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Does income inequality change the relationship between environmental attitudes and subjective well-being? Evidence for 27 European countries

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Does income inequality change the relationship between environmental attitudes and subjective well-being? Evidence for 27 European countries

Abstract: This paper explores the effects of income inequality on the relationship between environmental attitudes and life satisfaction across 27 European countries. Furthermore, it assesses the influence of the European Union on their citizens' behavior regarding the link between environmental attitudes and happiness. Using data from European Values Study, it applies an ordered probit model. The findings suggest that subjective and objective income inequality do not change the relationship between environmental attitudes and welfare, providing evidence of the "commitment effect". The results also show similar performance of the relationship between environmental attitudes and well-being between EU-members and non-EU members.

1. Introduction

Over the last fifty years, Subjective Well-Being (SWB) has gathered a wide range of happiness' determinants (Dolan et al., 2008; Diener et al., 1999).[1] Regarding income inequality, there is evidence of a negative and significant effect on welfare in Europe (Alesina et al., 2004), whereas public policies to redistribute income appear to make the European citizens happier (Hadju and Hadju, 2014). From another perspective, Environmental Attitudes (EA) have taken up more space in the happiness agenda, due to the influence of climate changes. Generally, EA have a positive impact on SWB, showing that environmental awareness may increase the welfare level (Ferrer-i-Carbonell and Gowdy, 2007; Sekulova and van den Bergh, 2013). However, to the best of my knowledge, the relationship between income inequality, environmental attitudes, and welfare remains unexplored. Therefore, the present study aims to analyze how EA affect the individual happiness level in Europe, taking into account the income inequality effects.

The SWB is an umbrella term for the different valuations that people make regarding their lives, which include emotional responses, inner conditions, economic factors, and global judgments (Veenhoven, 1997; Diener, 2006). In other words, SWB represents how satisfied they are with their lives, acting as a good proxy to utility (Frey and Stutzer, 2002). The welfare literature has

[1] SWB is also measured or recognized as happiness, welfare, well-being, or life satisfaction (Frey and Stutzer, 2002).

evidence of a large number of SWB determinants, such as income, marital status, main activity, gender, education level, and so forth (Dolan et al., 2008).

Environmental attitudes encompass a set of intentions, concerns, and beliefs related to nature. In doing so, the concept of EA ends up representing a type of generic environmental awareness. The *Biophilia* hypothesis discusses this behavior as the natural connection between human beings and nature (Kellert, 2008; Wilson, 1984). Ferrer-i-Carbonell and Gowdy (2007) show that the concerns about the depletion of the ozone layer and animal extinction impact the happiness level in the United Kingdom.

There are different ways of understanding the relationship between income inequality and welfare (Verme, 2011). Using the approach of objective income inequality (e.g., the Gini Index), Alesina et al. (2004) identify a strong aversion in Europe towards inequality, while only a moderate level in the United States. On the other hand, the subjective view (e.g., the individual perception about income) considers that people may also value positively income inequality since it offers opportunities for social mobility (Reyes-García et al., 2019; Clark, 2003). This phenomenon is also known as the "tunnel effect" (Hirschman and Rothschild, 1973). Nevertheless, when the desired level of aspiration is not reached, individuals may become more depressed ("frustrated achievers", see Graham and Pettinato, 2002; Brockmann et al., 2009).

The European Union has established a relevant role as the promoter of climate change policy due to its historical tradition in implementing directed agreements and policies to reduce the effects of environmental degradation (Delbeke and Vis, 2015). The EU's success in strengthening the implementation of greenhouse gas mitigations targets around the negotiations on the 1997 Kyoto Protocol demonstrates its leadership within ambitious climate policies, as well as expresses the strong public support within EU households to make these policies more effective (Oberthür, 2017).

This paper addresses two research questions: 1) In Europe, do EA influence significantly SWB when controlling for objective and subjective income inequality? 2) In the case of member states of the European Union, do EA still influence the SWB when controlling for both types of income

inequality? The first research question aims to argue if despite the effects of income inequality on happiness (Wu and Li, 2017; Graham and Felton, 2006; Graham and Pettinato, 2002; Ferrer-i-Carbonell, 2005), the EA still significantly influence the individual welfare level, based on the assumption that the approximation with nature may generate psychological well-being (*biophilia* hypothesis, see Wilson, 1984; Kellert, 2008; Smyth et al., 2008). Therefore, this study assumes that the relationship between EA and welfare may be influenced by the correlation between EA and income inequality. This assumption considers that the relative deprivation theory (Walker et al., 2015) and the "tunnel effect" (Hirschman and Rothschild, 1973) may intervene on the consumer's willingness to maintain a greener behavior, for example, due to the extra financial cost of organic products (Joshi and Raham, 2015). Similar to the previous one, the second research question tests if the member states of the European Union maintain a statistically significant relationship between EA and SWB, even when controlling for both types of income inequality. Here, the assumption considers the capacity of the EU to influence the behavior of its citizens, since it has been able to keep a relevant role as the promoter of climate change policy. For answering these questions, this paper uses the ordered orobit model, based on the 5^{th} wave of the European Values Study.

More specifically, the purpose of this study is to explore whether income inequality (objective or subjectively) may generate any impact on citizens' view regarding environmental issues, by identifying the relationship between EA and well-being using a representative sample of adults in Europe. In addition, it tests if the fact that a country is part of the European Union may influence how income inequality affects the link between EA and SWB.

The main finding of this paper is that EA have a highly significant relationship with well-being when controlling for both types of income inequality (objective and subjective), suggesting that regardless of the impacts that the differences in income levels among European citizens can generate on their behavior, the connection with nature remains strong, which can be called as "commitment effect". Furthermore, even when considering income inequality effects, the results indicate that the EU tends to encourage more the idea of individual support in implementing climate change policy.

