INCOME AND ENVIRONMENTAL PREFERENCES:

A COMPREHENSIVE STUDY OF GLOBAL DATASETS

by

JAIN YOU

(Under the Direction of Susana Ferreira)

ABSTRACT

Many studies have investigated the relationship between income and environmental preferences, but the findings are mixed. Using an ordered probit and pooled logit model, this work investigates the effect of income on environmental preferences from both a micro and macro perspective. Data collected from the World Value Survey, the European Social Survey, and the International Social Survey Program were merged with macro-income data from the World Bank. The results indicate a strong effect of income on environmental preferences after controlling for sociodemographic variables. While environmental preference tended to increase with income, the effects were strongest within the second-highest income group and the highest income group. In addition, at the macro level, the effect of national income on environmental preferences was significant.

INDEX WORDS: Environmental preference, Income effect, Ordered probit model, WVS, ISSP, ESS

INCOME AND ENVIRONMENTAL PREFERENCES:

A COMPREHENSIVE STUDY OF GLOBAL DATASETS

by

JAIN YOU

BA, Seoul Women's University, South Korea, 2011

MA, Ewha Womans University, South Korea, 2016

MA, Georgia State University, 2019

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2023

INCOME AND ENVIRONMENTAL PREFERENCES:

A COMPREHENSIVE STUDY OF GLOBAL DATASETS

by

JAIN YOU

Major Professor:	Susana Ferreira
Committee:	Jeffrey D. Mullen
	Benjamin Campbell

Electronic Version Approved:

Ron Walcott
Vice Provost for Graduate Education and Dean of the Graduate School
The University of Georgia
August 2023

ACKNOWLEDGEMENTS

I wish to express my profound appreciation to my thesis advisor, Dr. Ferreira, whose guidance has been an invaluable source of support. I am immensely grateful to Dr. Mullen, the advisor of the PhD and MS programs, for providing me with moral encouragement during challenging times. I extend my sincere thanks to Dr. Campbell for their participation in my thesis defense. Lastly, I would like to acknowledge the unwavering support of Myles, as well as the love, prayers, and support from my family, friends, and all those who have been by my side throughout this journey. Above all, I humbly acknowledge the guidance and blessings from God, which have played a crucial role in helping me reach this significant milestone in my academic pursuits.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

CHAPTER 1

INTRODUCTION

Environmental pollution, climate change caused by global warming, and loss of biodiversity due to habitat destruction have long been recognized as a cost to the economic growth achieved by industrialization. As part of an effort to address these problems, the United Nations announced the 2023 Agenda for Sustainable Development seeking initiatives such as sustainable cities, clean water, and renewable energy (UN, 2015). Additionally, numerous developed countries have taken significant steps by implementing environmental policies to regulate pollutant emissions and investing in research and development to enhance production efficiency, ultimately mitigating adverse environmental consequences (Cohen, 1998; Desai, 2002; Fiorino, 2001; Smulders & Gradus, 1996).

Previous research has been conducted to investigate the relationship between economic growth and environmental pollution, making it a significant area of discussion. The underlying mechanisms suggest that environmental quality tends to deteriorate as economic development progresses until a certain threshold is reached. However, beyond that threshold, the trend towards environmental degradation reverses and starts to improve. This hypothesis is well known as the environmental Kuznets curve (EKC), which is an inverted U-shaped curve developed by Grossman and Krueger (Grossman & Krueger, 1991) after the earlier work of Kuznets (Kuznetz, 1955).

This hypothesis has spurred economists to investigate the impact of economic growth and rising incomes on environmental protection. In line with the environmental Kuznets hypothesis,

previous empirical studies have consistently found evidence suggesting that higher national economic levels and individual income levels are associated with improved environmental conditions and increased environmental preferences (Auffhammer & Carson, 2008; Carson et al., 1997; Deacon & Norman, 2006; Ficko & Bončina, 2019). In developed countries, where economic growth has already reached high levels, and among affluent individuals in high-income groups, the primary concern shifts from mere survival to prioritizing goals such as well-being and a pleasant environment; thus, people from developed countries would have stronger preferences concerning the environment (Shao et al., 2018). However, Carson (2010) pointed out limitations of previous studies and found that the EKC does not hold for all countries and pollutants (Carson, 2010).

Further beyond environmental protection, the concept of environmental preference has begun to be used universally in the fields of environmental psychology, environmental economics, and environmental sociology, meaning the choices, priorities, needs, and overall dispositions individuals have about environmental factors (Bimonte, 2002; Kaplan, 1977; Kaplan, 1987). In environmental economics studies, environmental preferences have been examined in relation to income levels. Levinson (2009) found a positive correlation between income and the demand for clean air using a question that assessed willingness to pay (WTP) to reduce particulate matter (PM10) (Levinson, 2009). Other studies have confirmed that income is positively related to the WTP for smog mitigation, and that wealthier people tend to have stronger WTP to improve their living surroundings (Franzen & Meyer, 2010; Sun et al., 2016). In contrast, however, Ficko and Bončina (2019) explored respondents' interest in forest cover, growing stock, harvesting intensities, and the population of brown bears as measures of support for conservation efforts, and discovered that higher income individuals showed less interest in

environmental preservation. This suggests that the use of these different indicators to measure environmental preference yielded mixed results.

Furthermore, some studies suggest that increases in national and individual income levels do not have a substantial impact on environmental preferences (Dunlap & Mertig, 1995; Ferreira & Moro, 2013; Gallagher, 2004; Givens & Jorgenson, 2011; Shao et al., 2018). A perspective supporting this viewpoint argues that environmental degradation and the need for environmental improvement have become global concerns. Thus, some suggest that there is not significant heterogeneity regarding environmental preferences on the country and individual level, regardless of income (Dunlap & Mertig, 1995).

An alternative explanation is that since low-income countries and individuals are more vulnerable to the consequences of environmental deterioration, they may be more exposed to such issues and thus more sensitive to environmental pollution. In particular, the environmental preferences of low-income countries or individuals may be stronger due to the direct health problems they face as a result of living in degraded environments (Dunlap & York, 2008). Similarly, individuals or countries that already have favorable environmental quality may demonstrate lower environmental preferences due to lack of environmental concerns (Givens & Jorgenson, 2011; Poortinga et al., 2019). This can be attributed to the seamless provision of public services aimed at creating a pleasant environment, meeting the demands of the population.

The complex relationship between income level and environmental preference remains a topic of ongoing debate. This study employs three global surveys to investigate the relationship between environmental preferences, national income, and individual income levels. While many existing studies have primarily relied on survey data from a single country and there have been some studies that utilized survey data sets spanning multiple countries and time periods, only a

limited number of studies have attempted analyses using multiple distinct data sets (Poortinga et al., 2019) and they covered only European countries, thus limiting their perspective. On the other hand, prior studies utilizing multiple data sets have focused on investigating the determinants or levels of environmental awareness and environmental behavior, rather than specifically examining the relationship between income level and environmental preference. In this study, the concept of environmental preference, which comprehensively means attitudes toward environmental protection and eco-friendly consumption, was used to understand individual attitudes toward the environment from various perspectives.

Three separate data sets, including the World Value Survey spanning from 1990 to 2022 and encompassing 55 countries, the European Social Survey conducted in 2016 across 22 countries, and the International Social Survey Programme conducted in 1992, 2000, 2010, and 2020 across 36 countries are utilized. Additionally, GDP per capita data is collected from the World Bank website to analyze national income levels at the macro level. This comprehensive approach facilitates a thorough examination of the relationship between environmental preferences and income levels.

This paper makes significant contributions to the existing literature in several ways. Firstly, it is the first study to examine the impact of income levels on environmental preferences by utilizing three distinct data sets, offering both micro and macro perspectives on income. This novel approach seeks to elucidate the contradictory and inconclusive findings regarding the relationship between income and environmental preferences. Furthermore, the utilization of multiple distinct data sets enables a more detailed measurement and examination of three categories of environmental preferences. These categories are 1) "Trade-offs between economic growth and environmental preservation", 2) "Willingness to pay or accept for the environmental

reasons", and 3) "Consumption behavior in relation to the environment". Through the use of diverse questions to measure environmental preferences through these data sets, a more precise and nuanced understanding of the relationship between income and environmental preferences is attained. Finally, the empirical evidence generated from this study is anticipated to serve as valuable input for the formulation of environmental policies aimed at mitigating environmental degradation.

The structure of this thesis is organized as follows. In Section 2, a comprehensive review of the relevant literature is provided, along with the research questions. Section 3 presents the data sources description, as well as the research methodology used for the analysis. Moving on to Section 4, the findings of the analysis are presented and thoroughly discussed. Finally, in Section 5, the conclusion is presented, discussing their implications.

CHAPTER 2

LITERATURE REVIEW

Background and Environmental Kuznets Curve (EKC) Hypothesis

While extensive research in the fields of psychology and sociology has explored the factors influencing environmental awareness and behavior (Dunlap & Mertig, 1995; Dunlap & York, 2008; Gifford, 2014; Givens & Jorgenson, 2011), economists have primarily focused on elucidating the link between income and environmental quality. Though there are studies that support the EKC hypothesis, previous studies have confirmed that the EKC hypothesis does not apply to all countries and results may vary depending on the environmental indicators analyzed (Carson, 2010; Dinda, 2004; Ferreira & Moro, 2013; Givens & Jorgenson, 2011; Grossman & Krueger, 1991; Shao et al., 2018). Carson (2010) raised concerns about the assumption of income causality underlying the EKC, despite early studies establishing a positive correlation between income growth and environmental quality in wealthy countries. Additionally, Carson pointed the limitations of the reduced-form specification that assumes estimating the effect of income is enough with controlling a few covariates (Carson, 2010).

Prior to delving into further discussion on the relationship between income and environmental preferences, it is imperative to review pertinent background. The rapid growth of the global economy, driven by industrialization, has given rise to significant environmental challenges. Environmental issues began to gain significant public attention during the 1960s and 1970s. This heightened awareness was fueled by influential literary works such as “Silent Spring”(Carson, 2002), “The Population Bomb” (Ehrlich, 1978), and “The Club of Rome’s

Limits to Growth" (De Rome & Meadows, 1972). These books presented compelling arguments that shed light on the potential consequences of population growth and the resulting economic expansion, including profound environmental degradation and resource depletion. In response to the pessimistic perspective presented in "Limits to Growth," some economists have put forward a counterargument contending that economic prosperity fosters technological progress, leading to a reduction in environmental pollution and preventing resource depletion (Kneese & Ridker, 1972; Nordhaus, 1973; Solow, 1973).

In the midst of this debate, Grossman and Krueger (1994) presented a different perspective from the optimistic economists who believed in the compatibility of economic advancement and environmental protection. Their research, examining the effects of the North American Free Trade Agreement (NAFTA) on trade, challenged the notion that economic growth definitively leads to improvement in environmental outcomes. Instead, they provided an alternative hypothesis by developing the "Environmental Kuznetz Curve" (Grossman & Krueger, 1991). This theory suggests that environmental degradation initially increases as the economy grows until a certain threshold is reached, after which, environmental degradation starts to decline. That is, they argue that the relationship between economic development and environmental impact takes the form of an inverted U-shape.

