Uncovering The Relationship Between Redistribution Preferences and Environmentally Related Taxation

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UNCOVERING THE RELATIONSHIP BETWEEN REDISTRIBUTION PREFERENCES AND ENVIRONMENTALLY RELATED TAXATION

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ABSTRACT

The possible negative effects of environmentally related taxation on lower income households makes environmentally related taxation a double-edged sword that on the one hand reduces negative environmental externalities, yet on the other hand can very easily increase inequality if not implemented and designed correctly. More egalitarian individuals who favour equality for all are generally more in favour of environmentally related policies, as opposed to individuals holding more individualistic worldviews who do not want their individual freedoms impeded upon. Will more egalitarian individuals also be more in favour of environmentally related *taxation* as compared to general environmental policies? The results show that more egalitarian individuals are less supportive of environmentally related taxation, while higher environmental attitudes and higher trust in government make individuals more supportive of environmentally related taxation. This shows how important the design of policies is in gathering support. The earmarking of future revenues, clear communication, and transparency can contribute to gather this support for environmentally related taxation.

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INTRODUCTION

Adapting towards and mitigating climate change is one of the biggest social questions we currently have to deal with. Reducing emissions on local, national, and international levels is crucial in order to reach the 1.5°C goals set in the 2015 Paris Agreement (IPCCC, 2018). People and companies need to change their behaviour, politicians and civil servants need to come up with sound and effective policy, and international cooperation is needed to tackle this issue. The implementation of effective, science-based environmental and climate policy is one of the many puzzle pieces to be solved. Knowing the makeup of individual attitudes towards environmentally related taxation can help policymakers, politicians, and researchers in devising policy and choosing the right instruments and the way to communicate about their decisions. The regulation of negative environmental externalities, however, is an extremely complex undertaking. Air and soil pollution, the loss of biodiversity, and the emissions of greenhouse gasses are caused through widely varying manners, yet all contribute to climate change (IPCCC, 2018). Most economists see taxation as one of the most cost-effective and -efficient instruments available (Barde & Godard, 2012; Braathen, 2012; Criqui et al., 2019; Milne & Andersen, 2012; Sairinen, 2012; Tol, 2018). In economic theory, Pigou (1920) was the first to propose making use of negative environmental externalities as a tax base. This simple Pigouvian tax is argued to correct a negative externality most efficiently (Carattini et al., 2018; Goulder & Parry, 2008; Pizer & Sexton, 2019). By imposing a tax on the production of negative environmental externalities, the marginal production cost of the good or service is made equal to the actual social cost of the production (Goulder & Parry, 2008). In other words, the externality caused by environmentally harmful behaviour is internalised. Through this mechanism, the market-based mechanism of a tax is a first best and least-cost option in controlling negative environmental externalities.

Some countries have managed to successfully implement environmentally related taxes over the years. Finland was the first with a CO_2 tax on fossil fuels in 1990 with more following over the course of the ‘90s, consisting mostly of Northern European countries such as Sweden, Denmark, and the Netherlands (Sairinen, 2012). Yet, in

general, environmental related taxes are some of the least used environmental policy instruments in the world (Bovenberg & Goulder, 2002; Carattini et al., 2018; Kallbekken & Sælen, 2011). The main trend remains, in which public, corporate, and political opposition and unwillingness significantly complicated the implementation of environmentally related taxation (Braathen, 2012; Carattini et al., 2017; Criqui et al., 2019; Jaccard, 2012). One explanation for this is the unpopularity of taxation among the public as it is often believed that taxation will place a greater burden on the poor over the rich (Harring & Jagers, 2013; Pizer & Sexton, 2019). These kinds of concerns over the possible regressive nature of environmentally related taxation are indicative of the preferences for redistribution individuals have. Additionally, the possibility of manoeuvring for politics and government in designing environmental policy and especially environmentally related taxation is further narrowed by the influence of corporate interest groups and lobbyists (Braathen, 2012; Criqui et al., 2019; Dijkstra, 1999; Klenert et al., 2018; Oates & Portney, 2001). Instrument choice and implementation thus remains a political endeavour no matter the policy field, requiring public support (Amdur et al., 2014; Harring & Jagers, 2013; Heres et al., 2013).

An environmentally related tax has a high chance of being regressive when low- and high-income households pay the same rate, or when the tax is focused on a product more often bought by low-income households, and consequently will receive more opposition (Barde, 1999; Kosonen, 2012; Maestre-Andrés et al., 2019). Distributional effects and concerns such as fairness in terms of burdens on households and purchasing power effects play a in the support for environmentally related taxation (Maestre-Andrés et al., 2019). Many studies have found that due to low-income households spending a larger portion of their income on pollution-intensive goods (e.g., electricity, fuel, etc.) compared to higher income households and as such these households are at a larger disadvantage from the implementation of environmentally related taxation (Klenert et al., 2016). As such, environmentally related taxation is a double-edged sword that on the one hand reduces negative environmental externalities and increases welfare, yet on the other hand can very easily increase inequality if not implemented and designed correctly (Klenert et al., 2016). An interesting dimension related to this double-edged nature of environmentally related taxation is individuals' redistribution preferences. Egalitarian individuals who favour

equality are generally more in favour of environmental policies (Leiserowitz, 2006; Smith & Leiserowitz, 2013), yet due to the possible regressive effects of environmentally related taxation this support for environmental policies might disappear in the context of environmentally related taxation. The research puzzle that this paper thus tries to grapple with is whether more egalitarian individuals will also be more in favour of environmentally related *taxation* as compared to general environmental policies. More egalitarian individuals would in principle oppose environmentally related taxation due to its inherent regressiveness as an instrument in this policy area.