Overall, this study offers three main contributions. First, it adds to SWB literature, by showing evidence about a more varied set of EA able to act as determinants of welfare level. Second, the finding that households can provide direct financial support for climate change mitigation increases the chances to finance more specific environmental actions while making individuals happier. Third, in Europe, evidence on the "commitment effect" suggests advances in international cooperation on climate change, since, despite the effects of income inequality, the relationship between EA and SWB remains statistically significant.

The article is organized as follows. Section 2 presents a short literature review around the main topics. Next, Section 3 describes the dataset and variables applied in the study. Section 4 explains the econometric approach. Section 5 presents the results for both research questions. Lastly, Section 6 concludes.

2. Literature Review

2.1 - Subjective well-being

The broad concept of SWB includes assessments about stable traits of subjects, individual utility function, relative satisfaction, and cultural characteristics (Haller and Hadler, 2006), which makes it transcend the traditional view of economic prosperity (Diener et al., 1999). There are two distinct spheres of SWB: happiness and life satisfaction. The first represents an emotional or affective component, generally seen as an outcome of positive experiences, particularly close relationships, whereas the second entails a cognitive component, related to an evolution process including material, social aspirations, and achievements; which makes the concept of life satisfaction more conditioned by economic factors (Peiró, 2006; Haller and Hadler, 2006).

The SWB approach constitutes an effective tool for valuing environmental conditions, ranging from non-monetized health to aesthetic value, ecological footprints, consequences of correlated pollutants, and non-marginal effects regarding the impacts of climate change (Welsch and Kühling, 2009). Also, it is useful to assess the effects of attitudinal variables (Ferrer-i-Carbonell and Gowdy, 2007) and environmental awareness (Smyth et al., 2008) on welfare level.

Several studies have provided evidence about the determinants of happiness (Dolan et al., 2008). For instance, income level (Easterlin, 1974), gender (Alesina et al., 2004), employment status (Binder and Blankenberg, 2017), marital status (Helliwell, 2003), size of settlement (Ferreira et al., 2013), health (Cuñado and Gracia, 2013), unemployment (Di Tella et al., 2001; Winkelmann and Winkelmann, 1998), and age (Ferrer-i-Carbonell and Gowdy, 2007), among others.

2.2 - Environmental Attitudes

Over time, researchers have discussed the connection between the environment and human psychology (Ulrich, 1984; Krekel et al., 2016) as well as the effect of environmental awareness on individual well-being (Ferrer-i-Carbonell and Gowdy, 2007; Sekulova and van den Bergh, 2013; Smyth et al., 2008), which indicates that the debate around the *Biophilia* hypothesis (Wilson, 1984; Kellert, 2008) has been expanded to other spheres of social sciences.

The concept of environmental attitude is related to the idea of a type of generic environmental awareness, where the individuals can express, for example, their caring for nature and other species (Ferrer-i-Carbonell and Gowdy, 2007), the concern with air pollution and the perceived noise level (Rehdanz and Maddison, 2008), and the need to consume ecological products (Sekulova and van der Bergh, 2013). Equally, it may represent the concern to treat environmental protection as a social problem of major interest (Smyth et al., 2008).

Moreover, EA also depict the practice of social values related to the environment. Binder and Blankenberg (2016) find that egoistic and altruistic concerns have a significant distinct impact on well-being, the first being negative, while the second positive. Using the UK Household Longitudinal Study (UKHLS), Binder and Blankenberg (2017) assess the effects of a green lifestyle on welfare. They find that the link between those concepts is mostly due to self-image, and not due to concrete pro-environmental behavior. In other words, the self-assessment of what is the ecologically correct behavior plays a relevant role in the relationship between EA and well-being. In Spain, Guardiola et al. (2016) identify that when the individual is simultaneously concerned with the environment and volunteers, the influence of EA on life satisfaction is greater. Using a multi-country analysis, Welsch and Kühling (2018) show that if a society is more cohesive

about what is considered to be environmental awareness, sharing this value as a social norm enhances the benefits of a green self-image on well-being.

2.3 - Income Inequality – objective and subjective

The welfare literature has debated the relationship between happiness and income inequality by different views (Ngamaba et al., 2018). One relevant contribution is to show that an important part of the inequality problem is precisely how people see income inequality as well as how societal arrangements adjust personal judgments (Beja Jr., 2014). Therefore, income inequality studies demonstrate that either the objective inequality (Alesina et al., 2004; Hadju and Hadju, 2014; Wu and Li, 2017) or subjective inequality (Graham and Felton, 2006; Clark and Oswald, 1996; Ferrer-i-Carbonell, 2005) have a statically significant relationship with SWB.

The objective inequality follows the standard analysis of income distribution, where the Gini index serves as a proxy for testing its effects on SWB (Yu and Wang, 2017). Wu and Li (2017) examine the effect of local Gini coefficients on happiness within China and identify that, even for provincial indexes, income inequality reduces life satisfaction. Based on the dataset of the European Social Survey, Hadju and Hadju (2014) show that people in Europe are negatively affected by income inequality, whereas public policies devoted to promoting income equity increase the individual welfare level.

One possible mechanism to argue the impacts of objective income inequality on well-being is the relative deprivation theory (Verme, 2011). Walker et al. (2015) describe it as a sense of grievance about a perceived injustice, where anger and resentment at being involved in an unfair context lead to a posture of social protest. “Relative deprivation, then, refers to a situation in which people perceive themselves to be disadvantaged in relation to others.” (Brockmann et al., 2009, p.391). Consequently, it causes a depressing effect on individuals, reducing life satisfaction (Clark and Oswald, 1996; Graham and Felton, 2006). Moreover, assessing the relative deprivation of income in emerging economies, studies explain that greater objective gains are often associated with increased frustration rather than increased happiness (“frustrated achievers” phenomenon, see Graham and Pettinato, 2002; Brockmann et al., 2009).

The subjective inequality refers to the individuals' perception of how income can affect their well-being, through social comparison with a certain reference group (Ding et al., 2021; Clark, 2003; Stutzer, 2004; Ferrer-i-Carbonell, 2005), the effect of material norms on personal judgments (Easterlin, 1995), or by interacting with social institutions (Beja Jr., 2014).