This hypothesis has been applied to multiple studies. One landmark study conducted by the World Bank, utilizing the Environmental Kuznets Curve (EKC) hypothesis and analyzing data from multiple countries, found that high-income countries experienced significant reductions in sulfur dioxide concentrations and particulate matter (Shafik, 1994). Another study confirmed that the elasticity of emissions including nitrogen oxide, sulfur dioxide, and suspended

particulate matter varies according to income per capita (Panayotou, 1993). Additionally, they presented results suggesting emissions should be reduced as the country-specific income rises.

The emergence of the EKC hypothesis and the cumulative evidence from previous studies supporting the notion that higher national income can lead to environmental improvements has prompted new insights to further understand the drivers underlying environmental awareness and economic development (Auffhammer & Carson, 2008; Carson, 2010; Deacon & Norman, 2006; Ficko & Bončina, 2019; Kotchen et al., 2013; Panayotou, 1993; Selden & Song, 1994). To comprehend why a country's wealth affects environmental preferences, it is crucial to consider three distinct effects that arise from the structural changes in the economy during its growth: scale effects, technological effects, and composition effects (Grossman & Krueger, 1991). The scale effect pertains to the influence of escalated economic activity resulting from trade, investment, and industrialization on the environment. Industrial factories and manufacturing processes often emit various pollutants that contribute to air and water pollution. Additionally, the depletion of resources such as fossil fuels required for production deteriorates the quality of the environment and significantly reduces resource conservation. Even the process of trade itself can contribute to environmental pollution through the emissions generated by transportation. Overall, as the scale of production expands, it exacerbates environmental degradation.

The composition effect also plays a significant role in this regard. With the implementation of free trade, countries tend to specialize in the production of goods for which they have a comparative advantage. This specialization often leads to the concentration of industries that may not be subject to stringent environmental regulations. Consequently, the emissions of pollutants within each country remain uncontrolled and continue to increase

steadily (Grossman & Krueger, 1991). However, this effect is hypothetical, and its variation depends on whether the country has comparative advantage in polluting industries.

Finally, through a technique effect, we can expect that economic growth can have a positive impact on the environment. When a country recognizes the seriousness of environmental pollution due to its economic growth implements environmental regulations. As a result of more stringent environmental policies, industries that emit pollution tend to pivot to less polluting, cleaner industrial processes, a process that happens earlier in rich countries because they can afford to invest in research and development to reduce pollution levels from production processes to meet goals for environmental regulations (Komen et al., 1997). Eventually, technological advancements and practices developed by high-income countries will be transferred to developing countries, contributing to the reduction of pollution levels even in low-income countries (Grossman & Krueger, 1991).

Copeland and Taylor (1994) provide a relatively simple model-based definition of these three effects.

$$\hat{z} = \hat{S} + \widehat{\emptyset} + \hat{e}$$

where $\hat{z}$ is pollution emission, $\hat{S}$ is scale of the economy, $\widehat{\emptyset}$ is the importance of dirty industry and $\hat{e}$ is emissions intensity of production.

In the equation, $\hat{S}$ is the scale effect which refers to the impact of economic scale on pollution emissions, assuming output and production technology remain constant. According to the scale effect, a 10% increase in the size of the economy would lead to an increase in pollution emissions by the same proportion. In other words, if all other factors remain unchanged, a larger economy will generate higher levels of pollution. The second effect $\widehat{\emptyset}$ is the composition effect, which considers changes in the share of dirty industries in national income. As the proportion of

industries with higher pollution levels increases, overall pollution emissions also increase. This effect reflects the influence of the industrial structure on pollution outcomes. Lastly, the technique effect $\hat{e}$ accounts for changes in pollution intensity resulting from more stringent policy reflecting stronger environmental preferences and improvements in production technology (Copeland & Taylor, 2004).

Income and Environmental Preference

In addition to reduced-form studies relating environmental quality to income, there is an increasing number of studies on the effects of individual and household income on personal environmental preferences (Ferreira & Moro, 2013; Ficko & Bončina, 2019; Roca, 2003; Shao et al., 2018). Similar to results demonstrated on the macroeconomic level, at the micro level, the conventional wisdom is that as individuals' incomes increase, people are more inclined to prioritize values such as well-being and environmental preservation over mere survival. Consequently, their heightened environmental preferences contribute to a collective effort within society to mitigate environmental deterioration(Lubell et al., 2006).

Existing studies examining the relationship between income and environmental preferences, asking the WTP or how favor in environmental protection questions, demonstrate the significance of the income effect at the micro level. These questions provide valuable measures of individuals' willingness to contribute their resource and to make efforts towards environmental protection (Franzen & Meyer, 2010; Roca, 2003; Shao et al., 2018). The income elasticity of environmental preference can explain the income effect on environmental preferences. For example, when the environmental quality is considered as a normal good with unit elasticity, implying that as individuals' income levels rise, their WTP for the environment also increases in the same proportion. However, affluent individuals may have a higher WTP

even after their basic environmental needs are fulfilled, resulting in an elasticity exceeding 1 (Franzen & Meyer, 2010).

However, it remains inconclusive whether wealthy individuals consistently exhibit stronger environmental preferences, and the debate surrounding this topic is still ongoing. Indeed, certain studies suggest that the WTP for environmental preservation among the affluent reaches a plateau after a certain income threshold, or that their WTP is not necessarily higher compared to individuals with lower incomes (Dasgupta, 1995; Sagoff, 2000).

There are two possible reasons to explain the higher WTP for people with lower incomes. First, people with lower income may have a greater dependence on natural resources to support their livelihood. Thus, lower income people may have higher WTPs for environmental preferences since the destruction of natural resources due to environmental degradation is a threat to their livelihoods. Consequently, they exhibit higher WTP for environmental preferences as they recognize that the preservation of the environment directly impacts their ability to secure their livelihoods(Dunlap & York, 2008; Fairbrother, 2013; Franzen & Meyer, 2010; Sagoff, 2000; Shao et al., 2018).

Additionally, the disparity in environmental quality between low-income and high-income individuals might contribute to a higher WTP among the former group. Low-income individuals often face limitations in their ability to reside in pleasant neighborhoods with access to good public services. Consequently, they are more likely to live in areas characterized by environmental degradation, lacking proper cleanliness and hygiene. This heightened exposure to environmental pollution renders individuals with low incomes more susceptible to its adverse effects, making them acutely aware of the health risks associated with environmental degradation

and raising their environmental concerns (Neidell, 2004; Pearce et al., 2002). Based on the aforementioned considerations, we propose the following hypotheses:

H1: Higher-income individuals are less likely to agree on a trade-off between economic growth and environmental quality.

H2: Individuals with higher income levels are more willing to pay to protect the environment.

Returning to the macro perspective, the theory of post-materialism provides valuable insights into the relationship between a nation's income and environmental preferences from a macro view. When a society reaches a certain economic level, it moves away from material values and pursues post-material values. For example, individuals in wealthy countries often prioritize values such as quality of life, aesthetics, and environmental protection, thus resulting in environmental protection and stronger environmental preference (Inglehart, 1981). This implies that individuals' environmental preferences exhibit a noteworthy correlation with national wealth.

Other research presents a contrasting perspective, suggesting that the notion of economic affluence as the sole driver of environmentalism is limited. The study examines the relationship between environmentalism and income by comparing environmentalists with the general population. They found that while environmentalists do live better than the general people, environmentalists with higher income tend to be less post-materialistic. This finding challenges the assumption that higher income directly translates to a stronger inclination towards environmentalism (Cotgrove & Duff, 1981). Furthermore, a study conducted by Brechin and Kempton (1994) utilized Gallup Survey data to examine the relationship between income and environmental interest. Their findings revealed that people in poorer countries have more

concern about environmental issues compared to those in richer countries. Additionally, individuals in low-income countries demonstrated a higher WTP for environmental protection (Brechin & Kempton, 1994). Therefore, they criticized post-materialism theory, emphasizing that environmentalism is difficult to see as necessarily the result of economic affluence, and that environmentalism is a phenomenon that reflects concerns caused by experiences of actual environmental problems.

In response to these criticisms, Inglehart (1997) offers an alternative view of post-materialism by suggesting that developing countries, similar to individuals with lower incomes, can exhibit a strong interest in environmental issues. The argument is based on the premise that developing nations are more likely to encounter environmental degradation compared to wealthier countries and directly experience the negative consequences of such degradation. As a result, they demonstrate a genuine concern for environmental protection. Inglehart's viewpoint emphasizes that environmental concerns are not exclusive to affluent societies but can also arise in contexts where the impact of environmental issues is more pronounced and immediate (Inglehart, 1997).

Moreover, as the issue of environmental pollution and degradation continues to escalate and is acknowledged as a global concern, there are researchers who contend that this problem transcends the influence of income levels (Dunlap & Mertig, 1997). Conversely, studies that examine both national and individual income levels argue that as a country's income rises, the WTP for individual environmental preferences also increases, whereas a decrease in a country's wealth is associated with a decline in environmental preferences among its population (Stern et al., 1999). However, others have discovered that within affluent countries, individuals with higher incomes exhibit a lower WTP for environmental conservation efforts (Shao et al., 2018).

Therefore, building upon the aforementioned hypotheses, this study aims to investigate the influence of individual-level income on environmental preference, as well as examine the varying effects of national income on environmental preference from a macroscopic standpoint. By exploring both micro and macro dimensions, this research endeavors to provide a comprehensive understanding of the relationship between income and environmental preferences.

Income and Environmental Consumption Behavior

Existing studies largely support a positive correlation between income level and green consumption. While this study does not extensively delve into the relationship between income level and environmental consumption, it acknowledges the significance of this relationship. The WTP for environmental consumption is regarded as an indicator of environmental preference.

Given that a considerable portion of pollutant emissions originate from the industrial sector, with production processes being a primary source, the role of companies in addressing environmental pollution is significant. Furthermore, the rise in an individual's environmental preference increases the consumption of eco-friendly products for environmental reasons. Consequently, the rising demand of goods for environmental reasons can provide a clear signal that companies must produce products in consideration of the environment.

A previous study by Dinda (2004) highlighted enhancing the quality of the environment is primarily attributed to the consumption patterns of high-income individuals, who prioritize eco-friendly products (Dinda, 2004). Their sustained demand for such products stimulates their continuous production, prompting companies to recognize the importance of environmental responsibility. Consequently, companies are motivated to adopt sustainable practices and contribute to environmental protection efforts. To ensure an adequate analysis of the impact of

income on green purchases, it is important to account for the scale effect that may arise from wealthy individuals spending more.

This current study takes a unique approach by focusing on environmental consumption behavior through indicators that do not directly inquire about the willingness to purchase eco-friendly products. Instead, it examines the frequency of interest in eco-labeling when making purchases, specific product choices, and the avoidance of certain products due to environmental concerns. By examining these specific consumption behaviors, the study aims to capture respondents' environmental intentions and provide valuable insights into their actual consumption patterns related to the environment. As such, this study aims to analyze the impact of income on environmental consumption from both micro and macro perspectives using the questions of consumption behavior with environmental intention. The hypothesis formulated for this purpose is as follows:

H3: Individuals with higher income levels consume more environmentally friendly than other people.

