippines and Chile; and higher-income countries like the United States and Great Britain. Every country has a sample size of approximately 1000 respondents. Taiwan, France, South-Africa and Spain deviate in this matter with sample sizes above 2000 respondents. A full overview of the countries included in the dataset with sample sizes can be found in the Appendix.

3.2. Variables and measures

In table 1, the descriptive statistics are given for the dependent, independent and control variables.

Table 1. Descriptive statistics for dependent, independent and control variables

Variable	Valid N	Minimum	Maximum	Mean	S.D.
Dependent variables					
Environmental concern	44341	1	5	3.62	1.12
Index environmental concern	41848	1	5	2.90	0.74
Independent variables					
Relative wealth concerns	41431	1	10	5.13	1.801
Relative income (percentile rank)	32464	0.1	100	50	28.47
Main control variables					
Personal income	32464	0	31092	1665	1884
Local environmental problems	42815	1	5	2.76	1.07
Other control variables					
Age	44906	15	99	47	18.56
Gender	45075	0	1	0.54	0.50
Education	41627	0	70	12	4.18
Children	39269	0	1	0.40	0.49

3.2.1. Dependent variables

The primary dependent variable is regarding the environmental concern of respondents. This is measured in the survey using the following question phrase: “Generally speaking, how concerned are you about environmental issues?”. The respondent can answer in a five-point scale, from (1) “Not at all concerned” to (5) “Very concerned”. The additional option (8) “Can’t choose”, is coded as a missing variable in the analysis. Similar options in other variables are also coded as a missing variable. At last, ‘concern’ in the dependent variable does not imply involvement in environmental pressure groups but consists of being worried about environmental issues.

As a robustness check, an alternative measure of individuals’ attitudes towards the environment is created. This is an index of three separate variables, combined into one variable with a five-point scale.

The respondent is asked to give an opinion about the following statements: (a) “We worry too much about the future of the environment and not enough about prices and jobs today”, (b) “Almost everything we do in modern life harms the environment”, (c) “People worry too much about human progress harming the environment”. All statements can be answered in a five-point scale from (1) “Agree strongly” to (5) “Disagree strongly”. Also, the option (8) “Can’t choose” is included. As a higher score in statements (a) and (c) corresponds with less concern with the environment, the variables are recoded to an inverted scale for a correct model. Also, the index variable is reduced to a five-point scale to have a clear comparison with the main dependent variable.

3.2.2. Key independent variable

The main independent variable of this study is relative wealth concerns. This is measured in the ISSP with the variable “top-bottom self-placement”. Respondents have been asked the question: “In our society, there are groups that tend to be at the top and others that tend to be at the bottom. In such scale that goes from 10, at the top, and 1, at the bottom, where would you place yourself today in this scale?” Respondents consequently place themselves in society in a ten-point Likert-scale from (1) “Lowest, Bottom” to (10) “Highest, Top”.

There should be noted that “top-bottom self-placement” measures relative wealth concerns in a subjective matter. People are asked in which position they see themselves in society, which does not need to be the relative objective position in the whole country. For example, a working citizen in the business sector around the age of 40 will not compare him/herself with a student around the age of 20. The working citizen could still mark its position as low in society, even though it is objectively considered wealthy compared to others in the country. The theoretical framework predicts that citizens who subjectively see themselves in a low position in society will care less about the environment because they want more

economic and physical security. Therefore, the "top-bottom self-placement" measure is justified to be used as the main independent variable.

As environmental concerns have a small standard deviation of 1.1 and a range from only 1 to 5, relative wealth concerns are likely to have small coefficients in the analysis. For clarity purposes, the variable is therefore recoded to standardised value with a mean of 0. From the theoretical framework, it is expected that higher relative wealth concerns lead to more environmental concerns.

3.2.3 Main control variables

3.2.3.1. Personal income

The research puzzle of this study stems from the relationship of environmental concerns with absolute personal income. The analysis will, therefore, have a particular focus on the control variable 'personal income', to see whether relative income or personal income has more influence on environmental concern. The ISSP dataset includes both measurements in personal income and household income. The measurement for relative income, top-bottom self-placement, is measured at the individual level. For consistency purposes, this study uses, therefore, the respondent's personal income as the control variable in the model.