To understand the impact of subjective income inequality on happiness, a useful tool is an assumption that countries with more unequal income offer the opportunity of social mobility, which is also known as the "tunnel effect" (Hirschman and Rothschild, 1973). According to these authors, people tend to watch others around them move up in the income scale, this, in turn, raises their expectations about their social mobility, making them happier as expectations about their future are improved. Similarly, Reyes-García et al. (2019) find correlations in macro-level analysis, suggesting that a higher degree of country-level income inequality is associated with a higher average happiness level. However, Rözer and Kraaykamp (2013) explain that the fact of people living in more unequal countries report significantly higher levels of happiness may be conditioned just by the sample selection[2].

2.4 - Green behavior

Green behavior seeks to minimize harm to the environment as much as possible, aiming to reach environmental sustainability via behavioral changes, and its main determinants are the perceived costs/benefits, the moral/normative concerns, the role of affection, contextual factors, and habits (Steg and Vlek, 2009). Recycling, electric cars, and ecological consumption are types of actions related to green behavior. However, a consumer's positive attitude towards green products does not always translate directly into action (Joshi and Rahman, 2015), suggesting the existence of a value-action gap (Binder and Blankenberg, 2017).

Among the motivations for the consumers to make non-green purchasing decisions, Gleim et al. (2013) argue that the perceived high price of green products is the highest barrier, accounting for almost half of the reasons for not buying eco-friendly products. Exploring the literature on green purchase behavior, Joshi and Rahman (2015) identify that the higher price of eco-friendly products

[2] Also following Berg and Veenhoven (2010).

outweighed ethical considerations and widened the value-action gap. Thus, price may negatively influence environmental attitudes.

2.5 – EU climate change policy

The European Union climate policy started as part of environmental policy in 1987, by the Single European Act. A common recognition was that the countries face similar environmental problems, and they are often transboundary (Delbeke and Vis, 2015). Thus, all the negative externalities coming from the degradation of nature as well as the threats from climate change may be treated as a public good. The EU's coherence and unity in international climate negotiations increased significantly during the 1990s, with public support within the EU to carry out its climate change policy (Oberthür, 2017).

More recently, a report shows that the majority of Europeans believe they can play a role in protecting the environment, take actions towards it, accept the idea to pay more for environmentally friendly products, and - considering the sense of cooperation - they think that decisions concerning the environment should be made not only at national level but jointly within the EU (European Commission, 2014).

3. Data

The main data source comes from the fifth wave of the European Values Study (EVS). EVS is a large-scale, cross-national, and longitudinal survey on how Europeans think about family, work, religion, politics, and society. The first wave started in 1981, the fifth was launched in 2017.[3] EVS promotes the debate around ideas, beliefs, preferences, attitudes, values, and opinions of citizens all over Europe. In 2017 the survey was conducted face-to-face, respondents (only 18-year old's or older) were randomly selected, based on a national effective sample size of 1,200 respondents per country.[4] EVS uses random samples able to offer full coverage of the target population. This

[3] The survey conducted interviews until early 2020.

[4] The amount of 1,200 is for countries with a population of over 2 million. Others with a population below 2 million use a sample of 1,000 respondents.

paper uses a final dataset of 45,075 observations from 27 European countries, with the full pack of adjustments and restrictions applied.[5]

Following the previous studies (Beja Jr., 2014; Hadju and Hadju, 2014), life satisfaction is the proxy for the analysis of SWB, which relies on a self-reported measure of well-being, by the single-item question: "All things considered, how satisfied are you with your life as a whole these days?" Participants answer from 1 for "dissatisfied" to 10 for "satisfied". The choice for life satisfaction as the dependent variable seeks better to represent the strong influence that objective-material conditions of life (including macrosocial structures and institutions) have on SWB (Haller and Hadler, 2006; Schneider, 2016). Iceland (8.07) has the highest life satisfaction level in Europe, whereas the lowest is in Bulgaria (6.35). Following the previous studies (Ferreira et al., 2013), the Nordic countries are among the top three (8.04 in Norway and 8.01 in Denmark), and the Eastern countries are among the bottom three (6.36 in Russia and 6.54 in Lithuania). On the whole, European citizens report a high level of life satisfaction (7.49 on average). The descriptions of all variables used in this paper are in Table 1, while Table 2 contains their descriptive statistics.

The explanatory variables at the individual level include socio-economic and demographic characteristics (such as age, gender, net income, marital status, employment status, health, and the size of the town), and the selection seeks for those with evidence of impact on welfare (Dolan et al., 2008; Ferrer-i-Carbonell and Gowdy, 2007; Diener et al., 1999). Also, this paper applies a dummy variable for indicating whether the country is a state-member of the European Union (or not), aiming to highlight the influence of the EU Parliament on citizens' welfare.

The fifth wave of EVS has a topic encompassing a group of five questions related to the attitudes towards the environment, part of them provide a subtle reflection about the debate involving income, caring for nature, and social values (such as altruism and cooperation). These are used as a proxy to environmental attitudes.

[5] The countries present in the sample are Austria, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Iceland, Italy, Lithuania, Montenegro, Netherlands, North Macedonia, Norway, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, and Switzerland.