Overall, this work aims to investigate the relationship between income and environmental preferences, focusing on the hypotheses mentioned above. It does not provide specific quantitative measures of the elasticity of WTP. The primary goal of this paper is to understand the dynamics of environmental preferences and their variations across different income levels.

CHAPTER 3

RESEARCH METHODOLOGY

Databases

The repeated cross-sectional databases of the World Value Survey (WVS), the European Social Survey (ESS), and the International Social Survey Program (ISSP) are used to test the aforementioned hypotheses. The WVS is a global survey that has been conducted uninterruptedly since 1982, investigating values, beliefs, and attitudes of individuals as well as providing a representative sample of countries worldwide. The ESS focuses on European countries and conducts surveys on various topics, including politics, subjective well-being, trust, and cultural differences every two years since 2002. Additionally, the ISSP database is used, which collects survey data on the theme of 'Environment' at roughly 10-year intervals from 1993 to 2020. The ISSP is a program involving 45 national collaborations, aiming to investigate social values such as social inequality, religion, work, family, and environment on important topics in the social sciences. These survey programs, including the WVS, ESS, and ISSP, contribute significantly to social science research by providing data that allows for comparative analyses across countries and over time. Thus, by leveraging these comprehensive and diverse datasets, this study aims to provide a robust analysis of the relationship between income level and environmental preferences.

The databases are merged separately and analyzed based on the variables relevant to each hypothesis as described below.

Dependent Variables

The primary objective of this paper is to investigate environmental preferences by categorizing them into three distinct themes. These themes, related to the corresponding hypotheses presented in Section2, include:

1. Trade-off between economic growth and environmental protection: This category explores individuals' perspectives on balancing economic development with the need for environmental conservation.
2. Willingness to pay for the environment: This theme investigates individuals' willingness to contribute financially or making personal sacrifices to support environmental reasons.
3. Consumption for the environment: This theme explores individuals' consumption patterns and behaviors that align with environmental conservation, such as adopting eco-friendly practices and supporting sustainable production.

The questions that fall under the first theme are the following: i) “I would agree that combatting unemployment, we have to accept environmental problem” (WVS Wave2); ii) “I would agree that protecting the environment should be given priority, even if causes slower economic growth” (WVSs Wave 3-7); iii) “I would agree that economic growth harms the environment” (ISSPs Round 1-4). For the first question, the respondents are given with four options, where 1 is “Agree strongly”, 2 is “Agree”, 3 is “Disagree”, and 4 is “Disagree strongly”. The second question has binary options: 1. “Protecting the environment should be given priority, even if causes slower economic growth and some loss of jobs”, 2. “Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent”. The

third question has five options available, where 1 is “Agree strongly”, 2 is “Agree”, 3 is “Neither agree or disagree”, 4 is “Disagree”, and 5 is “Disagree strongly”.

For theme 2, WTP for the environment, there are six different questions: i) “I would support an increase in tax if used to prevent environmental pollution” (WVSs Wave 2-5); ii) “Would you favor increasing taxes on fossil fuels, such as oil, gas, and coal?” (ESS Round 8); iii) “How willing would you be to pay much higher taxes to protect the environment?” (ISSPs Round 1-4); iv) “I would buy things at a 20% higher price if it helped to protect the environment” (WVS Wave 3); v) “How willing would you be to pay much higher prices to protect the environment?” (ISSP Round 1-4); vi) “To what extent would you be willing to accept reductions in your standard of living to protect the environment?” (ISSP Round 1-4) For question i), there are four answerable options, where 1 is “Agree strongly”, 2 is “Agree”, 3 is “Disagree”, and 4 is “Disagree strongly”. Question ii) has five options, where 1 is “Strongly in favour”, 2 is “Somewhat in favour”, 3 is “Neither in favour nor against”, 4 is “Somewhat against”, and 5 is “Strongly against”. For question iii), there are options that 1 is “Very willing”, 2 is “Fairly willing”, 3 is “Neither willing nor unwilling”, 4 is “Fairly unwilling”, and 5 is “Very unwilling”. For question iv), the response options available for the questions are: 1. “Agree strongly”, 2. “Agree”, 3. “Disagree”, 4. “Disagree strongly” and for question v), 1. “Very willing”, 2. “Fairly willing”, 3. “Neither willing nor unwilling”, 4. “Fairly unwilling”, 5. “Very unwilling” are given. Question vi) has the following response options: 1. “Very willing”, 2. “Fairly willing”, 3. “Neither willing nor unwilling”, 4. “Fairly unwilling”, 5. “Very unwilling”.

For theme 3, consumption for the environment, two questions are used to measure: i) “When you are choosing a product, how often do you pay attention to any environmental labelling before deciding to buy?” (ISSP Round 1), ii) “How often do you avoid certain products

for environmental reasons?" (ISSP Round 3-4). For questions i) and ii), respondents can choose from four options: 1. "Always", 2. "Often", 3. "Sometimes", 4. "Never".

To facilitate the analysis, missing data were excluded, and the response options were adjusted as follows: For question i) and iii) of theme 1, 1 is "Disagree strongly", 2 is "Disagree", 3 is "Agree", and 4 is "Agree strongly". For question ii), there are binary options where 1 is "Protecting environment should be given priority", 0 is "Economic growth should be the top priority".

The aforementioned items are outlined in Table 1.

Table 1. Dependent Variables for Analysis

Theme	Question	Answer	Survey/Wave
1	"If we want to combat unemployment, we have to accept environmental problem"	4-point Likert scale (Disagree strongly to Agree strongly to)	WVS Wave 2
1	"Protecting the environment should be given priority, even if causes slower economic growth"	Binary scale (1. Protecting the environment should be given priority, 2. economic growth should be the top priority)	WVS Waves 3-7
1	"Economic growth harms the environment"	5-point Likert scale (Disagree strongly to Agree strongly)	ISSP Rounds 1-4
2	"I would agree to an increase in taxes if the extra money were used to prevent environmental damage"	4-point Likert scale (Disagree strongly to Agree strongly)	WVS Waves 2-5
2	"To what extent are you in favor or against the following policies to reduce climate change? Increasing taxes on fossil fuels, such as oil, gas, and coal"	5-point Likert scale (Strongly against to Strongly in favour)	ESS Round 8
2	"How willing would you be to pay much higher taxes to protect the environment?"	5-point Likert scale (Very unwilling to Very willing)	ISSP Rounds 1-4
2	"WTP: I would buy things at a 20% higher price if it helped to protect the environment"	4-point Likert scale (Disagree strongly to Agree strongly)	WVS Wave 3
2	"How willing would you be to pay much higher prices in order to protect the environment?"	5-point Likert scale (Very unwilling to Very willing)	ISSP Rounds 1-4
2	"How willing would you be to accept cuts in your standard of living in order to protect the environment?"	5-point Likert scale (Very unwilling to Very willing)	ISSP Rounds 1-4
3	"When you are choosing a product, how often do you pay attention to any environmental labeling before deciding to buy?"	4-point Likert scale (Never to Always)	ISSP Round 1

3	"How often do you avoid buying certain products for environmental reasons?"	4-point Likert scale (Never to Always)	ISSP Rounds 3-4

Data Description

Table 2 illustrates descriptive evidence by country from Question 3 from the first theme, Question 3 and Question 5 from the second theme, Question 2 from the third theme. To enhance the clarity and conciseness of the information presented in Table 2, careful selection has been made to include questions that best represent each theme. Descriptive evidence from the first theme, which focuses on the trade-off perspective, reveals that 47% of respondents from high-

Table 2. Descriptive Statistics by country

Theme 1: Trade-offs	Q3. Economic growth harms the environment (ISSP1-4)					
	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly Agree	Total
High-income countries[1]	1938	11025	6957	5913	1303	27136
	7.14%	40.63%	25.64%	21.79%	4.80%	100%
Middle- and low-income countries[2]	1161	5486	4589	5495	1470	18201
	6.38%	30.14%	25.21%	30.19%	25.21%	100%
World	3099	16511	11546	11408	2773	45337
	6.84%	36.42%	25.47%	25.16%	6.12%	100%
Theme 2-1: WTPs	Q3. How willing would you be to pay much higher taxes for the environment? (ISSP1-4)					
	Very unwilling	Unwilling	Neither willing nor unwilling	Willing	Very unwilling	Total
High-income countries	6,174	7,378	5,992	6,644	948	27,136

[1] High income countries: Austrailia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Icelamd, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden Switzerland, United Kingdom, United Staes of America (The World Bank, World Development Indicators, 2012).
[2] Middle- and low-income countries: Albania, Algeria, Azerbaijan, Argentina, Armenia, Bangladesh, Bosnia Herzegovina, Brazil, Bulgaria, Belarus, Chile, Taiwan, Colombia, Croatia, Czech Republic, Egypt, El Salvador, Estonia, Georgia, Hungary, India, Indonesia, Iran, Israel, Jordan, Korea, Latvia, Lithuania, Macedonia, Malta, Mexico, Moldova, Montengro, Morocco, Nigeria, North Ireland Pakistan, Peru, Philippines, Poland, Puero Rico, Romania, Russian Federation, Serbia, Singapore, Slovakia, Slovenia, South Africa, Tanzania, Turkiye, Zimbabwe, Uganda, Ukraine, Uruguay, Venezuela, Viet Nam, Zimbabwe (The World Bank, World Development Indicators 2012).

	22.75%	27.19%	22.08%	24.48%	3.49%	100%
Middle- and low-income high-income countries	5,326	4,842	3,692	3,497	844	18,201
	21.95%	26.70%	26.07%	19.35%	5.92%	100%
World	11,500	12,220	9,684	10,141	1,792	45,337
	25.37%	26.95%	21.36%	22.37%	3.95%	100%
Theme2-2: WTPs	Q5. How willing would you be to pay much higher prices in order to protect the environment? (ISSP 1-4)					
	Very unwilling	Unwilling	Neither willing nor unwilling	Willing	Very unwilling	Total
High-income countries	3,214	5,814	6,742	9,760	1,606	27,136
	11.84%	21.43%	24.85%	35.97%	5.92%	100%
Middle- and low-income countries	4,544	4,369	4,011	4,196	1081	18,201
	24.97%	24.00%	22.04%	23.05%	5.94%	100%
World	7,758	10,183	10,753	13,956	2,687	45,337
	17.11%	22.46%	23.72%	30.78%	5.93%	100%
Theme 3: Consumption	Q2. How often do you avoid buying certain products for environmental reasons? (ISSP 3-4)					
	Never	Sometimes	Often	Always	Total	
High-income countries	3,755	10,485	9,061	2,115		25,416
	14.77%	41.25%	35.65%	8.32%		100%
Middle- and low-income countries	5,568	7,142	3,711	1,538		17,959
	31.00%	39.77%	20.66%	8.56%		100%
World	9,323	17,627	12,772	3,653		43,375
	21.49%	40.64%	29.45%	8.42%		100%

income countries disagree with the notion that economic growth harms the environment. In contrast, approximately 55% of respondents from low-income countries agree with the belief that economic growth has detrimental effects on the environment. From the finding, it may assume that it is plausible to suggest that high-income countries are more likely to reject the trade-off perspective. These countries have already undergone significant economic development and have implemented technological advancements and environmental policies that have led to a cleaner environment. As a result, they may hold the belief that economic growth and environmental protection can be pursued simultaneously, without the need for sacrificing one for

the other. For theme 2, approximately 27% and 40% of respondents from high-income countries indicated a willingness to pay higher taxes and higher prices for the environment, respectively. These percentages are higher than those of respondents from low-income countries, suggesting that individuals from high-income countries are more willing to incur the costs of environmental protection through higher taxes and prices. Regarding the avoidance of certain products for environmental reasons, approximately 40% of respondents from high-income countries stated that they often or always avoid such products. In contrast, around 30% of respondents from low-income countries reported the same behavior.