The ISSP dataset measures the personal income for respondents in separate variables. Measurements in these variables are in the country's local currency. For example, the personal income of citizens in Mexico is measured in the Mexican Peso. The variables are therefore first converted to a common currency, US dollar, corrected for purchasing power parity (PPP). This is done using data from the OECD, which gives the amount of national currency per US dollar. After every respondent's personal income has been converted to US dollars, the variables were combined into one single variable of personal income, corrected for PPP. As the range in personal income is extensive, this variable is also recoded into standardised values for clarity purposes.

For robustness checks, an additional variable is created to measure the objective relative income of respondents. In this case, the above mentioned personal income of respondents is transformed into a percentile rank score within the respondent's country. The scores have a range from 0 to 100.

3.2.3.2. Local environmental problems

The OP-SV thesis gives local environmental problems as the second main factor why people would be more concerned about the environment. Therefore, this variable will be included in the analysis, which is asked to respondents with the statement: "Environmental problems have a direct effect on my everyday life". Respondents can answer this question in a five-point scale from (1) "Disagree strongly" to (5) "Agree strongly". From this scale, respondents with a low score are expected to be more concerned about the environment.

3.2.4. Other control variables

To the empirical model, important control variables are added to the analysis. The study of Shen and Saijo (2008) gives an overview of the literature on socio-demographic factors influencing environmental concerns. These contain mainly income, but also age, gender, education and the presence of children in the household. Therefore, these socio-demographic variables are added to the model as control variables.

3.2.4.1. Age

Age is in the dataset measured in number of years. The range is from 15 years to 99 years old.

3.2.4.2. Gender

Gender is included a dummy variable with the option of (0) "Male" and (1) "Female", where male is the reference category in the analysis.

3.2.4.3. Education

Education is measured by the number of years followed in education. If the respondent is still at school or university, it is counted as a missing value as the number of years in schooling is unclear.

3.2.4.4. Children

The presence of children in the household of the respondent is measured with a dummy variable. The respondent can have children (1) or not have them (0). The ISSP has two variables concerning children. The first variable is the number of children in the household between school age and 17 years. The second variable is the number of toddlers in the household. Both variables are combined, which leads to a variable with the total number of children in the household. Next, the variable is recoded to a dummy variable with the option of having children or not. It is expected that in households with children, the respondent will be more concerned about the environment because of the endangered future of its children.

3.3. Empirical model

The above mentioned dependent, independent and control variables are included in the following empirical model:

$$E_{ij} = \beta_0 + \beta_1 RC_{ij} + \beta_2 PI_{ij} + \beta_3 L_{ij} + \beta_4 C_{ij} + \varepsilon_{ij}$$

Where E_{ij} denotes the environment concerns of individual i living in country j, RC_{ij} denotes the relative wealth concerns of individual i living in country j, PI_{ij} denotes the personal income adjusted for PPP of individual i living in country j, L_{ij} denotes the perceived local environmental problems of individual i living in country j, C_{ij} denotes a vector of common socio-demographic factors of individual i living in country j and last, ε_{ij} denotes the error term for individual i living in country j.

The empirical model is tested using an OLS regression. The ISSP contains data of respondents of different countries, made by the local statistical bureau, which makes the data nested. This could lead to

possible biased effects in this nested data. Therefore, country dummy variables are added to the OLS regression as a measure against the possible violation of the assumption of independent errors. Also, the standard errors are adjusted for clustering at the country level. The data has been tested for multicollinearity, where no VIF-values above 5 have been found. A full overview of all VIF-values for every variable can be founded in the Appendix.

CHAPTER 4.

- EMPIRICAL RESULTS -

This chapter presents the results of the empirical model in different parts. First, the results of the OLS regression model are presented with environmental concerns as the dependent variable. These include different models where the independent variables are consecutively added to the regression model. Second, for robustness check, a second model is presented with a proxy index variable for environmental concerns, combining similar statements in the ISSP together in one variable. Also, a different measure for relative income is used as a robustness check.

4.1. Baseline results

In table 2, the results of the OLS regression are presented without the independent variable and the main control variables.

Table 2. Multilevel regression model results with environmental concerns as dependent variable

Variables	Coefficient	S.E.
Control variables		
Age	0.003***	0.001
Gender (ref: male)	0.125***	0.019
Education (years)	0.036***	0.005
Children (ref: no children)	0.010	0.027
Constant	3.449***	
R^2	0.088	
N	35677	

Model includes country dummy variables. (*), (**), and (***) indicate 5%, 1%, and 0.1% significance level, respectively.