On the basis of this, the main research question guiding this paper is as follows: *What is the relationship between redistribution preferences and support for environmentally related taxation?* With this research question the aim is to analyse the effect of redistribution preferences on individuals' support for environmentally related taxation. In addition, a secondary sub-question has been formulated: *Are more egalitarian individuals from developed countries less supportive of environmentally related taxation?* With this sub-question the aim is to extend and strengthen the research and gather more insights into the dynamics of the relationship between redistribution preferences and support for environmentally related taxation in the context of developed and developing countries. The data used to answer these questions consists of the third, fourth, and fifth wave of the World Value Survey (WVS). The WVS is one of the largest non-commercial academic social survey programs, ranging 120 countries and covering about 94.5% of the world's population. With the aim to analyse values, beliefs, and norms in a comparative cross-national and over-time perspective, the WVS is perfectly suited for the goals of this paper. Taken from the longitudinal WVS dataset ranging from 1981-2016, the variables made use of here were only conjointly present in the three waves mentioned and thus the data analysed in this paper ranges from 1994 to 2009. These three waves range a total of 86 countries, with a total of (N=) 221.838 respondents. Due to the nature of the data, the empirical method taken up in this paper is a cross-sectional design by conditioning through a multivariate regression.

The results show a consistent negative relationship between redistribution preferences and support for environmentally related taxation, suggesting that more egalitarian individuals are less supportive of environmentally related taxation.

Additionally, higher environmental attitudes and higher trust in government make that individuals are more supportive of environmentally related taxation. Furthermore, the results suggest that higher support for environmentally related taxation comes with higher levels of education, being female, and being more left-wing on the political left-right divide. There are smaller positive effects of income and location as well, suggesting that some individuals who are more supportive of environmentally related taxation have slightly higher incomes and live in larger cities or more populated areas. On the relationship between redistribution preferences and support for environmentally related taxation for individuals from developed and developing countries the results suggest that there is no difference between them. Instead, the largest differences between developed countries and developing countries can be found in the relationship between environmental attitudes and support for environmentally related taxation, as well as in the effect of the education level and income bracket an individual falls in.

To get at these results, this paper is organised as follows. First, the relevant literature will be reviewed to indicate current debates in the context of support for environmentally related taxation and redistribution preferences. On the basis of this literature review the theoretical framework of this paper will be outlined in the second chapter, including the research questions and hypotheses. The third chapter will elaborate further on the empirical method and data used in order to answer the research question, as well as the operationalisation of the variables. On the basis of the empirical method elaborated upon in this chapter, the results are presented in the fourth chapter. The fifth chapter will discuss these results in relation to the theory and address the policy implications following the results. A conclusion including policy recommendations and further research avenues will wrap up this paper.

LITERATURE REVIEW

The idea of using taxation as a way to combat environmental pollution and climate change has been around since the early 1900s and has been steadily developed by economists, political scientists, and environmental economists over the decades (Faure & Weishaar, 2012; Kollmann & Reichl, 2015). The introduction of the "Polluter Pays Principle" (PPP) by the OECD, defined as: "the principle according to which the polluter should bear the cost of measures to reduce pollution according to the extent of either the damage done to society or the exceeding of an acceptable level (standard) of pollution" (OECD, n.d.) boosted the idea further (Milne & Andersen, 2012). Nevertheless, environmental related taxation are currently some of the least used environmental policy instruments in the world (Bovenberg & Goulder, 2002; Carattini et al., 2018; Kallbekken & Sælen, 2011).

When thinking about environmentally related taxation most people will think of a carbon tax (also called carbon pricing), where governments put a price on the emission of CO_2 or other greenhouse gas (GHG) emissions (Criqui et al., 2019). Environmentally related taxation, however, is way broader than taxing harmful behaviour such as pollution or the emission of GHGs, it also encompasses the taxes on products, natural resources, and services (Milne, 2012; Milne & Andersen, 2012; Dresner et al., 2006). As such, this paper follows the OECD's (2001, p. 15) terminology on the concept of "environmentally related taxes" with the following definition:

> An environmentally related tax is defined as any compulsory, unrequited payment to general government levied on tax-bases deemed to be of particular environmental relevance. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportion to their payments.

The latter part of this definition is of extreme importance in the context of environmental policy and the market failures a market-based instrument like taxation tries to solve. Due to the public good nature of the environment (and all things that contribute to a good environment; clean air, habitable spaces, minimal extreme weather events, etc.) the benefits that a government provides by imposing environmentally related taxation is larger than the amount of tax paid per person (or even on a whole). This is one of the reasons as to why economists see taxation as one

of the most cost-effective instruments for environmental and climate policy (Barde & Godard, 2012; Carattini et al., 2017; Milne & Andersen, 2012). Another important note to make here is that environmentally related taxation should be seen as its own separate category within taxation as an umbrella term. While other forms of taxation are generally primarily used to raise revenue with the added benefit of slightly influencing behaviour, environmentally related taxation is not primarily designed for this, instead its main aim is to structurally change behaviour in order to reduce harmful behaviour (Backhaus, 1999; Barde, 1999; Faure & Weishaar, 2012).

The use of environmentally related taxation as a policy and instrument was increasingly popularised since the 1980s and 1990s, which coincided with increasing environmental challenges as well as increasing pressures on social security and the welfare system (Barde & Godard, 2012; Milne & Andersen, 2012). Environmentally related taxation thus seemed to be a two-for-one deal for governments, where environmental externalities were reduced and the government could increase its revenue and reduce tax burdens elsewhere (Braathen, 2012; Dresner et al., 2006; Milne & Andersen, 2012). Some countries have managed to successfully implement environmentally related taxes over the years. Finland was the first in 1990 with a CO_2 tax on fossil fuels and more followed over the course of the '90s, mostly Northern European countries such as Sweden, Denmark, and the Netherlands (Sairinen, 2012). In most cases environmentally related taxation is not implemented as stand-alone instruments and are often combined in policy mixes or added onto existing taxation schemes in for instance the energy or transport sectors (Ward & Cao, 2012).