Table 1 – Description of variables

Variable name	Source	Description
Life satisfaction	EVS	"All things considered, how satisfied are you with your life as a whole these days?": 1 (dissatisfied) - 10 (satisfied).
Socio-economic and demographic variables		
Income	EVS	Net household income from all sources (after taxes and other deductions). Ten deciles, being 1 (lower income) and 10 (high income)
Gender	EVS	Dummy: 1= Female
Age	EVS	Age in years
Marital status	EVS	06 categories: married, registered partnership, widowed, divorced, separated, and none of these (reference).
Employment status	EVS	10 categories: paid employment 30 hours a week or more, paid employment less than 30 hours a week, self-employed, military service, retired/pensioned, homemaker, student, unemployed, disabled, and others (reference).
Health (self-reported)	EVS	05 categories: very good, good (reference), fair, poor or very poor.
Size of town	EVS	05 categories: under 5,000 (reference); from 5,001 to 20,000; from 20,001 to 100,000; from 100,001 to 500,000; more than 500,001 inhabitants.
European Union member state	EU	Dummy: 1= if it is a member state of the EU
Environmental attitudes		
Direct support	EVS	"I would give part of my income if I were certain that the money would be used to prevent environmental pollution": 1 (agree strongly) and 5 (disagree strongly).
Difficult to do much alone	EVS	"It is just too difficult for someone like me to do much about the environment": 1 (agree strongly) and 5 (disagree strongly).
Low importance	EVS	"There are more important things to do in life than protect the environment": 1 (agree strongly) and 5 (disagree strongly).
Conditional support	EVS	"There is no point in doing what I can for the environment unless others do the same": 1 (agree strongly) and 5 (disagree strongly).
Exaggerated environmental threats	EVS	"Many of the claims about environmental threats are exaggerated": 1 (agree strongly) and 5 (disagree strongly).
Objective income inequality	WIID	Gini coefficient at country-level, by the method of equivalized net income per capita.
Subjective income inequality		
Social mobility	EVS	"How would you place your views on this scale?": 1 (incomes should be made more equal) and 10 (there should be greater incentives for individual effort).
Society's provisions	EVS	"What should a society provide?" Topic: "Eliminating big inequalities in income between citizens.": 1 (very important) and 4 (not at all important).
Essential characteristic of democracy	EVS	"Please tell me for each of the following things how essential you think it is as a characteristic of democracy." Topic: "The state makes people's incomes equal": 1 (not at all an essential characteristic of democracy) and 10 (an essential characteristic of democracy). There is also option 0 (It is against democracy).

Objective income inequality is operationalized by the Gini index at the country level. It was taken from World Income Inequality Database (WIID), provided by UNU-WIDER (2021), depending on availability by country, and preferably using the method of equivalized net income per capita

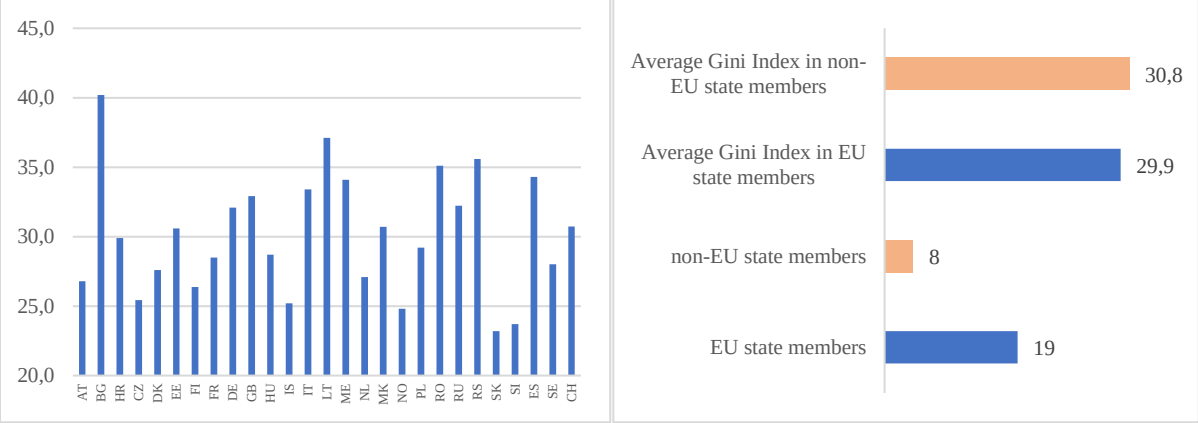
of the year in which EVS took place in the particular country.[6] Here, the aim is to capture the behavior of each respondent according to the level of income inequality in the same time dimension. This type of inequality measure is a popular indicator used by most researchers to discuss the inequality-welfare relationship (Schneider, 2016; Ngamaba et al., 2018). According to Figure 1-a, the Gini index achieves the highest value in Bulgaria (40.2 points), and the lowest in Slovakia (23.2 points). Also, following Figure 1-b, the average Gini index in the EU is slightly lower than the average in non-EU member states (the difference amounts to 0.9 points).

Table 2 – Descriptive statistics of variables used

Variable	Obs.	Mean	Std.Dev.	Min	Max
Satisfaction (scale 1 -10)	45,075	7.49	2.05	1	10
Socio-economic and demographic variables					
Income (scale 1 - 10)	45,075	4.27	3.55	1	10
Gender (female in %)	45,075	55.0	50.0	0	1
Age (years)	45,075	50.00	18.16	18	82
Marital status (married in %)	45,075	50.0	50.0	0	1
Employment status (%)					
Paid work more than 30 hours	45,075	43.0	50.0	0	1
Retired	45,075	27.0	45.0	0	1
Health (self-reported in %)					
Very good	45,075	23.0	42.0	0	1
Fair	45,075	26.0	44.0	0	1
Size of town (%)					
From 5,000 to 20,000	45,075	20.0	40.0	0	1
From 20,001 to 100,000	45,075	20.0	40.0	0	1
From 100,001 to 500,000	45,075	15.0	36.0	0	1
European Union member state (%)	45,075	71.0	46.0	0	1
Environmental attitudes (scale 1 - 5)					
Direct support	45,075	2.59	1.33	1	5
Dificult to do much alone	45,075	3.18	1.33	1	5
Low importance	45,075	3.19	1.28	1	5
Conditional support	45,075	3.32	1.37	1	5
Exaggerated environmental threats	45,075	3.26	1.46	1	5
Objective income inequality (absolute value)	45,075	30.13	4.01	23.20	40.20
Subjective income inequality					
Social mobility (scale 1 -10)	45,075	5.39	2.94	1	10
Society's provisions (scale 1 -4)	45,075	1.79	1.08	1	4
Essential characteristic of democracy (scale 0 -10)	45,075	4.68	4.07	0	10

[6] The 5th wave of EVS was done between 2017 and 2020. Thus, this study applies one restriction to the Gini dataset. If this requirement is not met, the country was excluded from the dataset.