The results of the control variables show a low r-squared value of 0.088, as it is expected to increase with the addition of the independent and main control variables. Also, there seems for this model no significant effect of having children to the amount of environmental concern.

In table 3, the model with the results of the OLS regression are presented without relative wealth concerns and personal income, but with the addition of the perceived local environmental problems.

Table 3. OLS regression model results with environmental concerns as dependent variable

Variables	Coefficient	S.E.
Main control variables		
Local environmental problems	0.230***	0.016
Other control variables		
Age	0.002**	0.001
Gender	0.121***	0.018
Education (years)	0.029***	0.004
Children (ref: no children)	0.010	0.026
Constant	4.150***	
R^2	0.128	
N	34217	

Model includes country dummy variables. (*), (**), and (***) indicate 5%, 1%, and 0.1% significance level, respectively.

The addition of the perceived local environmental problems shows a definite increase in the r-squared value. In the previous model, only 8.8% of the variance in the dependent variable is explained by the independent variable, wherein this model, 12.8% of the variance is explained. Also, the coefficient is positive for local environmental problems. This indicates that respondents who perceive more local environmental problems are more concerned about the environment. The coefficient indicates that a 1 point increase in perceived local environmental problems leads to a 0.230 increase in environmental concerns. Taking into account the small range of 1 to 5 in the dependent variable, the effect of local environmental problems can be considered substantial.

In table 4, the model with the results of the OLS regression are presented without relative wealth concern, but with the addition of the personal income of the respondent.

Table 4. OLS regression model results with environmental concerns as dependent variable

Variables	Coefficient	S.E.
Main control variables		
Personal income (standardized)	-0.009	0.009
Local environmental problems	-0.243***	0.015
Other control variables		
Age	0.001	0.001
Gender	-0.126***	0.021
Education (years)	0.033***	0.005
Children (ref: no children)	0.007	0.030
Constant	4.180	
R^2	0.141	
N	23975	

Model includes country dummy variables. (*), (**), and (***) indicate 5%, 1%, and 0.1% significance level, respectively.

The results show an increase in the r-squared value from 0.128 to 0.141 again. This means 14.1% of the variance in the dependent variable is explained in this model. The coefficient of personal income shows no significant value. The effect of personal income on environmental concerns is therefore ambiguous.

The primary independent variable of this study, relative wealth concern, is added in the final model shown in table 5.

Table 5. OLS regression model results with environmental concerns as dependent variable

Variables	Coefficient	S.E.
Independent variable		
Relative income concerns (standardized)	0.058*	0.22
Main control variables		
Personal income (standardized)	-0.020*	0.008
Local environmental problems	-0.236***	0.015
Other control variables		
Age	0.001	0.001
Gender	0.124***	0.022
Education (years)	0.029***	0.004
Children (ref: no children)	0.008	0.032
Constant	4.220	
R^2	0.143	
N	22589	

Model includes country dummy variables. (*), (**), and (***) indicate 5%, 1%, and 0.1% significance level, respectively.

The r-squared value in this model increases slightly to 0.143. More interestingly, relative wealth concerns show a positive relationship with the dependent variable environmental concern. Also, this relationship is significant at the 5%-level. This means that if a citizen considers itself being part of a higher level of society, It is likely to have more environmental concerns. The coefficient of the independent variable is 0.058. As the relative wealth concern is recoded into standardised values, the coefficient has to be interpreted in a different way than a standard regression coefficient. In this context, if a citizen has a one-unit increase in its z-score of relative wealth concern, it is expected to increase its environmental concern by 0.051, considering all other things equal.

There should also be noted that personal income has now a significant value at the 5%-level. This relationship with environmental concerns is negative. If a respondent has a higher personal income, it is

expected to be less concerned about the environment. Also, the effect of age is not significant in the final model.

The total number of cases in the final model is 22589, which is significantly smaller than the 45152 cases in the original dataset. This is mainly due to low responses to personal income. However, due to the significant importance of this variable in the theoretical framework, personal income has not been omitted from the model.

4.2. Robustness checks

To check whether the model is robust to changes in the dependent variable, a second OLS regression is shown in table 6. Here the dependent variable is an index variable with statements about the environmental concerns.