Thus, the findings suggest that environmental preferences differ based on a country's income level, with higher-income countries showing a stronger inclination towards environmental concerns.

Table 3. Descriptive Statistics by income level

Theme 1: Trade-offs	Q3. Economic growth harms the environment (ISSP 1-4)					
Income	Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly	Total
1st	708	3,505	2,896	3,159	840	11,108
	6.37%	31.55%	26.07%	28.44%	7.56%	100%
2nd	630	3,919	3,090	3,131	774	11,544
	5.46%	33.95%	26.77%	27.12%	6.70%	100%
3rd	653	3,886	2,695	2,515	553	10,302
	6.34%	37.72%	26.16%	24.41%	5.37%	100%
4th	566	3,031	1,830	1,666	369	7,462
	7.59%	40.62%	24.52%	22.33%	4.95%	100%
5th	542	2,170	1,035	937	237	4,921
	11.01%	44.10%	21.03%	19.04%	4.82%	100%
Total	3,099	16,511	11,546	11,408	2,773	45,337
	6.84%	36.42%	25.47%	25.16%	6.12%	100%
Theme 2-1: WTPs	Q3. How willing would you be to pay much higher taxes for the environment? (ISSP1-4)					
Income	Very unwilling	Unwilling	Neither willing nor unwilling	Willing	Very unwilling	Total
1st	3,322	3,202	2,197	2,010	377	11,108
	29.91%	28.83%	19.78%	18.10%	3.39%	100%
2nd	3,258	3,136	2,516	2,257	377	11,544
	28.22%	27.17%	21.79%	19.55%	3.27%	100%
3rd	2,375	2,747	2,294	2,487	399	10,302

	23.05%	26.66%	22.27%	24.14%	3.87%	100%
4th	1,539	1,874	1,647	2,052	350	7,462
	20.62%	25.11%	22.07%	27.50%	4.69%	100%
5th	1,006	1,261	1,030	1,335	289	4,921
	20.44%	25.62%	20.93%	27.13%	5.87%	100%
Total	11,500	12,220	9,684	10,141	1,792	45,337
	25.37%	26.95%	21.36%	22.37%	3.95%	100%
Theme2-2 WTPs	Q5. How willing would you be to pay much higher prices in order to protect the environment? (ISSP 1-4)					
Income	Very unwilling	Unwilling	Neither willing nor unwilling	Willing	Very unwilling	Total
1st	2,605	2,701	2,467	2,744	591	11,108
	23.45%	24.32%	22.21%	24.70%	5.32	100%
2nd	2,146	2,670	2,864	3,272	592	11,544
	18.59%	23.13%	24.81%	28.34%	5.13	100%
3rd	1,527	2,294	2,531	3,384	566	10,302
	14.82%	22.27%	24.57%	32.85%	5.49%	100%
4th	922	1,558	1,715	2,739	528	7,462
	12.36%	20.88%	22.98%	36.71%	7.08%	100%
5th	558	960	1,176	1,817	410	4,921
	11.34%	19.51%	23.90%	36.92%	8.33%	100%
Total	7,758	10,183	10,753	13,956	2,687	45,337
	17.11%	22.46%	23.72%	30.78%	5.93%	100%
Theme 3. Consumption	Q2. How often do you avoid buying certain products for environmental reasons? (ISSP 3-4)					
Income	Never	Sometimes	Often	Always	Total	
1st	2,324	2,831	1,747	720	7,622	
	30.49%	37.14%	22.92%	9.45%	100%	
2nd	2,064	3,103	1,930	691	7,788	
	26.50%	39.84%	24.78%	8.87%	100%	
3rd	1,663	2,754	1,826	588	6,831	
	24.34%	40.32%	26.73%	8.61%	100%	
4th	978	1,650	1,078	379	4,085	
	23.94%	40.39%	26.39%	9.28%	100%	
5th	630	1,206	813	223	2,872	
	21.94%	41.99%	28.31%	7.76%	100%	
Total	7,659	11,544	7,394	2,601	29,198	
	26.23%	39.54%	25.32%	8.91%	100%	

Table 3 presents descriptive evidence of environmental preferences based on individual income levels. For the first theme, the results indicate that as income levels increase, the proportion of respondents who strongly disagree or disagree with the view that economic growth harms the environment also increases. However, approximately 35% of respondents with lowest income agree with the trade-off perspective, which is higher than the approximately 22% of

respondents from the highest income group who agree. The statistical figures of the second theme for willingness to pay higher taxes and higher prices for the environment show that approximately 33% and 44% of respondents from the highest income group, respectively, are willing to do so. However, approximately 50% and 46% of respondents from the lowest income group responded that they would not pay. These findings suggest that the lowest income group expresses the least support for paying higher taxes and prices for the environment. Lastly, regarding the third theme of avoiding the purchase of certain items for environmental reasons, the results similarly indicate that respondents from higher-income groups reported the highest frequency of engaging in this behavior. On the other hand, approximately 30% of respondents from the lower-income group responded that they do not engage in such avoidance at all, implying a lower level of environmental preference in the lower income group.

The statistical evidence from descriptive analysis indicates a positive association between income levels and environmental preferences, suggesting that individuals from higher-income countries or groups tend to exhibit stronger environmental preferences. However, it is crucial to emphasize that these findings do not establish a significant relationship between environmental preferences and income. To validate the conclusions drawn from the statistical descriptions, it is essential to account for potential confounding factors, such as demographic characteristics, country-specific effects, and year fixed effects, that could influence this relationship.

Income Variables at the Micro Level

At the micro level in this study, individual income is assessed using self-reported household income and individual income levels. Instead of calculating an exact figure for the WTP, this paper focuses on examining the differential impact of income on the WTPs. In the World Values Survey (WVS), respondents are asked to indicate their household income group by

selecting a corresponding letter. The question asks, "We would like to know in what group your household is, counting all wages, salaries, pensions, and other incomes that come in. Just give the letter of the group your household falls into, before taxes and other deductions." The response options consist of 10 deciles, ranging from 1 (lowest decile) to 10 (highest decile). Each individual is expected to provide their response considering the quintiles specific to their country.

The European Social Survey (ESS Round 8) follows a similar approach. Respondents are asked, "If you add up the income from all sources, which letter describes your household's total net income?" The response options for this question consist of 10 income groups, representing different income levels.

Meanwhile, the ISSP collects information on personal income rather than household income to measure individual income. The options for income quintiles provided to respondents in each country are not consistent, and it is not feasible to transform them into 10 deciles comparable to the WVS and ESS. Therefore, a transformation into five quantiles is adopted to ensure a wider range of income while including all countries maintaining analytical feasibility.. To create the five quantiles, the database is examined to identify the lowest and highest groups in each country. The income groups are then divided into 5 intervals, taking into account the proportion of respondents in each category. This transformation implies that 1 signifies bottom 20% and 5 means top 20% of the income distribution.

Measuring self-assessed household income and individual income divided into deciles or quantiles offers several advantages. Firstly, individuals in each country have a better understanding and perception of the country's economic level and social structure, allowing them to make a suitable assessment of their income position. In other words, self-assessed income

provides a relative measure of respondents' income compared to other groups within their society (Fairbrother, 2013). Secondly, since income can be derived from various sources beyond just employment, such as dividends and welfare subsidies, obtaining comprehensive information on all income sources can be challenging. Therefore, self-assessed income allows for a relatively straightforward approach by soliciting information from respondents who are most knowledgeable about their income. As all hypotheses investigated in this study regard the influence of income levels on environmental preferences, the income variable is included as an independent variable in all analyses. For WVSs and ESS, ten income groups are modified into nine dummy variables. For ISSPs, the five income levels are transformed into four dummy variables. The base variables are the lowest income group, and the remaining dummy variables serve as the reference groups for comparison with the lowest income group.

Income Variables at the Macro Level

In Section 2, we have previously established through existing studies that both individual income at the micro level and national development at the macro level influence the WTP for environmental protection awareness and environmental preference (Carson et al., 1997; Dunlap & York, 2008; Ficko & Bončina, 2019). To consider the macro-level factor, GDP per capita data is collected from the World Bank for each country. The World Bank provides economic indicator that was adjusted for inflation and was converted them into US dollars ($). GDP per capita constant 2015 ($) is used, which provides a standardized measure across countries and accounts for inflation. Subsequently, these macro-level data are merged with the WVS, ESS, and ISSP datasets. Due to the large magnitude of these indicators, a log transformation is applied to the GDP per capita values. After the log transformation, the variable is included as independent variables in all analyses to control for the macroeconomic factors.

Other Socio-demographic Variables

In addition to individual and national income variables, it is important to consider individual demographic variables that need to be controlled for. These demographic variables provide important insights into the characteristics of respondents and can help identify potential confounding factors.

In this study, transformations and adjustments are made to ensure consistency and compatibility across the variables in each dataset. For the WVSs, individual sociodemographic variables include a gender (male), age, education (edu_#), marital status (married), and size of town where the respondents live in (townsize). We construct the following dummy variables: a dummy for the gender is male, dummy variables for those who completed primary education, secondary education, and college education are edu_2, edu_3, and edu_4 respectively, with the reference category being no formal education. Marital status is modified in a dummy variable whether the respondent is married (married).

In the ESS, the individual sociodemographic variables include gender, age, education (edu_#), marital status (marsts), and the size of the town where the respondents live (domicil). Dummy variables for gender, education, marital status, and size of town are constructed same as WVS.

Similarly, demographic variables in the ISSP have age, education, male, marital, and town size. In contrast to the previous surveys, the ISSP survey offers more comprehensive options for educational variables. Thus, three new dummy variables have been made: edu_secondary, edu_post_secondary, and edu_university. Information about the construction and transformation of variables is provided in Table 8, Table 9 and Table 10 in APPENDIX A.

Research Methods

In order to analyze income effect on environmental preferences, a regression analysis is needed. Since our dependent variables except question ii) of Theme 1 are discrete and ordered variables which mean the options have intrinsic ranking order, we use ordered probit regression. The dependent variable for question ii) under Theme 1 has binary outcomes that probit regression is used for analysis.