In a case study on Sweden, France and Canada, Criqui et al. (2019) found that even though in theory a tax might be the most efficient in reducing GHG emissions, it is not the most easily implemented or accepted due to socio-economic and socio-political factors such as natural resource endowments, sectoral lobby power, acceptance of taxation policies by voters, and the specific industry or product targeted. This explains why in 2000 and in 2009 French proposals for carbon-related taxation did not manage to pass through the constitutional court (Braathen, 2012). Furthermore, proposals for environmentally related taxation have been rejected in Australia in 2014, Switzerland in 2000 and 2015, and in the US in 2016 (Carattini et al., 2017). Successful cases exist as well: as of 2016, a total of 18 countries and two Canadian provinces have environmentally related taxation (Carattini et al., 2018; Jaccard, 2012).

DETERMINANTS OF PUBLIC SUPPORT AND PUBLIC OPPOSITION

There is an extensive literature on the determinants of public opposition or support for environmentally related taxation. Many studies have found that, in general, public opposition arises because of the perception individuals have of taxation (Chiroleu-Assouline & Fodha, 2014; Dresner et al., 2006; Drews & van den Bergh, 2015; Kallbekken & Sælen, 2011). People see taxation as an instrument that is ineffective in achieving policy goals and instead is perceived as merely a way through which government can raise more revenues for itself (Dresner et al., 2006). Furthermore, people find taxation to be coercive and instead favour 'pull' instruments such as subsidies (Carattini et al., 2017; Kallbekken & Sælen, 2011; Steg et al., 2006). While taxation is considered to be a 'push' measure, pushing people towards a certain behaviour, instruments such as subsidies reward beneficial behaviour and thus 'pull' people in (de Groot & Schuitema, 2012; Drews & van den Bergh, 2015). Taxation and other market-based instruments are thus often seen as involuntary and coercive, which force people into certain behaviour whether voluntary or not (Rhodes et al., 2017). Consequently, people are more in favour of taxation if they are better informed about how the instrument works—to have the same insights as economists and politicians when designing these mechanisms (Carattini et al., 2017; Dresner et al., 2006; Heres et al., 2013; Klenert et al., 2018). In the case of environmentally related taxation, it has been found that individuals do not understand that environmental related taxes are aimed at increasing welfare by improving the environment and mitigating climate change and do not have as primary aim to raise revenues (Kallbekken et al., 2011).

Individuals also worry about the distributional implications and fairness of taxation (Criqui et al., 2019; Kallbekken & Sælen, 2011; Jaccard, 2012; Jagers & Hammar, 2009). Taxation often have larger effects on lower income households such as for instance in the case of energy taxes as energy makes up a larger portion of low-income households' spending, or in the case of fuel taxes which disproportionately affect individuals living in remote areas (Jagers & Hammar, 2009; Kosonen, 2012). Another important factor that influences public acceptance of environmentally related taxation is their trust in the government: if people's trust in their government is low, they consequently do not trust the government to do as they promised with (new) tax

revenues (Dresner et al., 2006; Jagers & Hammar, 2009; Klenert et al., 2018). Or, in other words, if people do trust their government, they will trust them to implement sound and effective policies and act responsibly with the added revenues from environmentally related taxation (Criqui et al., 2019; Harring & Jagers, 2013).

A last factor often indicated as an important determinant of public support or opposition for environmentally related taxation are environmental attitudes. Environmental attitudes encompass a broad range of attitudes, values and believes, which are both determined by and affected through other variables and attitudes and shape individuals' behaviour (Fielding & Hornsey, 2016; Gifford & Sussman, 2012; Poortinga et al., 2019). As such, in this paper environmental attitudes are considered to be: "[…] concern for the environment or caring about environmental issues" (Gifford & Sussman, 2012). Environmental attitudes are of importance in the context of individuals' support or opposition towards environmentally related taxation as strong attitudes are often related with positive types of behaviour (Gifford & Sussman, 2012; Li et al., 2019). In general, younger people, women, individuals with higher income levels, centre- and left-leaning individuals, individuals with more egalitarian world views, and individuals experiencing the effects of climate change have higher concern for the environment (Gifford & Sussman, 2012). Additionally, in their literature review of determinants of pro-environmental behaviour, Li et al. (2019, p. 30) found that: "Generally, most studies suggest that environmental attitude is the major determinant of environmental behavior." They also acknowledge, however, that there are a number of studies who have not found a significant effect of environmental attitudes on individual (environmentally friendly) behaviour (Li et al., 2019). As such, it will be interesting to see what the case is in the context of support for environmentally related taxation.

REDISTRIBUTIVE PREFERENCES & ENVIRONMENTALLY RELATED TAXATION

An environmentally related tax has a high chance of being regressive when low- and high-income households pay the same rate, or when the tax is focused on a product more often bought by low-income households, and consequently will receive more opposition (Barde, 1999; Kosonen, 2012; Maestre-Andrés et al., 2019). Distributional effects and concerns such as fairness in terms of burdens on households and purchasing power effects play a role in the support for environmentally related

taxation (Maestre-Andrés et al., 2019). Many studies have found that due to low-income households spending a larger portion of their income on pollution-intensive goods (e.g., electricity, fuel, etc.) these households are at a larger disadvantage from the implementation of environmentally related taxation (Klenert et al., 2016). This is because environmentally related taxation is generally focused on those goods that have become necessities for all households in society which make up most of the expenses for low-income households. As such, environmentally related taxation is a double-edged sword that on the one hand reduces negative environmental externalities, yet on the other hand can very easily increase inequality if not implemented and designed correctly (Klenert et al., 2016). This is especially the case in developed countries where carbon- and pollution-intensive goods are seen as necessities and an integral part of life (Dorband et al., 2019; Klenert et al., 2016). In a study on the environmentally related taxations used in Denmark it was found that except for fuel and car ownership taxes, all other environmentally related taxation were regressive and thus impacted low-income households disproportionately (Klinge Jacobsen et al., 2003). While, on the other hand, in cases like South Africa, Vietnam, and Pakistan, progressive consequences of environmentally related taxation have been found (van Heerden et al., 2005; Nurdianto & Resosudarmo, 2016; Shah & Larsen, 1992).