Regarding subjective income inequality, this paper uses three questions taken from EVS 2017, all of them related to a dilemma involving income distribution and social values (for a similar approach, see Beja Jr., 2014). The first represents a feeling of social mobility ("tunnel effect", see Hirschman and Rothschild, 1973), whereby the respondent may express his or her preference about the duality between equality income and more rewards to the personal effort. The second promotes a reflection about what society must provide in terms of eliminating the big income inequalities among citizens (Fehr and Schmidt, 1999). The last question deals with the essential characteristic of democracy, having the government the responsibility to create public policies that are able to reduce income inequality (Hadju and Hadju, 2014).



(a) Gini index by country (b) Average Gini Index per group

Figure 1 – Gini Index
Source: WIID.

4. Estimation strategy

Following the estimation strategies employed elsewhere (Smyth et al., 2008; Brereton et al., 2008; Ambrey et al., 2014), the ordered probit model is estimated, since this approach respects the ordinal nature of the dependent variable.[7] Equation (1) expresses the personal SWB, which is a latent variable, thus, not observed. Therefore, what is observed is the SWB level, which is an ordered variable and has a relationship with the latent subjective well-being given by Equation (3). According to Maddala (1983), the $SWB_{i,k}^{*}$ associates and orders the levels of well-being, from 1 for "dissatisfied" to 10 for "satisfied". The unobserved latent SWB variable is:

[7] According to Ferrer-i-Carbonell and Frijters (2004), OLS also reaches similar results.

$$SWB^{*}_{i,k} = \alpha + \varphi \ln(\boldsymbol{Y}_{i,k}) + \beta \boldsymbol{D}_{i,k} + \mu \boldsymbol{EU}_{k} + \xi \boldsymbol{EA}_{i,k} + \varpi \boldsymbol{OBJ}_{k} + \phi \boldsymbol{SUB}_{i,k} + \boldsymbol{\varepsilon}_{i,k} \quad (1)$$

Where the $SWB^{*}_{i,k}$ is the subjective well-being of individual i, which is measured by the life satisfaction level, in country k; $\ln(\boldsymbol{Y}_{i,k})$ is the natural log of the net household income; $\boldsymbol{D}_{i,k}$ stands for a vector of demographic and socio-economic variables (age, gender, health, employment status, and so forth); $\boldsymbol{EU}_{k}$ is a dummy variable, which indicates whether the country is a state member of the European Union (or not); $\boldsymbol{EA}_{i,k}$ represents a vector of five different expressions of environmental attitudes; $\boldsymbol{OBJ}_{k}$ stands for objective inequality, operationalized by the Gini index per country; $\boldsymbol{SUB}_{i,k}$ represents a vector for subjective inequality; and $\boldsymbol{\varepsilon}_{i,k}$ is the usual error term. Equation (1) is the base for estimation of three different specifications.[8] For answering the first research question, this study uses the dataset of the fifth EVS, encompassing 27 countries. For the second one, the estimation divides the aforementioned dataset into two sub-samples, one for EU member states (19 countries) and the other for non-EU member states (8 countries), having each sub-sample one single estimation.

In this paper, where $SWB \in J = \{1,2, \dots ,10\}$, the unknown parameters α_m with $m = 1,2, \dots ,9$ are considered such that:

$$\alpha_1 < \alpha_2 , \dots , < \alpha_9 \quad (2)$$

While the ordinal dependent variable satisfies:

$$SWB = \begin{cases} 1, if\ SWB^{*} \leq \alpha_1 \\ 2, if\ \alpha_1 < SWB^{*} \leq \alpha_2 \\ \dots \\ 9, if\ \alpha_8 < SWB^{*} \leq \alpha_9 \\ 10, if\ SWB^{*} > \alpha_9 \end{cases} \quad (3)$$

The unknown parameters α_m and the remaining parameters ($\varphi, \beta, \mu, \xi, \varpi, \phi$) are estimated by the Maximum Likelihood Method (Maddala, 1983).

[8] Overall, three different specifications for the 1st research question and two for the second one were estimated. However, the dummy variable ($\boldsymbol{EU}_{k}$) was excluded in the two specifications related to the 2nd research question, since it was used two sub-samples, one in each estimation.

Table 3 – Life satisfaction, environmental attitudes and income inequality in Europe