We estimate the following Ordered Probit Model and Pooled probit model:

$$Y_{ijt} = \beta_0 + \beta_1 ln\ perGDP_{jt} + \sum_k \vartheta_k Income_{k,ijt} + \beta_2 \mathbf{X}_{ijt} + \gamma_t dyear_t + \beta_3 dcountry_j + \varepsilon_{ijt}$$

where i, j and t are individual, country and year respectively; β_0 is the constant term; **X** is a vector including socioeconomic controls other than income: age, male, education, married and townsize; $dcountry_j$ are country dummy variables; $dyear_t$ is year fixed effect; ε_{ijt} is the error term accounting for random variations, unobserved factors, and other unobservable elements, which is assumed to follow a standard normal distribution. In addition, two income variables are incorporated to consider both micro and macro perspectives. The first variable, "Income," considers relative income levels by utilizing four dummy variables or ten dummies that capture individuals' positions within the corresponding income group. These dummy variables enable the examination of income differentials at the micro level. The second variable comprises continuous national income measures, GDP per capita, expressed in constant 2015 US dollars. By including the macro-level indicator, the analysis considers the broader economic context and its impact on environmental preferences.

Sociodemographic variables are included as additional factors in the model. These variables include age, gender dummy (male), marital status (married), variables for education (edu_primary, edu_secondary and edu_college) and town size where the respondents live

(townsize). By including these sociodemographic variables, the analysis seeks to address potential confounding factors that could be associated with both income and environmental preferences. This approach helps diminish the influence of other co-occurring factors, such as educational level and residential location, on environmental preferences. Additionally, the inclusion of year and country dummies in the specification helps account for any time-specific or country-specific effects that may impact environmental preferences.

The model equation is estimated in each corresponding to a different dependent variable related to three themes: Trade-offs, the WTP, and Consumption. To ensure the robustness and validity of the study and to accurately estimate the income effect, year and country dummy variables are added to all specifications and OLS regression results are provided with ordered probit regression. These dummy variables help to account for any time-specific or country-specific effects that may influence the relationship between income and environmental preferences. Table 4 to 7 present the estimated effects of income on environmental preferences for three different subjects using OLS and ordered probit specifications applied to a global sample.

CHAPTER 4

EMPIRICAL RESULTS AND DISCUSSION

Theme 1: Trade-off Between Economic Growth and Environmental Preferences

Table 4 presents the analysis results for the first question under Theme 1, which examines "Combating unemployment, we have to accept environmental problems", using the World Values Survey (WVS) data from 1990 to 1994. This question aims to gauge respondents' perspective on whether environmental problems should be accepted to address unemployment.

Column (2), which examines the differential effect of income levels, indicate a significantly negative relationship between income levels and the trade-off perspective, with all income deciles, except the highest income group, showing this negative relationship at a significance level of 0.01%. does not exhibit a significantly different impact on the trade-off view compared to the lowest income group. The results also reveal a pattern: the negative coefficient increases from the 2nd decile to the 5th decile, and the estimates further increase from the 6th decile to the 9th decile. This suggests that individuals in the 4th, 5th, and 9th income groups are more inclined to disagree with the idea of accepting environmental problems to address unemployment.

Interestingly, the highest-income group is less likely than the 7th, 8th, and 9th decile income groups to believe that environmental problems must be accepted to tackle unemployment. Additionally, GDP per capita has a positive and significant impact on the trade-off perspective, implying that countries with higher national income are more likely to agree with the notion of accepting environmental problems to combat unemployment.

Table 4. Ordered Probit and Logit Regression Analysis Results of Theme 1

	Theme 1. Dependent variable: Trade-offs between economic growth and environmental preferences					
	Combatting unemployment, we have to accept environmental problem (WVS 2)		Protecting the environment should be given priority, even if causes slower economic growth (Binary outcomes) (WVS 3-7)		Economic growth harms the environment (ISSP 1-4)	
	(1) OLS	(2) Ordered Probit	(3) Logit	(4) Probit	(5) OLS	(6) Ordered Probit
Age	-.000	-.001	-.004**	-.002**	.001**	.001**
	(.001)	(.001)	(.001)	(.000)	(.000)	(.000)
Male	-.025	-.023	-.057**	-.035**	-.008	-.015
	(.033)	(.034)	(.016)	(.010)	(.010)	(.010)
Education						
primary education	.262**	.281**	.091**	.056**	-.099**	-.970**
	(.088)	(.091)	(.026)	(.016)	(.015)	(.015)
secondary education	-.045	-.046	.283**	.173**	-.190**	-.189**
	(.081)	(.082)	(.032)	(.020)	(.017)	(.018)
college education	-.209*	-.209*	.500**	.307**	-.280**	-.290**
	(.083)	(.085)	(.031)	(.019)	(.019)	(.020)
Married	.035	.038	-.054**	-.033**	-.045**	-.046**
	(.036)	(.038)	(.018)	(.011)	(.010)	(.011)
Townsize	-.008	-.009	-.010*	-.006*		
	(.009)	(.009)	(.004)	(.002)		
Small city					.023	.025
					(.017)	(.018)
Suburb of the big city					.044*	.049*
					(.022)	(.023)
Big city					-.004	-.006
					(.020)	(.021)
income						
2nd category	-.198**	-.201**	.102*	.063*	-.001	.001
	(.053)	(.055)	(.045)	(.028)	(.014)	(.015)
3rd category	-.243**	-.242**	.058	.036	-.044**	-.043**
	(.057)	(.059)	(.038)	(.024)	(.015)	(.016)
4th category	-.352**	-.355**	.039	.025	-.100**	-.101**
	(.061)	(.063)	(.037)	(.023)	(.017)	(.018)
5th category	-.353**	-.355**	.046	.029	-.205**	-.216**
	(.066)	(.068)	(.034)	(.021)	(.020)	(.021)
6th category	-.212**	-.213**	-.005	-.002		
	(.072)	(.074)	(.037)	(.023)		
7th category	-.278**	-.288**	-.053	-.032		
	(.074)	(.077)	(.039)	(.024)		
8th category	-.260**	-.275**	-.059	-.035		
	(.081)	(.084)	(.045)	(.028)		
9th category	-.328**	-.343**	-.067	-.040		
	(.124)	(.128)	(.071)	(.043)		
10th category	-.283	-.265	-.218**	-.134**		
	(.149)	(.158)	(.068)	(.042)		
Log GDP per capita	.162**	.198**	.823**	.500**	-.001	.025
	(.042)	(.044)	(.050)	(.029)	(.085)	(.089)
Constant	2.071**		-8.619**	-5.226**	3.452**	
	(.308)		(.076)	(.327)	(.706)	

Observations	4285	4285	68938	68938	45337	45337
F	17.34**				81.09**	
Adj R^2	.064				.089	
Root MSE	1.046				1.009	4035.44**
LR chi2		295.29**	3902.83**	3905.54**		
Pseudo R^2		.025	.042	.042		.031

*significant at 5%; **significant at 10%. z statistics in parentheses and country and year dummies are included in the estimates.

For column (4), the second lowest income group exhibits a statistically significant difference in the trade-off perspective compared to the baseline group (income 1) at the 1% significance level. Additionally, the highest income group displays a negative coefficient, indicating a statistically significant difference compared to the lowest income group. This implies that wealthier individuals disagree with the notion that protecting the environment should take priority, even if it leads to a slowdown in economic growth. Conversely, individuals with lower income believe that priority should be given to protecting the environment, even if it results in a decline in economic growth. On the other hand, the remaining income groups (3rd to 9th deciles) are not statistically significant, as the confidence intervals include both negative and positive values. This indicates that these income groups are not significantly different from the lowest income group in terms of the trade-off perspective. GDP per capita exhibits a significantly positive impact, indicating that people in wealthier countries tend to place a higher value on protecting the environment compared to prioritizing economic growth.

For the last question, "economic growth harms the environment," personal income levels are represented by negative values. Column (6) of the analysis reveals that most income groups exhibit a statistically significant difference compared to the baseline group (income_scale 1). This suggests that as income levels increase, a greater proportion of individuals hold the belief that economic growth does not necessarily harm the environment. Meanwhile, national income is not

statistically significant, which implies that the trade-off view is not influenced by the overall national income.

Based on these findings, the results support H1 at the micro income level. This is evident from the results of question 2 and 3, where the highest income groups display the strongest disagreement with the trade-off view. However, at the macro income level, the findings do not support H1. Instead, they indicate that higher national income is positively associated with the trade-off view, suggesting that wealthier countries are more inclined to prioritize environmental protection or believe that economic growth has negative environmental consequences.

Theme 2: Willingness to Pay for the Environment

Theme 2 focuses on measuring environmental preference through six questions, and the analysis results for the first three questions are presented in Table 5. The analysis specifically examines the impact of personal income on the willingness to pay higher taxes for the environment. In column (2), it is observed that there is a positive correlation between individual income and the inclination to contribute more taxes for environmental purposes. Income groups ranging from the 5th to 10th deciles show statistically significant differences compared to the baseline group (Income1), indicating that these income groups have a significantly different impact on the willingness to pay higher taxes to prevent environmental pollution. As coefficients increase from 5^{th} decile to 9^{th} decile income group, individuals are more inclined to contribute a higher amount of taxes to prevent environmental issues. This trend is particularly prominent in the second-highest income group, with a significant increase in the effect size. However, for the highest income group, the coefficient magnitude notably decreases, indicating a sharp decline in the willingness to pay higher taxes for the environment in that group.

Table 5. Ordered Probit Regression Analysis Results of Theme 2-1

	Increase in tax if used to prevent environmental pollution (WVS 2-5)		Increasing taxes on fossil fuels, such as oil, gas and coal (ESS 8)		How willing would you be to pay much higher taxes to protect the environment? (ISSP 1-4)	
	(1) OLS	(2) Ordered Probit	(3) OLS	(4) Ordered Probit	(5) OLS	(6) Ordered Probit
Age	.000	.000	-.002**	-.002**	.001	.001
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Male	-.007	-.006	-.059**	-.049**	-.006	-.006
	(.007)	(.008)	(.013)	(.011)	(.010)	(.010)
Education						
primary education	-.004	-.008	.049	.052*	.166**	.158**
	(.017)	(.021)	(.026)	(.023)	(.017)	(.015)
secondary education	.083**	.105**	.109**	.104**	.344**	.322**
	(.016)	(.021)	(.030)	(.027)	(.019)	(.018)
college education	.172**	.220**	.362**	.329**	.575**	.529**
	(.018)	(.023)	(.029)	(.026)	(.022)	(.020)
Married	.008	.010	-.073**	-.065**	.019	.018
	(.007)	(.009)	(.014)	(.013)	(.012)	(.011)
Townsize	.005**	.007**				
	(.002)	(.002)				
A town or a small city			.179**	.165**	.052**	.044*
			(.029)	(.026)	(.019)	(.018)
The suburbs of a big city			.236**	.218**	.071**	.064**
			(.032)	(.029)	(.025)	(.021)
Big city			.305**	.282**	.113**	.108**
			(.030)	(.027)	(.023)	(.019)
Income						
2nd category	.001	-.004	.012	.017	.018	.016
	(.015)	(.019)	(.028)	(.026)	(.016)	(.015)
3rd category	-.010	-.019	.094**	.086**	.119**	.110**
	(.014)	(.019)	(.028)	(.025)	(.017)	(.016)
4th category	.021	.018	.088**	.083**	.180**	.162**
	(.014)	(.019)	(.029)	(.026)	(.019)	(.018)
5th category	.051**	.059**	.099**	.091**	.160**	.145**
	(.014)	(.018)	(.029)	(.026)	(.022)	(.021)
6th category	.060**	.069**	.166**	.153**		
	(.015)	(.020)	(.030)	(.027)		
7th category	.084**	.098**	.161**	.148**		
	(.016)	(.021)	(.030)	(.027)		
8th category	.110**	.134**	.216**	.193**		
	(.018)	(.023)	(.031)	(.027)		
9th category	.138**	.174**	.251**	.226**		
	(.022)	(.029)	(.033)	(.030)		
10th category	.088**	.108**	.280**	.254**		
	(.023)	(.030)	(.034)	(.031)		
Log GDP per capita	-1.299**	-1.757**	-2.987*	-2.667*	-.403**	-.449**
	(.274)	(.353)	(1.456)	(1.303)	(.097)	(.090)
Constant	11.552**		34.513**		5.556**	
	(2.000)		(15.582)		(.804)	
Observations	66284	66284	34434	34434	45337	45337

F	114.41**		80.38**		75.43**	
Adj R^2	.115		1.178		.083	
Root MSE	.836				1.150	
LR chi2		7836.42**		3253.75**		3886.35**
Pseudo R^2		.047		.031		.029

*significant at 5%; **significant at 10%. z statistics in parentheses and country and year dummies are included in the estimates.