The preference for regressive or progressive taxation is influenced by the way an individual perceives the world and believes the way it should work (Drews & van den Bergh, 2015; Smith & Leiserowitz, 2013). It has been found that more egalitarian worldviews—that people are equal and deserve equal rights and opportunities—lead to stronger support for environmentally related policies (Leiserowitz, 2006; Smith & Leiserowitz, 2013). On the other hand, the more individualistic worldviews—those who do not want their individual freedoms impeded upon, especially by the government—are most opposed to environmentally related policies (Leiserowitz, 2006; Smith & Leiserowitz, 2013). However, due to the possible regressive effects of environmentally related taxation the support for environmental policies by egalitarian individuals might disappear in the context of environmentally related taxation. These worldviews are also more indirectly represented in an individual's political orientation or ideology, where it has been found that the more centre- and left-leaning individuals which are generally linked to more egalitarian worldviews are less opposed towards environmentally related policies (Hammar & Jagers, 2007; Harring & Jagers, 2007).

More specifically, it has been found that individuals with more egalitarian world views that prefer redistribution are generally female, younger, poorer, and left leaning (Alesina & Giuliano, 2011). On the other hand, individuals with more hierarchical or individualistic worldviews are generally male, older, richer, white, and are higher educated (Alesina & Giuliano, 2011).

On the basis of the preceding discussion of the literature it should have become clear that due to the nature of environmentally related taxation as an instrument and the way such policies are perceived by individuals, support for environmentally related taxation is made up of complex dynamics. Many factors play a role in whether an individual supports environmentally related taxation or not, the question this paper poses is what role there is for redistribution preferences in explaining support for environmentally related taxation. The following chapter will discuss the specific research question(s) and the hypotheses to be empirically tested on the basis of these questions.

THEORETICAL FRAMEWORK

In order to uncover what role there is for redistribution preferences in explaining support for environmentally related taxation this chapter constructs a theoretical framework on the basis of the theory reviewed. In addition, the main research question and sub-question are specified, as well as the empirical hypotheses to be tested.

MAIN RESEARCH QUESTION

As shown on the basis of the literature discussed in the previous chapter, many studies have already focused on environmental attitudes, trust in government institutions, understanding of taxation instruments and policies, individual-level demographics, and other variables to explain why individuals support or oppose environmentally related taxation, yet the role of redistribution preferences has been somewhat neglected. This is especially of importance in the context of environmentally related taxation as a tax would be the most effective instrument in reducing negative environmental externalities, yet if designed poorly might have disproportionately negative effects on low-income households (Dorband et al., 2019; Klenert et al., 2016; Klinge Jacobsen et al., 2003; Maestre-Andrés et al., 2019). In order to understand a larger part of why individuals support or oppose environmentally related taxation their redistribution preferences could prove to be very insightful. As such, the main research question is as follows: *What is the relationship between redistribution preferences and support for environmentally related taxation?* With this research question the aim is to analyse the effect of redistribution preferences on individuals' support for environmentally related taxation. The review of the literature has shown that redistribution preferences constitute different worldviews—egalitarian or individualistic—of how the world should work: egalitarian individuals want more equality in terms of rights and opportunities, while individualistic individuals do not want their individual freedoms impeded upon (Leiserowitz, 2006; Smith & Leiserowitz, 2013). In the context of environmentally related taxation, more egalitarian individuals—although generally more supportive of climate policies—will not support environmentally related taxation as it is often considered to be regressive and disproportionately affect low-income households (Dorband et al., 2019; Klenert et al., 2016; Klinge Jacobsen et al., 2003; Leiserowitz, 2006; Smith & Leiserowitz,

2013). On the basis of this the following relationship between redistribution preferences and support for environmentally related taxation is hypothesised:

> *H1: There is a negative relationship between redistribution preferences and tax support, meaning that more egalitarian individuals are less supportive of environmentally related taxation.*

SECONDARY RESEARCH QUESTION

A secondary, sub-question also follows from the theory which focuses on the difference between developed and developing countries. Many studies have shown that low-income households in developed countries are the group most disproportionally affected by the regressivity of environmentally related taxation (Dorband et al., 2019; Klenert et al., 2016; Klinge Jacobsen et al., 2003; Maestre-Andrés et al., 2019). On the basis of this the following sub-question has been formulated: *Is there a difference between developed and developing countries in the relationship between redistribution preferences and support for environmentally related taxation?* With this sub-question the aim is to extend and strengthen the research and gather more insights into the dynamics of the relationship between redistribution preferences and support for environmentally related taxation in the context of developed and developing countries. The distinction between developed and developing countries is theoretically relevant as it has been shown that low-income households are disproportionately disadvantaged by environmentally related taxation in developed countries as carbon- and pollution-intensive goods are seen as necessities and an integral part of life in developed countries (Dorband et al., 2019; Klenert et al., 2016). On the basis of this the following relationship between redistribution preferences and environmentally related taxation in the context of developed countries is hypothesised:

> *H2: There is a negative relationship between redistribution preferences and tax support in developed countries and there is a positive or neutral relationship between redistribution preferences and tax support in developing countries, meaning that more egalitarian individuals in developed countries are less supportive of environmentally related taxation compared to individuals in developing countries.*

With these research question and hypotheses, the aim is to uncover what role there is for redistribution preferences in explaining support for environmentally related taxation. The following chapter discusses the data and empirical method used to test these hypotheses empirically and come up with an answer to the research question(s).