Table 6. OLS regression model results with an index of environmental concerns as the dependent variable

Variables	Coefficient	S.E.
Independent variable		
Relative income concerns (standardized)	0.043**	0.012
Main control variables		
Personal income (standardized)	0.039**	0.011
Local environmental problems	-0.003	0.020
Other control variables		
Age	-0.000	0.000
Gender	0.030**	0.014
Education (years)	0.027***	0.004
Children (ref: no children)	0.020	0.013
Constant	2.589	
R^2	0.089	
N	21744	

Model includes country dummy variables. (*), (**), and (***) indicate 5%, 1%, and 0.1% significance level, respectively.

The results of this model show different results. First, the effect of the main dependent variable of this study is similar to the main model. However, the effect of personal income is, in this case, positive and significant at the 0.1% level, where the effect of local environmental problems is not significant. The change in the effect of income shows the ambiguous relationship between personal income and environmental concerns, as the effect completely differs with a small change in measurement. The change in the effect of local environmental problems is, however, not expected as almost all empirical study show a negative relationship of the variable. This effect needs, therefore, more examination in further research.

There should be noted that the r-squared value of the model with the index variable is 0.089, which is significantly smaller than the 0.143 of the original model. This questions the results of the alternative model. This urges the need for further research on this topic.

CHAPTER 5.

- CONCLUSION -

What causes a person to have more concerns about the environment? This study tried to fill the theoretical gap in the role of income in the original 'Objective-Problems Subjective-Values' thesis of Ronald Inglehart (1995). By introducing relative wealth concerns as an alternative variable, the ambiguous relation of personal income and environmental concerns could be explained. It was expected that a person that considers itself higher in society would be more concerned about the environment.

The results in the analysis show a positive relationship between relative wealth concerns and environmental concerns. If a person perceives itself in a lower position in society, it is less likely to be concerned about the environment. This finding corresponds with the expected relationship in the theoretical framework. Hypothesis 1 is therefore accepted. There should be, however, noted that the effect of local environmental problems stronger is than the effect of relative wealth concerns. This is seen in the strong increase of the r-squared value for local environmental problems, as well as in the strong coefficient. In addition, the robustness check result in different outcomes than the original model. The unclear relationship of personal income and environmental concerns is confirmed in the robustness check. The change in significance of local environmental problems, however, calls for caution which needs to be researched in further research.

The results of this study has implications for policy-makers in the fight against climate change. Several governments are following the Paris Agreement and are implementing active economic measures in energy transition and adaptation to climate change. A robust public opinion with concerns about the environment is therefore essential to see proper effects of these measures. This study contributes to understanding why citizens are concerned about the environment by showing the importance of citizens' relative wealth concerns. If citizens feel they do not have a high position in society, policy measures

against climate change could have fewer effects. As climate change policy is for many countries the most important economic change at the moment, it could be useful to think about citizens' relative concerns.

However, this conclusion should be read with a severe cause. The results need further examination to strengthen the argument for the role of relative wealth concerns. The ISSP will release its in 2020 its next Environment module which could provide more accurate data about the current explaining factors for environmental concerns. Also, alternative measurements for environmental concerns instead of one single variable could provide more clarity as the robustness check in the analysis chapter showed different results. At last, the ISSP shows the subjective measurement of environmental concerns, where it would also be interesting to see if less relative wealth concerns lead to more objective behaviour towards concerns about the environment.

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- APPENDIX -

Appendix 1. Overview of VIF-values for independent and control variables

Variable	VIF-value
Independent variables	
Relative wealth concerns	1.39
Relative income	2.30
Main control variables	
Personal income	1.69
Local environmental problems	1.09
Other control variables	
Age	1.33
Gender	1.07
Education	1.57
Children	1.22

Appendix 2. Overview of countries in the 2010 environment module of the ISSP including sample sizes

Country	Sample size
Argentina	1130
Austria	1019
Belgium	1142
Bulgaria	1003
Canada	971
Chile	1436
Taiwan	2209
Croatia	1210
Czech Republic	1428
Denmark	1305
Finland	1202
France	2253
Germany	1407
Israel	1216
Japan	1307
South Korea	1576

Latvia	1000
Lithuania	1023
Mexico	1637
New Zealand	1172
Norway	1358
Philippines	1200
Russia	1619
Slovak Republic	1159
Slovenia	1082
South Africa	3112
Spain	2560
Sweden	1181
Switzerland	1212
Turkey	1665
United Kingdom	928
United States	1430