On the other hand, national income GDP per capita has a significantly negative impact on the WTP higher environmental taxes. This suggests that as a country's economic level improves, people become less WTP taxes for environmental purposes.

For the second question, the analysis in the fourth column examines the impact of income on taxes levied on fossil fuels. Significant positive effects are observed from the third to the tenth income deciles, indicating that higher-income groups are more supportive of tax increases on fossil fuels compared to the baseline group (the 1st decile income group, omitted variable). Specifically, the 10th income decile has the highest coefficient among the income groups, indicating that individuals in the highest income group significantly support tax increases on fossil fuels. In contrast, GDP per capita shows a significantly negative relationship, suggesting that wealthier countries tend to oppose tax increases to reduce fossil fuel usage. Therefore, at the micro income level, hypothesis H2 regarding the WTP taxes on fossil fuels is supported. However, at the macro income level, hypothesis H2 is rejected.

According to the results in column 6 of the third question, both personal and national income show statistical significance at the 1% level for the WTP higher taxes to protect the environment. At the micro income level, individuals with higher income are more WTP higher taxes for the environment. However, the highest income group is less WTP taxes compared to the 4th quintile income group.

Table 6. Ordered Probit Regression Analysis Results of Theme 2-2

	I would buy things at a 20% higher price if it helped to protect the environment? (WVS 3)		How willing would you be to pay much higher prices in order to protect the environment? (ISSP 1-4)		How willing would you be to accept cuts in your standard of living in order to protect the environment? (ISSP 1-4)	
	(7) OLS	(8) Ordered Probit	(9) OLS	(10) Ordered Probit	(11) OLS	(12) Ordered Probit
Age	-.001	-.002	-.000	.000	-.000	-.000
	(.001)	(.001)	(.000)	(.000)	(.000)	(000)
Male	-.020	-.025	-.035**	-.031**	-.047**	-.042**
	(.020)	(.027)	(.011)	(.010)	(.011)	(.010)
Education						
primary education	.140	.193	.184**	.172**	.170**	.157**
	(.079)	(.105)	(.016)	(.015)	(.017)	(.015)
secondary education	.253**	.344**	.366**	.342**	.333**	.308**
	(.078)	(.104)	(.019)	(.018)	(.019)	(.018)
college education	.340**	.458**	.545**	.514**	.511**	.473**
	(.081)	(.109)	(.021)	(.020)	(.022)	(.020)
Married	-.004	-.006	.027*	.023*	.026*	.020
	(.022)	(.030)	(.011)	(.011)	(.011)	(.011)
Townsize	.004	.005				
	(.005)	(.006)				
A town or a small city			.007	.005	-.018	-.018
			(.019)	(.018)	(.019)	(.018)
The suburbs of a big city			.034	.029	-.005	-.008
			(.024)	(.023)	(.025)	(.023)
Big city			.067**	.069**	.045*	.044*
			(.022)	(.021)	(022)	(.021)
Income						
2nd category	.021	.027	.051**	.045**	.046**	.040**
	(.056)	(.074)	(.016)	(.015)	(.016)	(.015)
3rd category	.005	.004	.131**	.118**	.115**	.100**
	(.056)	(.074)	(.017)	(.016)	(.017)	(.016)
4th category	-.034	-.047	.221**	.205**	.150**	.132**
	(.057)	(.075)	(.019)	(.018)	(.019)	(.018)
5th category	.026	.035	.268**	.249**	.121**	.109**
	(.056)	(.075)	(.022)	(.021)	(.022)	(.021))
6th category	.078	.104				
	(.058)	(.077)				
7th category	.086	.113				
	(.058)	(.077)				
8th category	.097	.129				
	(.061)	(.081)				
9th category	.124	.168				
	(.065)	(.087)				
10th category	.088*	.216*				
	(.023)	(.090)				
Log GDP per capita	.710**	.908**	-.238*	-.269**	-.215*	-.282**
	(.173)	(.231)	(.094)	(.089)	(.096)	(.090)
Constant	-5.270**		4.389**		3.682**	
	(1.830)		(.783)		(.797)	

Observations	6649	6649	45337	45337	45337	45337
F	19.13**		119.91**		97.40**	
Adj R^2	.057		0.126		0.105	
Root MSE	.809		1.120		1.141	
LR chi2		407.02**		5930.93**		4946.03**
Pseudo R^2		.025		.043		.036

*significant at 5%; **significant at 10%. z statistics in parentheses and country and year dummies are included in the estimates.

Therefore, hypothesis H2 is partially supported at the micro income level. Additionally, GDP per capita is negatively associated with the WTP higher taxes, indicating that individuals and countries with higher GDP per capita are less likely to support tax increases for environmental protection. Therefore, hypothesis H2 is not supported at the macro income level.

For the fourth question of Theme 2, column (8) in Table 24 indicates that only the 10th income decile group has a significant impact on the WTP a higher price for green products. This suggests that individuals in the highest income group are more likely to purchase green products even at a 20% higher price. Additionally, GDP per capita is statistically significant at the 1% level, indicating that people living in countries with higher national income are more WTP for environmental protection. These findings support the hypothesis of H2 at both the micro and macro income levels.

Column (10) of the fifth question in Theme 2 examines the WTP a higher price to protect the environment using data from the International Social Survey Programme (ISSP) from 1990 to 2021. Both individual income and national income indicators have a significantly positive impact on the WTP higher prices for environmental protection. This means that individuals with higher income and countries with higher national income are more WTP a higher price for environmental protection. Therefore, hypothesis H2 is supported in terms of the WTP a higher

price for the environment at the individual income level, but not at the national income level since the indicator has a negative value.

The final question in Theme 2 focuses on the willingness to accept (WTA) a reduction in living standards for environmental purposes, using survey data from the International Social Survey Programme (ISSP) conducted from 1990 to 2021. Table 24 demonstrates that all income quintiles exhibit a significantly positive effect at the 1% level. As income increases, the impact of income on the WTA a reduction in living standards for the environment becomes greater, although once the highest income is reached, the magnitude of the coefficient decreases. Individuals in the 4^{th} income quintile show the highest willingness to accept a reduction in living standards for the environment. Additionally, GDP per capita has a significantly negative effect, suggesting that wealthier countries are less willing to accept a reduction in living standards to protect the environment.

Overall, hypothesis H2 is supported at the personal income level, as the highest and second highest income groups are more willing to pay higher prices or accept a reduction in living standards to protect the environment. However, H2 is not supported at the macro income level, as countries with lower income are more willing to pay higher prices or accept a reduction in living standards.

Theme 3: Consumption for the Environment

The first question in Theme 3 focuses on individuals' consideration of environmental labeling when making consumption choices. The analysis is performed on a database from the International Social Survey Programme (ISSP) conducted between 1993-1994. Table 25 presents the results of this analysis.

Table 7. Ordered Probit Regression Analysis Results of Theme 3

	When you are choosing a product, how often do you pay attention to any environmental labeling before deciding to buy? (ISSP 1)		How often do you avoid buying certain products for environmental reasons? (ISSP 3-4)	
	(1) OLS	(2) Ordered Probit	(3) OLS	(4) Ordered Probit
Age	-.001	-.002	.004**	.005**
	(.001)	(.001)	(.000)	(.000)
Male	-.164**	-.193**	-.153**	-.191**
	(.034)	(.040)	(.011)	(.013)
Education				
primary education	.099*	.115*	.149**	.191**
	(.042)	(.050)	(.017)	(.021)
secondary education	.130*	.150*	.235**	.299**
	(.056)	(.065)	(.019)	(.023)
college education	.324**	.378**	.332**	.414**
	(.055)	(.063)	(.022)	(.027)
Married	.128**	.157**	.027*	.038**
	(.036)	(.042)	(.011)	(.014)
Townsize				
A town or a small city	.151*	.189*	-.021	-.016
	(.066)	(.078)	(.025)	(.030)
The suburbs of a big city	.254**	.317**	-.039	-.039
	(.068)	(.080)	(.026)	(.032)
Big city	.178*	.226*	.011	.024
	(.075)	(.089)	(.024)	(.030)
Income				
2nd category	.118*	.149*	.031*	.044*
	(.057)	(.067)	(.015)	(.019)
3rd category	.168**	.207**	.058**	.080**
	(.065)	(.076)	(.016)	(.020)
4th category	.207**	.249**	.084**	.111**
	(.074)	(.086)	(.019)	(.024)
5th category	-.004	.019	.059**	.081**
	(.139)	(.161)	(.022)	(.027)
6th category				
7th category				
8th category				
9th category				
10th category				
Log GDP per capita	-.492	-.430	-.210**	-.245**
	(.261)	(.305)	(.033)	(.040)
Constant	6.786*		3.502**	
	(2.649)		(.312)	
Observations	3292	3292	29198	29198

F	7.51**		59.95**	
Adj R^2	.033		.085	
Root MSE	.929		.878	
LR chi2		128.00**		2764.91**
Pseudo R^2		.015		.037

*significant at 5%; **significant at 10%. z statistics in parentheses and country and year dummies are included in the estimates.

While the effect of individual income is significantly positive, interestingly, the highest income quintile does not exhibit a significant effect. The income coefficients size increases as income rises from the 2nd to the 4th quintiles, indicating that individuals in the 4th income quintile are most inclined towards eco-labeling. In contrast, the highest income quintile does not differ significantly from the first quintile in terms of eco-labeling considerations. Moreover, the GDP per capita, representing national income, does not have a significantly positive effect of national income on the attention of eco-labeling. Therefore, for the eco-labeling question, H3 is not supported as the highest income group and log GDP per capita do not exhibit statistically significant coefficients.