DATA & EMPIRICAL METHOD

In order to test the hypotheses developed on the basis of the theoretical framework and answer the research questions, this paper takes up a quantitative approach. This chapter will first elaborate on the data set used and the empirical method employed in this paper to test the hypotheses, including a number of methodological considerations and the model specification. This is followed by the variables and their operationalisation and some relevant descriptive statistics.

THE DATASET

The data used to put the hypotheses to the empirical test are the third, fourth, and fifth wave of the World Value Survey (WVS). The WVS is one of the largest non-commercial academic social survey programs, ranging 120 countries and covering about 94.5% of the world's population. With the aim to analyse values, beliefs, and norms in a comparative cross-national and over-time perspective, the WVS is perfectly suited for the goals of this paper. Taken from the longitudinal WVS dataset ranging from 1981-2016, the variables made use of here were only conjointly present in the three waves mentioned and thus the data analysed in this paper ranges from 1994 to 2009. These three waves range a total of 86 countries, with a total of (N=) 221.838 respondents.

EMPIRICAL METHOD

Due to the nature of the data, the empirical method taken up in this paper is a cross-sectional design by conditioning through a multivariate regression. The following model will be used to put the data and theory to the empirical test:

$$\boldsymbol{y}_{ict} = \alpha_{ict} + \boldsymbol{\beta}_{ict} + \boldsymbol{\beta}\, R_{ict} + \boldsymbol{\beta}\, E_{ict} + \boldsymbol{\beta}\, T_{ict} + \boldsymbol{\beta}\, X_{ict}$$

Where $\boldsymbol{y}_{ict}$ stands for the dependent outcome variable, indicating whether an individual *i* supports environmentally related taxation in country *c* and year *t*. α_{ct} stands for the constant for individual *i* in country *c* and year *t*, which equals the value of $\boldsymbol{y}_{ict}$ when the value of all other variables on the right-hand side of the equation are zero. $\boldsymbol{\beta}_{ct}$ stands for the slope of the entire model including all explanatory variables for individual *i* in

country *c* and year *t*. $\boldsymbol{\beta}\ R_{ict}$ denotes the effect of the main independent explanatory variable of interest: the redistribution preferences for individual *i* in country *c* and year *t*. $\boldsymbol{\beta}\ E_{ict}$ stands for the effect of environmental attitudes in explaining support for environmentally related taxation of individual *i* in country *c* and year *t*. $\boldsymbol{\beta}\ T_{ict}$ denotes the effect of trust in government institutions on support for environmentally related taxation for individual *i* in country *c* and year *t*. And last, $\boldsymbol{\beta}\ X_{ict}$ stands for the control variables consisting of age, gender, education level, ideology, income scale, and location for individual *i* in country *c* and year *t*.

All independent and control variables are controlled for the country and year effects in order to control for the institutional and unobserved differences between countries and the different years that the data is recorded. In addition, both the trust in government institutions and environmental attitude variables are added in order to account for possible confounder bias. The literature has suggested that environmental attitudes and trust in government institutions are important determinants of an individuals' support for environmentally related taxation and thus cannot be kept out of the equation and analysis.

THE VARIABLES

In the remainder of this chapter the operationalisation of the variables will be discussed with a focus on the statistical properties of the variables as well as some noteworthy descriptive statistics. Table 1 below summarises the descriptive statistics of all variables.

SUPPORT FOR ENVIRONMENTALLY RELATED TAXATION

An individual's support for environmentally related taxation is operationalised and measured through individuals' response to the statement "I would agree to an increase in taxes if the extra money were used to prevent environmental damage". Respondents could base their answer on a 4-point Likert-scale ranging from 1 (strongly disagree) to 4 (strongly agree). As such, higher values on this variable indicates that an individual is more in support of environmentally related taxation. For this variable a total of 170.892 answers were recorded, with 50.946 answers missing due to respondents not knowing or unwilling to answer. The biggest group of respondents, about 60%, agreed or strongly agreed with the statement they were presented with and are thus supportive of environmentally related taxation (and thus had a value of 3 or higher).

TABLE I. DESCRIPTIVE STATISTICS

	N	*Mean*	*Std. Deviation*
Tax Support (Range 1-4, with 1=strongly disagree; 4=strongly agree)	170.892	2.64	.8732525
Redistribution Preferences (Range 1-10, with 1=larger income differences; 10=more equal incomes)	207.721	5.14	3.011133
Environmental Attitudes (Range 1-2, with 1=Economic Growth; 2=Protecting environment)	177.652	1.55	.4971986
Trust in Government Institutions (Range 1-10, with 1=low trust; 10=high trust)	181.129	4.74	2.336263
Age (13-99)	221.332	40.5	15.99523
Education Level (Range 1-8, with 1=incomplete elementary education; 8=completed university education)	205.999	4.60	2.244391
Gender (Range 1-2, with 1=male; 2=female)	221.652	.	.4997359
Income (Range 1-10, with 1=lowest step; 10=highest step)	198.549	4.53	2.395631
Location (Range 1-8, with 1=under 2000; 8=500.000 and more)	144.985	4.92	2.498684
Ideology (Range 1-10, with 1=right, 10=left)	152.813	5.30	2.494676

REDISTRIBUTION PREFERENCES

The redistribution preferences of an individual are based on a survey question in which individuals could place their views on a scale from left (1) to right (10) on income inequality. More specifically, respondents were asked: "How would you place your views on this scale? 1 means you agree completely with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between". The statement on the left at number 1 read: "We need larger income differences as incentives for individual effort", while the statement on the right at number 10 read: "Incomes should be made more equal". As such, higher values on this variable indicates that an individual prefers more redistribution and thus has more egalitarian worldviews. For this variable a total of 207.721 answers were recorded, with 13.117 answers missing due to respondents not knowing or unwilling to answer. The two biggest clusters of respondents are found at the two extremes of the scales, with 16.11% of the respondents stating that larger income differences as incentives are needed and thus being more individualistic, and the next biggest group of 13.48% of the respondents clustering at the opposite end of the scale stating that incomes should be made more equal and thus being more egalitarian.