	Standard		**+ Objective inequality**		**+ Subjective inequality**	
	Model 1		**Model 2**		**Model 3**	
	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Socio-economic and demographic variables						
Ln (Income)	0.019***	(0.002)	0.018***	(0.002)	0.017***	(0.002)
Gender	0.057***	(0.010)	0.056***	(0.010)	0.060***	(0.010)
Age	-0.017***	(0.002)	-0.016***	(0.002)	-0.016***	(0.002)
Age^2	2.24e-04***	(0.000)	2.13e-04***	(0.000)	2.11e-04***	(0.000)
Marital status						
Married	0.189***	(0.014)	0.203***	(0.014)	0.197***	(0.014)
Partnership	0.187***	(0.030)	0.154***	(0.030)	0.154***	(0.030)
Widowed	-0.158***	(0.023)	-0.129***	(0.023)	-0.131***	(0.023)
Divorced	-0.054***	(0.020)	-0.053***	(0.020)	-0.057***	(0.020)
Separated	-0.177***	(0.041)	-0.164***	(0.041)	-0.160***	(0.041)
Employment status						
Paid work more than 30 hours	0.024	(0.041)	0.043	(0.041)	0.038	(0.041)
Paid work less than 30 hours	0.086*	(0.044)	0.104**	(0.044)	0.106**	(0.045)
Self-employed	0.089**	(0.045)	0.120***	(0.045)	0.111**	(0.045)
Military	-0.001	(0.207)	0.048	(0.207)	0.042	(0.207)
Retired	0.119***	(0.042)	0.141***	(0.042)	0.137***	(0.042)
Homemaker	0.011	(0.047)	0.065	(0.047)	0.063	(0.047)
Student	0.047	(0.046)	0.073	(0.046)	0.067	(0.046)
Unemployed	-0.193***	(0.045)	-0.145***	(0.045)	-0.141***	(0.045)
Disabled	0.047	(0.054)	0.025	(0.054)	0.026	(0.054)
Health (self-reported)						
Very good	0.507***	(0.013)	0.499***	(0.013)	0.499***	(0.013)
Fair	-0.450***	(0.013)	-0.445***	(0.013)	-0.443***	(0.013)
Poor	-0.981***	(0.021)	-0.979***	(0.021)	-0.972***	(0.021)
Very poor	-1.367***	(0.042)	-1.364***	(0.042)	-1.360***	(0.042)
Size of town						
From 5.000 to 20.000	-0.005	(0.014)	0.031**	(0.014)	0.035**	(0.014)
From 20.001 to 100.000	-0.047***	(0.014)	-0.021	(0.014)	-0.022	(0.014)
From 100.001 to 500.000	-0.085***	(0.015)	-0.049***	(0.015)	-0.048***	(0.015)
Above 500.000	-0.185***	(0.018)	-0.138***	(0.018)	-0.143***	(0.018)
European Union member state	0.005	(0.011)	-0.023**	(0.011)	-0.030***	(0.011)
Environmental attitudes						
Direct support	-0.036***	(0.004)	-0.039***	(0.004)	-0.039***	(0.004)
Difficult to do much alone	0.054***	(0.005)	0.051***	(0.005)	0.049***	(0.005)
Low importance	0.009*	(0.005)	0.011**	(0.005)	0.011**	(0.005)
Conditioned support	0.021***	(0.005)	0.013***	(0.005)	0.012***	(0.005)
Exaggerated environmental threats	0.004	(0.004)	8.95e-04	(0.004)	0.003	(0.004)
Objective income inequality			-0.0267***	(0.001)	-0.027***	(0.001)
Subjective income inequality						
Social mobility					0.021***	(0.002)
Society's provisions					-0.002	(0.005)
Essential characteristic of democracy					-2.10e-04	(0.001)
Log likelihood	-84,250		-84,031		-83,952	
Pseudo R^2	0.053		0.0555		0.0563	
n	45,075		45,075		45,075	

Note: Standard errors in parentheses. Significance: *** p < 0.01; **p < 0.05; *p < 0.1. The intercepts are not shown.

5. Outcomes

For answering the first research question, three different specifications of the model presented in Equation (1) were estimated. The first one is the simplest version (Model 1), which represents the standard SWB regression with information at the individual level, plus the environmental attitudes' variables. In what socio-economic and demographic variables are concerned, the results shown in Table 3 are consistent with previous findings (Diener et al., 1999; Dolan et al., 2008). Higher income levels and being a female have a positive and significant impact on life satisfaction at the 1% level (Alesina et al., 2004; Wu and Li, 2017; Ferrer-i-Carbonell, 2005). As usual, age has a U-shaped effect on welfare (Ferrer-i-Carbonell and Gowdy, 2007).

Respondents who are married or in a registered partnership report to be more satisfied with life, whereas widowed, divorced, and separated are less pleased (Ferreira et al., 2013; Welsch and Kühling, 2018). Regarding the employment status, workers in a paid job with less than 30 hours, self-employed, and retired are happier than unemployed ones (Binder and Blankenberg, 2017; Ferrer-i-Carbonell and Gowdy, 2007; Di Tella et al., 2001). Only people who feel they have very good health report to be more satisfied with life, whereas others that report having a fair, poor, or very poor health status are less happy (Cuñado and Gracia, 2013). Similar to Ferreira et al. (2013), the individual welfare level tends to decrease as the size of the dwelling area of the subjects increases, suggesting that living in less populated areas increases life satisfaction.

In Model 1, the coefficient on the dummy variable indicating whether the country is an EU state member (or not) has no statistical significance. However, it reaches 5% significance level in Model 2, and 1% level in Model 3, indicating that, as the EU citizens take into account the harmful effects of income inequality (objective and subjective) on SWB, they become less satisfied with their lives. Alesina et al. (2004) find similar results when they discuss the effects of income inequalities among Europeans and U.S. citizens, showing a strong aversion to unequal distribution of income in Europe.

Most EA coefficients have a statistically significant relationship with life satisfaction, indicating a strong connection with nature (Wilson, 1984; Kellert, 2008). The first one refers a possible (financial) direct support, whereby the individual may fund an environmental policy, by giving

part of her/his own income; but it is conditioned to be sure that this funding will be applied to prevent environmental pollution. So, the coefficient on "direct support" has a negative and significant relation with welfare, suggesting that agreeing to donate part of personal income to specific environmental public policies makes individuals happier, as they are concerned about the harmful effects of environmental degradation. Ferrer-i-Carbonell and Gowdy (2007) have a similar result regarding the depletion of the ozone layer and animal extinction, even though without mentioning any kind of financial support coming from the participants. The second type of environmental attitude ("difficult to do much alone") expresses the feeling of altruism, as it shows that all individual and voluntary support, even if small, is relevant to combat the effects of climate change. Here, personal and simple voluntary acts in defense of environmental sustainability make the European citizen happier. Binder and Blankenberg (2016) also find a positive and significant impact of altruistic concerns on well-being, by using a longitudinal data set from the German Socio-Economic Panel (SOEP).

Third, the coefficient on "low importance" represents the level of importance that respondents assume regarding environmental protection. Again, this EA has a positive impact on life satisfaction, suggesting that the environmental issues have priority on their to-do list, which reinforces the relevance of everyone doing something to reduce the effects of climate change. Assessing the relationship between the environment and well-being in urban China, Smyth et al. (2008) identify that most individuals have observed a good or significant improvement (i.e., an increase in the level of relevance) in environmental consciousness in their neighborhood and, that it makes them happier.