The second question of Theme 3, which investigates the behavior of not purchasing certain products for environmental reasons, is analyzed by combining data from two surveys conducted in 2010 and 2021. At the micro level, individual income has a significantly positive impact on the behavior of not purchasing certain items due to environmental reasons. A notable difference from the analysis results in the 1990s is the emergence of the highest income quintile as a statistically significant factor. This implies that individuals with incomes beyond the first quintile are avoiding products for environmental reasons. However, the impact is greatest for individuals in the 4th income quintile, rather than the highest income group. On the other hand, based on the coefficient of log GDP per capita, the data suggests that individuals from wealthier countries are less likely to avoid certain products for environmental reasons. Therefore,

hypothesis H3 is supported at the individual income level, indicating that higher individual income is associated with a greater likelihood of avoiding certain products for environmental considerations. However, H3 is not supported at the national income level, as log GDP per capita has a significant negative effect on the avoidance of certain products for environmental reasons.

CHAPTER 5

CONCLUSION

This paper examines the influence of income level on environmental preferences by constructing data from WVS, ESS, and ISSP into three themes: Theme 1 focuses on the trade-offs between economic growth and the environment, Theme 2 explores willingness to pay for environmental initiatives, and Theme 3 examines patterns of environmental consumption The analysis, conducted using both ordered probit and pooled logit models, reveals that personal income level significantly contributes to environmental preferences. Overall, individuals with higher income levels tend to hold a different perspective from the trade-off viewpoint between the economy and the environment. Especially, people in the second highest and highest income groups are more inclined to have a stronger environmental preference and exhibit a greater WTP higher taxes and prices for environmental causes. Furthermore, the second highest income group demonstrates the strongest willingness to sacrifice their living standards to promote environmental improvement. However, for the WTP higher price for the environment, the highest income group is more willing to pay much higher price to protect the environment.

The first question's findings regarding environmental suggest that individuals with higher incomes are more attentive to environmental labeling, while the highest income group does not show a significant impact on attention to eco-labeling. Instead, the second highest income group is interested in eco-labeling most. In addition, people in the second highest income group are more likely to avoid purchasing certain products for environmental reasons compared to other income groups. These results are consistent with a previous study that found a decrease in

willingness to pay for the environment at the highest income level (Shao et al., 2018). However, our study reveals an interesting finding that the highest income group shows a particularly strong positive correlation between income and the WTP higher taxes on fossil fuels and higher prices for the environment. This suggests that individuals with higher incomes in this category are more willing to contribute financially for environmental purposes. Therefore, it is challenging to draw definitive conclusions about WTP among the wealthiest individuals.

Indeed, it is interesting to note that individuals in the second highest income group exhibit the strongest environmental preferences, challenging the assumption that the highest income automatically corresponds to the strongest environmental concerns. Additionally, our study reveals that a country's GDP per capita significantly influences environmental preferences. Specifically, we find that wealthy countries are more inclined to agree with the trade-off view and are less supportive of higher taxes for environmental purposes. Moreover, countries with higher national income are less likely to make sacrifices in their standard of living or avoid certain products for environmental reasons. These findings imply that individuals in high-income countries may not actively contribute to environmental efforts, either financially or through behavioral changes. This could be attributed to the fact that high-income countries have already achieved significant economic growth and are often leaders in technology and environmental policy. As a result, they may not exhibit a strong environmental preference anymore, as they have already made considerable efforts to improve the environment and currently enjoy a good environmental quality.

Overall, it is a significant finding that the income level with a notable effect on environmental preference is the second highest or the highest income group. This has important implications for policy development. Firstly, individuals with high incomes tend to be optimistic

towards economic growth and they think sacrificing the environment is not necessary for the economy growth, implying a need to address their over optimistic perspective through policies that assign economic value to environmental impacts. Implementing pricing mechanisms, such as environmental taxes or carbon pricing, can help internalize the costs of environmental pollution and promote sustainable behaviors among the affluent.

Secondly, the study shows that the high-income group has a stronger inclination to support higher environmental taxes, while the low-income group is less favorable towards green taxes. This suggests the possibility of implementing progressive environmental taxation, where high-income individuals pay a higher rate of environmental taxes in line with their higher income. This approach not only aligns with the environmental preferences of the high-income class but also ensures a fair distribution of the tax burden, with lower-income groups contributing proportionately less.

Lastly, when considering the high-income group who expressed willingness to avoid consuming certain items for environmental reasons and to reduce their standard of living, the government can consider providing tax deductions and subsidies to encourage these environmentally friendly behaviors.

In addition to government policies, companies can also make strategies to attract customers with high income using our findings. Taking into account the fact that high-income individuals are willing to avoid certain purchases for environmental reasons and make lifestyle adjustments, companies can develop eco-friendly products and conducting environmental campaigns that encourage such behaviors can attract high-income consumers.

REFERENCES

Auffhammer, M., & Carson, R. T. (2008). Forecasting the path of China's CO2 emissions using province-level information. *Journal of Environmental Economics and Management*, *55*(3), 229-247.

Bimonte, S. (2002). Information access, income distribution, and the Environmental Kuznets Curve. *Ecological economics*, *41*(1), 145-156.

Brechin, S. R., & Kempton, W. (1994). Global environmentalism: a challenge to the postmaterialism thesis? *Social science quarterly*, *75*(2), 245-269.

Carson, R. (2002). *Silent spring*. Houghton Mifflin Harcourt.

Carson, R. T. (2010). The environmental Kuznets curve: seeking empirical regularity and theoretical structure. *Review of environmental Economics and Policy*.

Carson, R. T., Jeon, Y., & McCubbin, D. R. (1997). The relationship between air pollution emissions and income: US data. *Environment and Development Economics*, *2*(4), 433-450.

Cohen, M. A. (1998). Monitoring and enforcement of environmental policy. *Available at SSRN 120108*.

Copeland, B. R., & Taylor, M. S. (2004). Trade, growth, and the environment. *Journal of Economic literature*, *42*(1), 7-71.

Cotgrove, S., & Duff, A. (1981). Environmentalism, values, and social change. *British journal of sociology*, 92-110.

Dasgupta, P. (1995). The population problem: theory and evidence. *Journal of Economic literature*, *33*(4), 1879-1902.

De Rome, C., & Meadows, D. H. (1972). *The limits to growth: a report for the Club of Rome's project on the predicament of mankind*. New York: Universe Books.

Deacon, R. T., & Norman, C. S. (2006). Does the environmental Kuznets curve describe how individual countries behave? *Land Economics*, *82*(2), 291-315.

Desai, U. (2002). Institutions and environmental policy in developed countries. *Environmental Politics and Policy in Industrialized Countries*, 1-27.

Dinda, S. (2004). Environmental Kuznets curve hypothesis: a survey. *Ecological economics*, *49*(4), 431-455.

Dunlap, R. E., & Mertig, A. G. (1995). Global concern for the environment: is affluence a prerequisite? *Journal of Social Issues*, *51*(4), 121-137.

Dunlap, R. E., & Mertig, A. G. (1997). Global environmental concern: An anomaly for postmaterialism. *Social science quarterly*, *78*(1), 24-29.

Dunlap, R. E., & York, R. (2008). The globalization of environmental concern and the limits of the postmaterialist values explanation: Evidence from four multinational surveys. *The Sociological Quarterly*, *49*(3), 529-563.

Ehrlich, P. R. (1978). The population bomb.

Fairbrother, M. (2013). Rich people, poor people, and environmental concern: Evidence across nations and time. *European sociological review*, *29*(5), 910-922.

Ferreira, S., & Moro, M. (2013). Income and preferences for the environment: evidence from subjective well-being data. *Environment and Planning A*, *45*(3), 650-667.
Ficko, A., & Bončina, A. (2019). Public attitudes toward environmental protection in the most developed countries: The Environmental Concern Kuznets Curve theory. *Journal of environmental management*, *231*, 968-981.
Fiorino, D. J. (2001). Environmental policy as learning: a new view of an old landscape. *Public administration review*, *61*(3), 322-334.
Franzen, A., & Meyer, R. (2010). Environmental attitudes in cross-national perspective: A multilevel analysis of the ISSP 1993 and 2000. *European sociological review*, *26*(2), 219-234.
Gallagher, K. (2004). *Free trade and the environment: Mexico, NAFTA, and beyond*. Stanford University Press.
Gifford, R. (2014). Environmental psychology matters. *Annual review of psychology*, *65*, 541-579.
Givens, J. E., & Jorgenson, A. K. (2011). The effects of affluence, economic development, and environmental degradation on environmental concern: A multilevel analysis. *Organization & Environment*, *24*(1), 74-91.
Grossman, G. M., & Krueger, A. B. (1991). Environmental impacts of a North American free trade agreement. In: National Bureau of economic research Cambridge, Mass., USA.
Inglehart, R. (1981). Post-materialism in an environment of insecurity. *American political science review*, *75*(4), 880-900.
Inglehart, R. (1997). *Modernization: Cultural, Economic, and Political Change in 43 Societies and Postmodernization*. Princeton University Press.
Kaplan, R. (1977). Patterns of environmental preference. *Environment and behavior*, *9*(2), 195-216.
Kaplan, S. (1987). Aesthetics, affect, and cognition: Environmental preference from an evolutionary perspective. *Environment and behavior*, *19*(1), 3-32.
Kneese, A., & Ridker, R. (1972). Predicament of mankind. *Washington Post*, *2*.
Komen, M. H., Gerking, S., & Folmer, H. (1997). Income and environmental R&D: empirical evidence from OECD countries. *Environment and Development Economics*, *2*(4), 505-515.
Kotchen, M. J., Boyle, K. J., & Leiserowitz, A. A. (2013). Willingness-to-pay and policy-instrument choice for climate-change policy in the United States. *Energy Policy*, *55*, 617-625.
Kuznetz, S. (1955). Economic Growth and Incur in Equality. *American Economic Review*.
Levinson, A. (2009). *Valuing air quality using happiness data*.
Lubell, M., Vedlitz, A., Zahran, S., & Alston, L. T. (2006). Collective action, environmental activism, and air quality policy. *Political Research Quarterly*, *59*(1), 149-160.
Neidell, M. J. (2004). Air pollution, health, and socio-economic status: the effect of outdoor air quality on childhood asthma. *Journal of health economics*, *23*(6), 1209-1236.
Nordhaus, W. D. (1973). World dynamics: measurement without data. *The Economic Journal*, *83*(332), 1156-1183.
Panayotou, T. (1993). Empirical tests and policy analysis of environmental degradation at different stages of economic development.
Pearce, D., Pearce, C., & Palmer, C. (2002). *Valuing the environment in developing countries: case studies* (Vol. 1). Edward Elgar Publishing.

Poortinga, W., Whitmarsh, L., Steg, L., Böhm, G., & Fisher, S. (2019). Climate change perceptions and their individual-level determinants: A cross-European analysis. *Global environmental change*, *55*, 25-35.

Roca, J. (2003). Do individual preferences explain the Environmental Kuznets curve? *Ecological economics*, *45*(1), 3-10.

Sagoff, M. (2000). Do we consume too much? *The Ruffin Series of the Society for Business Ethics*, *2*, 53-74.

Selden, T. M., & Song, D. (1994). Environmental quality and development: is there a Kuznets curve for air pollution emissions? *Journal of Environmental Economics and Management*, *27*(2), 147-162.