ENVIRONMENTAL ATTITUDES

The variable measuring the environmental attitude of an individual is based on a survey question in which individuals could indicate whether they identify with one statement over another. More specifically, they were asked: "Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?" The first statement, coded as number 1, read "Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent" and the second, coded as number 2, was: "Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs". As such, individuals with higher values on this variable are considered to have higher concern for the environment and thus stronger environmental attitudes. For this variable a total of 177.652 responses were recorded, with 44.816 answers missing due to respondents not knowing or unwilling to answer. Respondents were about split between the two statements, with 44.71 not knowing or unwilling to answer. The two biggest clusters of respondents are found at the two extremes of the scale, with 16.11% of the respondents stating that larger income

differences as incentives are needed and thus being more individualistic, and the next biggest group of 13.48% of the respondents clustering at the opposite end of the scale stating that incomes should be made more equal and thus being more egalitarian.

ENVIRONMENTAL ATTITUDES

The variable measuring the environmental attitude of an individual is based on a survey question in which individuals could indicate whether they identify with one statement over another. More specifically, they were asked: "Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?" The first statement, coded as number 1, read "Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent" and the second, coded as number 2, was: "Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs". As such, individuals with higher values on this variable are considered to have higher concern for the environment and thus stronger environmental attitudes. For this variable a total of 177.652 responses were recorded, with 44.186 answers missing due to respondents not knowing or unwilling to answer. Respondents were about split between the two statements, with 44.71% preferring economic growth and job creation over protecting the environment.

TRUST IN GOVERNMENT INSTITUTIONS

Trust in government institutions is a broad concept as the institution and practice of government is wide ranging and reaching. As such, to operationalise trust in government and its institutions as widely as possible, three variables are being used: trust in government, trust in parliament, and trust in political parties. Making use of a Principal Component Analysis (PCA) it was explored whether these three variables can be computed into one variable: trust in government institutions. This to account for possible issues of multicollinearity down the line. An extensive description of the process of constructing this new variable—"trust in government institutions"—can be found in the appendix. This new variable has a total of 181.129 recorded answers with 40.709 missings. No missings on any of the three base variables were allowed in the creation of the trust in government institutions variable and thus it has a range from 3 to 12, with 3 indicating low trust in government institutions and 12 indicating high support in government institutions. For the sake of interpretation this variable was recoded on a scale from 1-10. For this variable, the biggest group of respondents

(24.50%) is found at a value of 4, indicating that most respondents are relatively distrustful of their government institutions. The relevant tables and statistics for the PCA and the base variables used to construct the trust in government institutions variable can be found in the appendix.

CONTROL VARIABLES

Last, the control variables: age, education, gender, income, location, and political ideology. First, age. This was asked after inquiring about the respondent's year of birth, the interviewer corroborates their previous answer by asking "this means you are ___ years old". Only 506 of the total 221.838 respondents have a missing value on this variable. The data ranges from 13 to 99, with the mean indicating that the average respondent is about 40 years old.

The respondents' education level was measured by asking them what their highest educational level attained is. The answers were coded into a 8-point scale, ranging from incomplete elementary education (1) to completed university-level education (8). A total of 205.999 answers were recorded for this variable, with 15.839 answers missing due to respondents not knowing or unwilling to answer. The largest group of respondents has completed technical or vocational schooling (18.72%), followed by the group of respondents that have completed university of applied sciences or college degree level schooling (17.11%), and the third biggest group consists of respondents that have completed elementary education (15.51%).

The gender of respondents was observed by the interviewer and coded either male (1) or female (2). Only 186 out of the total 221.838 respondents have a missing value on this variable. The dataset is pretty evenly split between males and females, with 48.37% of respondents being male and 51.63% of respondents being female.

Income was measured through a subjective scale in which respondents could sort themselves into a country-specific 10-point scale, where 1 is the lowest income group in the country and 10 is the highest income group in the country. The subjectiveness of this measure could be argued to be an issue, yet on the other hand due to the psychological effect of taxation and redistribution preferences a subjective estimation can be relevant as well as an individual might see themselves as comparatively better or worse off and thus affect their preferences. A total of 198.549 responses were recorded for this variable, with 23.289 missing due to respondents not knowing or

unwilling to answer. The first 4 points of the scale makes up about half of the respondents (52.42%), indicating that the distribution of income across this sample is slightly skewed to the right, which is in line with the general trend in society. Most respondents (15.09%) are found at the fifth step of the 10-point scale.

Variation in respondents' location is measured through the size of the town the respondent is a residence of, as coded by the interviewer. The scale ranges from 1 to 8, where 1 is under 2,000 residents, and 8 is 500,000 residents or more. A total of 144.985 responses were recorded for this variable, with 76,853 answers missing due to respondents not knowing or unwilling to answer. About half of the respondents (53.12%) lives in a town with 50.000 residents or less. Most respondents (21.08%) live in a town with 500.000 residents or more.