Lastly, the coefficient on "conditioned support" also has a positive and significant impact on SWB. This finding reinforces the idea that the individual actions of all citizens contribute positively to the environment, regardless of whether others are doing something or not. In other words, it excludes any behavior conditioned by what others are doing. Therefore, being proactive and acting cooperatively in the fight against climate change increases satisfaction with life. In Spain, Guardiola et al. (2016) test the effect of being simultaneously concerned with environmental issues and volunteer in organizations defending the environment on SWB. The authors find that this variable has a positive influence on well-being, suggesting that this behavior may express the

incorporation of intrinsic characteristics of respondents. Otherwise, this finding implicitly indicates the practice of social values, such as cooperation.

In Model 2, the Gini index is added to serve as a proxy to objective income inequality. Following the previous studies (Ding et al., 2021; Hadju and Hadju, 2014; Wu and Li, 2017; Rözer and Kraaykamp, 2013), this coefficient has a negative and significant impact on well-being at the 1% level. One possible reason for this result is the relative deprivation theory (Verme, 2011; Walker et al., 2015), whereby respondents see income inequality as a perceived injustice, generating reactions such as anger and resentment. Moreover, when subjects feel that they are at disadvantage with respect to others, this may depress them (Brockmann et al., 2009), and reduce their happiness level (Clark and Oswald, 1996; Graham and Felton, 2006). In Europe, this result follows the evidence found by Alesina et al. (2004). Regarding the effect of objective income inequality on the relationship between EA and life satisfaction, there is only one change, an increase in the level of statistical significance in the coefficient on “low importance” from 10% to 5%, suggesting that when the Gini index is added to the regression, the relationship between the level of importance that respondents assume regarding the environmental protection and SWB becomes stronger.

After adding subjective income inequality in Model 3, most coefficients remain constant. Among the three proxy variables to measure subjective income inequality, only the coefficient on “social mobility” is statistically significant, having a positive relationship with well-being. This result may indicate that respondents have a preference for higher incentives, as, individually, they work harder. Since the question asks the subjects to place their view on a scale between "incomes should be made more equal" or "there should be greater incentives for individual effort", implicitly, this finding shows that greater incentives may be equivalent to greater financial returns, which, over time, is supposed to lead them to a higher income class. Otherwise, their behavior expresses a sense of social mobility (the “tunnel effect”, see Hirschman and Rothschild, 1973), which makes them happier. Using a dataset from the British Household Panel Survey (from 1991 to 2002), Clark (2003) finds a positive link between regional income inequality and life satisfaction, highlighting that, at least part of those respondents is inequality-loving rather than inequality-averse, which means that higher income inequality works as a signal of opportunity for the first ones. Likewise,

Graham and Felton (2006) show that income inequality seems to be a signal of constant advantage for the wealthy people in Latin America.

Table 4 – Life satisfaction, EA and income inequality in EU members and non-EU members

	EU members		**Non-EU members**	
	Model 1		**Model 2**	
	Coef.	Std. Error	Coef.	Std. Error
Socio-economic and demographic variables				
Ln (Income)	0.015***	(0.002)	0.025***	(0.003)
Gender	0.057***	(0.012)	0.067***	(0.019)
Age	-0.014***	(0.002)	-0.021***	(0.003)
Age^2	1.72e-04***	(2.06e-05)	3.01e-04***	(3.28e-05)
Marital status				
Married	0.209***	(0.017)	0.178***	(0.026)
Partnership	0.156***	(0.035)	0.134**	(0.056)
Widowed	-0.126***	(0.027)	-0.121***	(0.045)
Divorced	-0.072***	(0.024)	-0.012	(0.037)
Separated	-0.198***	(0.049)	-0.080	(0.078)
Employment status				
Paid work more than 30 hours	0.043	(0.048)	0.049	(0.077)
Paid work less than 30 hours	0.101*	(0.053)	0.125	(0.083)
Self-employed	0.117**	(0.054)	0.108	(0.085)
Military	0.018	(0.255)	0.040	(0.356)
Retired	0.169***	(0.050)	0.107	(0.081)
Homemaker	0.090	(0.055)	0.044	(0.088)
Student	0.066	(0.055)	0.081	(0.086)
Unemployed	-0.175***	(0.053)	-0.048	(0.083)
Disabled	-0.006	(0.065)	0.083	(0.098)
Health				
Very good	0.488***	(0.016)	0.507***	(0.023)
Fair	-0.435***	(0.015)	-0.450***	(0.024)
Poor	-0.973***	(0.024)	-0.956***	(0.042)
Very poor	-1.406***	(0.048)	-1.224***	(0.089)
Size of town (in number of inhabitants)				
From 5.000 to 20.000	0.059***	(0.017)	0.014	(0.026)
From 20.001 to 100.000	0.013	(0.017)	-0.067***	(0.025)
From 100.001 to 500.000	-0.001	(0.019)	-0.115***	(0.026)
Above 500.000	-0.078***	(0.021)	-0.332***	(0.041)
Environmental attitudes				
Direct support	-0.038***	(0.004)	-0.039***	(0.007)
Difficult to do much alone	0.046***	(0.005)	0.054***	(0.009)
Low importance	0.007	(0.006)	0.017*	(0.009)
Conditioned support	0.013**	(0.006)	0.012	(0.009)
Exaggerated environmental threats	0.001	(0.005)	0.005	(0.008)
Objective income inequality	-0.028***	(0.001)	-0.028***	(0.003)
Subjective income inequality				
Social mobility	0.026***	(0.002)	0.011***	(0.003)
Society´s provisions	-0.007	(0.005)	0.017	(0.011)
Essential characteristics of democracy	-0.004***	(0.001)	0.012***	(0.003)
Log likelihood	-59,329		-24,526	
Pseudo R2	0.0561		0.0595	
n	31,923		13,152	

Note: Standard errors in parentheses. Significance: *** p < 0.01; **p < 0.05; *p < 0.1. The intercepts are not shown.