Shafik, N. (1994). Economic development and environmental quality: an econometric analysis. *Oxford economic papers*, *46*(Supplement_1), 757-773.

Shao, S., Tian, Z., & Fan, M. (2018). Do the rich have stronger willingness to pay for environmental protection? New evidence from a survey in China. *World Development*, *105*, 83-94.

Smulders, S., & Gradus, R. (1996). Pollution abatement and long-term growth. *european Journal of Political economy*, *12*(3), 505-532.

Solow, R. M. (1973). Is the End of the World at Hand? *Challenge*, *16*(1), 39-50.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 81-97.

Sun, C., Yuan, X., & Yao, X. (2016). Social acceptance towards the air pollution in China: evidence from public's willingness to pay for smog mitigation. *Energy Policy*, *92*, 313-324.

APPENDIX A

VARIABLES USED FOR THE ANALYSIS

Table A.1 Variables used for the Analysis (WVS)

Variable Name	Definition	Information	Measurement	Source	Year
consci (V16)	Trade-offs between economic growth and environmental preferences	Combatting unemployment, we have to accept environmental problem (1=Agree strongly, 2=Agree, 3=Disagree, 4=Disagree strongly)	Modified in binary variable (1 = agree strongly or agree, 0= disagree or disagree strongly)	World Value Survey (Round 2)	1990-1994
consci (V41)	Trade-offs between economic growth and environmental preferences	Protecting the environment should be given priority, even if causes slower economic growth (1=Agree strongly, 2=Agree, 3=Disagree, 4=Disagree strongly)	Modified in binary variable (1 = agree strongly or agree, 0= disagree or disagree strongly)	World Value Survey (Round 3-7)	1995-2021
w_tax (V13)	Willing to pay for environmental tax	Increase in taxes if used to prevent environmental pollution 1.- Agree strongly 2.- Agree 3.- Disagree 4.- Disagree strongly	Modified in binary variable (1 = agree strongly or agree, 0= disagree or disagree strongly)	World Value Survey (Round 2-5)	1995-2009
w_price(V39)	Willing to buy things at a 20% higher price for the environment	Environment: I would buy things at a 20% higher price if it helped to protect the environment 1.- Strongly agree 2.- Agree 3.- Disagree 4.- Strongly disagree	Modified in binary variable (1 = agree strongly or agree, 0= disagree or disagree strongly)	World Value Survey (Round 3)	1995-1999
age (V355)	Age This means you are .... years old.	……years old	Not modified	World Value Survey (Round 2-7)	1990-2022
male (V353)	Gender	1.-Male 2.-Female	Modified in a male (1= Male, 0 = Female)	World Value Survey (Round 2-7)	1990-2022

edu (V375)	Highest educational level attained	1.- None 2.- Less than Primary 3.- Primary 4.- Less than Secondary technical/vocational 5.- Secondary technical/vocational 6.- Less than Secondary university preparatory 7.- Secondary university preparatory 8.- Some university education 9.- University degree	Modified in 1 = have no education experience(1), 2 = have a primary education(2,3), 3= have a secondary education(4-7), 4 = have a college education(8,9)	World Value Survey (Round 2-7)	1990-2022
married	Marital status	1. Married, 2. Not married	Modified in married dummy (1/0)	World Value Survey (Round 2-7)	1990-2022
townsize (V368)	Size of town	1.- <2000 2.- 2-5000 3.- 5-10000 4.- 10-20000 5.- 20-50000 6.- 50-100000 7.- 100-500000 8.- >500000	Not modified	World Value Survey (Round 2-7)	1990-2022
gdp_pcap_2015c	GDP per capita	GDP per capita (Constant 2015)	Not modified	World Bank	1990-2022
h_income# (V363)	Here is a scale of incomes and we would like to know in what group your household is, counting all wages, salaries, pensions and other incomes that come in. Just give the letter of the group your household falls into, before taxes and other deductions.	1.- Lowest 2.- 2 3.- 3 4.- 4 5.- 5 6.- 6 7.- 7 8.- 8 9.- 9 10.- Highest	Modified in dummy variables (1=2, 0 = if else) (1=3, 0 = if else) (1=4, 0 = if else) (1=5, 0 = if else) (1=6, 0 = if else) (1=7, 0 = if else) (1=8, 0 = if else) (1=9, 0 = if else) (1=10, 0 = if else)	World Value Survey (Round 2-7)	1990-2021

Table A.2. Variables used for the Analysis (ESS)

Variable Name	Definition	Information	Measurement	Source	Year

impenv	Environmental consciousness	She strongly believes that people should care for nature. Looking after the environment is important to her. 1 = Very much like me 2 = like me 3 = somewhat like me 4 = a little like me 5 = Not like me 6 = Not like me at all 88 = Don't know	Modified in binary variable (1 = protecting environment, 0= Economy growth and creating jobs)	European Social Survey (Round 8)	2016/2017
inctxff	Willing to pay for environmental tax	Increasing taxes on fossil fuels, such as oil, gas and coal. 1 = Strongly in favor, 2 = Somewhat in favor 3 = Neither in favour nor against 4 = Somewhat against, 5 = Strongly against, 7 = Refusal 8 = Don't know	Modified in binary variable (1 = Strongly in favor or somewhat in favor (1,2), 0= somewhat against or strongly against strongly(3,4,5))	European Social Survey (Round 8)	2016-2017
inwyys	Start of interview, year			European Social Survey (Round 8)	
gndr/male	Gender	1.-Male 2.-Female	Modified in a male (1= Male, 0 = Female)	European Social Survey (Round 8)	2016/2017
eisced	Highest educational level achieved	0.- Not possible to harmonize into education level 1.- Less than lower secondary 2.- Lower secondary	Modified in 1 = No education experience (0), 2 = have a primary education (1,2,3), 3= have a secondary education (4,5)	European Social Survey (Round 8)	2016/2017

		3.- Lower tier upper secondary 4.- Upper tier upon secondary 5.- Advanced vocational, sub-degree 6.- Lower tertiary education, BA level 7.- higher tertiary education, MA level 55.- Other	4 = have a college education (6) 5= have a graduate education (7)		
marsts->marital	Marital status	1.- Legally married 2.- In a legally registered civil union 3.- Legally separated 4.- Legally divorced/civil union dissolved 5.- Widowed/civil partner died 6.- None of these (Never married) 66.- Not applicable 77.- Refusal 88.- Don't know 99.- No answer	Modified in 1 = Married (1,2), 0 = not married (3-6)	European Social Survey (Round 8)	2016/2017
domicil	The area where respondents live	1. A big city 2. Suburbs or outskirts of big city 3. Town or small city 4. Country village 5. Farm or home in countryside 7. Refusal 8. Don't know 9. No answer	Modified in 4 dummies (0/1)	European Social Survey (Round 8)	2016/2017

log gdp_pcap	GDP per capita	GDP per capita (Constant 2015)	Not modified	World Bank	1990-2022
hinctnta	Household's total net income	1.- 1st decile 2.- 2nd decile 3.- 3rd decile 4.- 4th decile 5.- 5th decile 6.- 6th decile 7.- 7th decile 8.- 8th decile 9.- 9th decile 10.- 10th decile	Modified in 9 scales dummy variables (0/1)	European Social Survey (Round 8)	2016/2017

Table A.3 Variables used for the Analysis (ISSP)

Variable Name	Definition	Information	Measurement	Source	Year
w_trade(v22)	Tradeoff between economic growth and the environment	Economic growth: harms the environment 1 = strongly agree 2 = agree 3 = neither agree nor disagree 4 = disagree 5 = strongly disagree 8 = don't know 9 = NA	Modified in binary variable (1 = agree strongly or agree (1,2), 0= disagree or disagree strongly, (3, 4,5))	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
w_tax(v27)	Willing to pay higher taxes	How willing would you be to pay much higher taxes to protect the environment? 1. Very willing 2. Fairly willing 3. Neither willing nor unwilling 4. Fairly unwilling 5. Very unwilling 8. Can't choose, don't know 9. NA, refused	Modified in binary variable (1 = very willing or fairly willing (1,2), 0= unwilling or fairly unwilling or very unwilling strongly, (4,5))	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020

w_price(v24)	Willing to pay higher price	How willing would you be to pay much higher prices to protect the environment 1 = Very willing 2 = Fairly willing 3 = Neither willing nor unwilling 4. Fairly unwilling 5. Very unwilling 8. Can't choose, don't know 9. NA, refused	Modified in binary variable (1 = very willing or fairly willing (1,2), 0= fairly unwilling or very unwilling strongly, (4,5))	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
w_dliving(v26)	Willing to accept cuts in your standard of living	How willing would you be to accept cuts in standard of living to protect the environment 1. Very willing 2. Fairly willing 3. Neither willing nor unwilling 4. Fairly unwilling 5. Very unwilling 8. Can't choose, don't know 9. NA, refused	Modified in binary variable (1 = very willing or fairly willing (1,2), 0= fairly unwilling or very unwilling strongly, (4,5))	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
wconsum_label (v99)	Consumption for the environment	When you are choosing a product, how often do you pay attention to any environmental labeling before deciding to buy it? 1. Always 2. Often 3. Sometimes	Modified in binary variable (1 = always or often or sometimes (1,2,3), 0= never (4))	International Social Survey Programme: Environment I - ISSP	1993-1994

		4. Never 8. Can't choose, don't know 9. NA, refused 0. NAV			
wconsum(v60)	Consumption for the environment	How often do you avoid buying certain products for environmental reasons? 1. Always 2. Often 3. Sometimes 4. Never 9. NA, refused	Modified in binary variable (1 = always or often or sometimes (1,2), 0= never (4))	International Social Survey Programme: Environment III – ISSP Environment IV - ISSP	2010-2021
year	Year of interview			International Social Survey Programme: Environment I - ISSP	1993-2021
age(v201)	Age of respondents	14. years . . 98. years 99. NA, refused	not modified	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
Sex/Male (v200)	Gender of respondent	1. Male 2. Female	Modified in Male dummy (0/1)	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
Marital(v202)/married	Marital status	1. Married or living as married 2. Widowed 3. Divorced 4. Separated 5. Single 9. NA, refused	Modified in 1. Married 0. Not married	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
edu(v205) secondary post_secondary university	Highest education level	1. None 2. Incomplete primary 3. Primary completed 4. Incomplete secondary 5. Secondary completed 6. Incomplete semi-higher 7. Semi-higher completed	Modified in 1. Primary (1,2,3) 2. Secondary (4,5) 3. Post secondary (6,7) 4. University (8,9)	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020

		8. Incomplete university 9. University completed 99.NA			
income_scale#	Individual income	1. lowest 2. 3. 4. 5. Highest	Modified in four dummies (0/1)	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020
place(V65) big_city the_suburbs	The place where respondents live	1. A big city 2. The suburbs or outskirts of a big city 3. A small city or town 4. A country village 5. Farm or home in the country 7. Refusal 8. Don't know 9. No answer	Modified in 4 dummies (0/1) 1. 1 2. 2 3. (3,4,5)	International Social Survey Programme: Environment I - ISSP Environment II – ISSP Environment III - ISSP Environment IV - ISSP	1993-2020