Last, the political ideology of respondents was measured through having respondents place themselves on a 10-point scale. More specifically, respondents were asked: "In political matters, people talk of "the left" and "the right". How would you place your views on this scale, generally speaking?". The scale ranges from 1, being Right, to 10, being Left. A total of 152.813 responses were recorded for this variable, with 69.025 answers missing due to respondents not knowing or unwilling to answer. The largest group of respondents (28.07%) is found at 6, which could be interpreted as centre-left, the second largest group (14.04%) is found at 5, which could be interpreted as centre-right, and the third largest group (10.06%) is found at 1, which is right.

Next, this data and the empirical method described above will be used in order to put the hypotheses to the empirical test in order to formulate an answer to the research questions. The results of these empirical tests are described in the following chapter.

RESULTS

Before the results are discussed the necessary assumptions need to be tested in order to see if valid inference can be made from the regression as is, or whether some extra steps need to be added in order to make the results more robust. Conditioning through a multivariate OLS regression puts some strong assumptions on the data and the relationships that are aimed to be uncovered. The following six assumptions have to be tested: (1) uncorrelated residuals; (2) homoscedasticity; (3) no autocorrelation; (4) normally distributed residuals; (5) no multicollinearity; and (6) linearity. It is of importance to test these assumptions as otherwise the standard error and regression coefficients can be over- or underestimated and thus false inferences about the sample and population can be made. An extensive description of the tested assumptions can be found in the appendix, on the basis of which it was concluded that all assumptions hold, and the model can be carried out as specified through a multivariate OLS regression. With these additional steps safeguarding the results, the following section will discuss the primary results of the main specification of the model and primary hypothesis. The second section of this chapter will delve further into the model and hypothesised relationships focusing on the hypothesised differences between developed and developing countries in the context of redistribution preferences and environmentally related taxation.

MAIN RESULTS

The results of the regression are reported in Table 2 below. Starting with model 1 in the column 1, which focuses on the sole effect of redistribution preferences on tax support controlling for all the control variables, we first look at the summary statistics at the bottom of the table where we find that the model is statistically significant at the 0.01 level based on the F-test. This means that the model holds explanatory value and the R^2 is statistically significant. The R^2 shows that model 1 explains 7.93% of the variation in support for environmentally related taxation. Looking at the coefficients in column 1, the first model shows that there is a statistically significant negative relationship between support for environmentally related taxation and redistribution preferences.

TABLE II. RESULTS

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Constant	2.527 (0.037)**	2.142 (0.039)**	1.999 (0.041)**	1.692 (0.057)**	2.305 (0.057)**
Redistribution Preferences	-0.006 (0.001)**	-0.006 (0.001)**	-0.006 (0.001)**	-0.006 (0.001)**	-0.006 (0.001)**
Environmental Attitudes		0.287 (0.006)**	0.285 (0.006)**	0.365 (0.009)**	0.193 (0.009)**
Trust in Government Institutions			0.037 (0.001)**	0.042 (0.002)**	0.033 (0.002)**
Age	-0.002 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Education Level	0.031 (0.001)**	0.026 (0.001)**	0.026 (0.001)**	0.037 (0.002)**	0.014 (0.002)**
Gender	0.016 (0.006)**	0.020 (0.006)**	0.027 (0.006)**	0.036 (0.009)**	0.011 (0.009)
Income	0.011 (0.001)**	0.009 (0.001)**	0.008 (0.001)**	0.005 (0.002)*	0.014 (0.002)**
Ideology	0.011 (0.001)**	0.009 (0.001)**	0.010 (0.001)**	0.018 (0.002)**	0.003 (0.001)
Location	0.003 (0.001)*	0.003 (0.001)*	0.004 (0.001)**	0.004 (0.001)*	0.001 (0.002)
Prob > F	0.000**	0.000**	0.000**	0.000**	0.000**
R^2	0.0793 (7.93%)	0.1067 (10.67%)	0.1112 (11.12%)	0.1199 (11.99%)	0.0962 (9.62%)

Note: Constant refers to the dependent outcome variable of "Tax Support", ranging from 1-4, with 1=strongly disagree and 4=strongly agree with a mean of 2.65. * Significant at the 0.05 level; ** Significant at the 0.01 level.

As support for environmentally related taxation goes up, redistribution preferences goes down with 0.006, indicating more individualistic redistribution preferences in relation to support for environmentally related taxation. As for the control variables, all are statistically significant at the 0.01 level except for age, which is not significant at all, and location, which is only significant at the 0.05 level. All significant control variables have a positive relationship with support for environmentally related taxation, indicating that there is a higher chance of individuals who are supportive of environmentally related taxation being higher educated, female, being in a higher income bracket, being more left on the political spectrum, and residing in larger cities. However, all coefficients are relatively small, with the largest effect found by education level at a 0.031 unit increase with each unit increase in support for environmentally related taxation. Gender has the next biggest effect with a 0.016 unit increase with each unit increase in support for environmentally related taxation. Income, and ideology have a similar effect with a 0.011 unit increase in the respective variables with each unit increase in support for environmentally related taxation. Location exerts the smallest change in support for environmentally related taxation at a 0.003 unit increase with each unit increase in support for environmentally related taxation in the first model.