In sum, EA affect SWB significantly when controlling for objective and subjective income inequality across European countries. This finding suggests that even when the effect of relative deprivation theory (Walker, 2015), as well as the influence of social mobility (Hirschman and Rothschild, 1973), are considered on individuals' behavior, they maintain a persistent urge to connect to nature, demonstrating constant attention for environmental protection (*biophilia* hypothesis, see Wilson, 1984; Kellert, 2008; Smyth et al., 2008; Sekulova and van der Bergh, 2013). For instance, this result indicates that even if the price is the highest barrier to purchase green products (Gleim et al., 2013; Joshi and Raham, 2015), the consumers tend to keep their willingness to choose a green behavior, either because individuals feel at a disadvantage compared to others (and therefore cannot afford a slightly higher price for an ecological product compared to traditional ones) or because they need to focus on their personal efforts, save more money and thus achieve a wealthier social class. Therefore, after including both objective and subjective income inequality measures, the fact that the sign and the significance levels of EA' coefficients are maintained, hints those European consumers have a strong caring for nature, which may be named "commitment effect". In other words, "commitment" expresses the dedication, effort and, and willingness to contribute to environmental preservation, even when the unequal distribution of income in a country may generate a series of stimuli against green behavior, as mentioned above (but not only).

Turning to the second research question, the sample was divided into two sub-samples. One including the nations that are part of the European Union and the other with the remaining countries. One estimation was made for each sub-sample. In comparison to the coefficients for the whole of Europe, Table 4 shows similar results concerning the socio-economic and demographic variables, except for the coefficient on the size of the town, whose results in both specifications partially change.

Regarding EA, the results between the two sub-samples are equal for the coefficients on "direct support", "difficult to do much alone", and "exaggerated environmental threats". The variable "low importance" shows a striking result, once it has a positive and statistically significant relationship with well-being at the 10% level for the non-EU member states, whereas for the EU members has no significance. Curiously, this finding suggests that there is a correlation between

the level of importance regarding environmental protection and SWB only for non-EU members. One possible reason for this result may be related to a simple question of sample composition. On the other hand, the coefficient on "conditional support" is statistically significant at the 5% level for EU members, whereas it has no significance for the non-EU countries. This finding suggests that the EU citizens are happier for acting cooperatively since the individual behavior regarding environmental protection is not conditioned by what others are doing (Guardiola et al., 2016).

Among the variables related to income inequality, the objective view shows the same results for both sub-samples. Regarding the subjective view, in comparison to Table 3, Table 4 contains only one different result. The coefficient on "essential characteristics of democracy" is statistically significant at the 1% level in both estimations, but it has opposite signs, being negative for the EU members and positive for the other group. This result may express the existence of divergences around the European citizens' opinion on the role of the democratic system of government on income inequality, which generates distinct impacts on the SWB.

Thus, Table 4 shows that the member states of the European Union maintain a statistically significant relationship between environmental attitudes and SWB for three out of five EA's coefficients, even when controlling for both types of income inequality. Non-EU members' countries have a similar performance. Thus, this result provides evidence for EU's influence on the citizens' behavior, reaffirming its role as the promoter of climate change policy (Oberthür, 2017).

6. Concluding remarks

The debate around the effects of environmental attitudes on well-being has received an increasing interest in welfare literature over the last decades (Ferrer-i-Carbonell and Gowdy, 2007; Sekulova and van der Bergh, 2013; Smyth et al., 2008), frequently also considering the effects of green self-image (Binder and Blankenberg, 2017) and social values (Guardiola et al., 2016; Welsch and Kühling, 2018). Similarly, the analysis of the impacts of income inequality on well-being have been expanded, including assessments by the lens of objective view (Hadju and Hadju, 2014; Yu and Wang, 2017; Wu and Li, 2017), as well as the subjective one (Ding et al., 2021; Clark, 2003; Beja Jr., 2014). This paper thereby adds to the current happiness literature, by assessing the effects

of objective and subjective income inequality on the relationship between EA and life satisfaction level in Europe.

The identification of the "commitment effect" represents a great contribution, since it demonstrates the possibility of maintaining a strong link between EA and well-being in Europe, even when controlling for both types of income inequality (objective and subjective). Previous studies have shown that income inequality may unleash a series of unwanted effects on citizens' behavior (such as depression, anger, ambition, and so forth; see Walker, 2015; Graham and Pettinato, 2002). In this sense, the present study becomes relevant as it provides evidence that the aforementioned effects do not seem to affect the consumers' willingness to adopt environmental attitudes that will lead them to green behavior.

Additionally, given that public policies are strongly dependent on individual support, this research increases its relevance, since it uses a dataset at the individual level of 27 European countries, divided into two sub-samples, EU and non-EU members. For instance, as respondents donate part of their income to a well-structured environmental policy aimed at preventing pollution (provided it is done transparently and consistently), they feel more satisfied with life. Donations may therefore represent an alternative for raising funds for these measures, which consequently would also help to implement more public policies aimed at combating the effects of environmental degradation across Europe.

Regarding social values, the fact that both types of income inequalities coexist with the practice of altruistic and cooperative environmental behavior also gives us some relief in terms of the evolution of public policies devoted to environmental preservation as well as those for combating income inequality. In other words, the result of this study shows that environmental policies can be successful (due to the strong relationship between EA and SWB), even if some countries have difficulties in reducing income inequality.

Following the evidence provided by Oberthür (2017), the results show the influence of the European Union on the behavior of their citizens towards inspiring the acceptance of environmental attitudes, which may lead to promote the increase of individual support in

implementing climate change policy. However, the estimation for the non-EU members' countries also demonstrates a similar pattern.

The present research may be expanded in several ways. First, the application of a survey that allows exploring more deeply the relationship between the willingness (or unwillingness) of individuals to adopt environmental attitudes in their daily life, having as a direct function the restrictions (or opportunities) created by the unequal distribution of income. Second, applying the same survey applied in both sides of the Atlantic Sea, would allow to test if income inequality has distinct effects on the relation between EA and SWB in Europe and in the United States. Third, another interesting way to improve these results will be to collect answers in rural and urban areas, since the former may have a different view regarding EA due to the proximity to natural resources.

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