The second model in column 2 builds from the first model by including environmental attitudes. This model is statistically significant at the 0.01 level as well. The R^2 at the bottom of column 2 shows that the inclusion of environmental attitudes increases the explanatory value of the first model to a R^2 of 0.1067, or 10.67%, meaning that the second model explains an additional 2.74% of the variation in support for environmentally related taxation by including environmental attitudes. The coefficient for redistribution preferences stays significant at the 0.01 level, is similar to the coefficient for the same variable in the first model and keeps the same sign. Additionally, the second model shows that environmental attitudes has a statistically significant and positive effect on support for environmentally related taxation. With each unit increase in support for environmentally related taxation, environmental attitudes increase by 0.287. Similar trends as in the first model can be observed in the control variables in the second model: all significant control variables are in a positive relationship with support for environmentally related taxation. Again, the control variable of age is not statistically significant, with all other variables being significant

at the 0.01 level and location significant at the 0.05 level. The largest effect in the control variables is again found in education level, with a 0.026 unit increase in education level with each unit increase in support for environmentally related taxation. Gender has the next biggest effect with a 0.020 unit increase with each unit increase in support for environmentally related taxation. Location is again the smallest with a coefficient of 0.003 and income and ideology stay equal to each other with coefficients of 0.009.

The third model in column 3 builds further on the first and second model and includes the entire regression as specified in the previous chapter and thus includes redistribution preferences, environmental attitudes, and trust in government institutions. Again, looking at the bottom of the table in column 3, the third model is statistically significant at the 0.01 level with the addition of trust in government institutions increasing the R^2 to 0.1112 and thus explaining a total of 11.12% (a 0.45% increase from the second model) of the variance in support for environmentally related taxation. In this third model the effect of redistribution preferences on support for environmentally related taxation remains significant at the 0.01 level, negative, and of the same value at a -0.006 unit decrease in redistribution preferences with each unit increase in support for environmentally related taxation. The same goes for environmental attitudes, the effect of which remains statistically significant at the 0.01 level, positive, and with a similar value as in the second model of a 0.285 unit increase in environmental attitudes with each unit increase in support for environmentally related taxation. Trust in government institutions has a statistically significant positive relationship at the 0.01 level to support for environmentally related taxation. Each unit increase in support for environmentally related taxation is accompanied by a 0.037 increase in trust in government institutions, suggesting that higher trust in government institutions increases support for environmentally related taxation. The control variables in this model again remain similar, with most notably the effect of location becoming more significant with its effect being significant at the 0.01 level in this third model. Education level again has the largest effect (0.026), followed by gender (0.026), ideology (0.010), income (0.008), and location (0.004), which are all significant at the 0.01 level. Again, the control variable of age is insignificant.

DIFFERENCES BETWEEN DEVELOPED AND DEVELOPING COUNTRIES

In order to get at the differences between individuals living in developed and developing countries the sample was split on the basis of a dummy variable indicating 1 for developed countries and 0 for developing countries. This split was based on the United Nations' World Economic Situation and Prospects report from 2002, which is the main report from the UN on the state of the world's economy, which divides all countries into four categories: developed economies, major developing economies, transitioning economies, and developing economies (United Nations, 2002). It was decided to base this division on the basis of a paper from the relevant time period (2002) in order to account for the differences between developed and developing countries that existed at the time as well as include countries in the right category as some have shifted into different categories in the last two decades. In the context of this paper and for analytical purposes in order to make sure the split sample have equal weight in terms of group sizes, developed economies and economies in transition will be taken as one category and major developing economies and developing economies will be taken as one category. A table detailing which country belongs to which category is included in the appendix.

The fourth and fifth model shown in column 4 and 5 respectively of table 2 show the results of the complete model specification for developed countries (column 4) and developing countries (column 5). In other words, these two columns show the differences between developed and developing countries in the effect of redistribution preferences, environmental attitudes, and trust in government institutions on support for environmentally related taxation. Starting with column 4, focusing on the effects of redistribution preferences, environmental attitudes, and trust in government institutions in developed countries, the values at the bottom of the table show us that this model is statistically significant at the 0.01 level. The R^2 shows that the explanatory value of the model lies at 11.99% of the variance in support for environmentally related taxation. Looking at the coefficients, the statistically significant negative relationship between support for environmentally related taxation and redistribution preferences remains as in the previous three models. As support for environmentally related taxation goes up, redistribution preferences goes down with 0.006, indicating more individualistic redistribution preferences in relation to support

for environmentally related taxation for individuals in developed countries. Interestingly, the coefficient for developed countries remains equal to the previous three models while it was expected that egalitarian individuals in developed countries would be even less supportive of environmentally related taxation. Second, the effect of environmental attitudes on support for environmentally related taxation is significant at the 0.01 level and indicates a positive relationship. A notable difference here is the size increase of the environmental attitudes' coefficient compared to the previous two models, which increases from 0.287 and 0.285 in the second and third models respectively to 0.365 in the fourth model. The coefficient for trust in government institutions indicates a statistically significant positive effect at the 0.01 level of trust in government institutions on support for environmentally related taxation in developed countries. More specifically, each unit increase in support for environmentally related taxation is accompanied by a 0.042 unit increase in trust for government institutions in developed countries. The control variables are all positively related to support for environmentally related taxation as in the previous two models, the values of education level, gender, and ideology have increased compared to the fluctuations in the previous three models. The coefficient for education level shows that for each unit increase in support for environmentally related taxation education level goes up by 0.037 units, which is significant at the 0.01 level. The effect for gender increases for individuals in developed countries, with a 0.036 statistically significant at the 0.01 level unit increase with each unit increase in support for environmentally related taxation. The effect of ideology increases as well in the context of developed countries, resulting in a 0.018 unit increase in ideology with each unit increase in support for environmentally related taxation. The effects of income and location remain similar to the previous two models, with both significant at the 0.05 level. Last, the control variable for age has remained insignificant.

Moving on to the last column of the table, focusing on the effects of redistribution preferences, environmental attitudes, and trust in government institutions in developing countries. As can be seen at the bottom of the fifth column, the model is significant at the 0.01 level and explains a total of 9.62% of the variance in support for environmentally related taxation in developing countries as shown by the R^2. This is a bit of a drop from both the third and fourth model and could partially be explained by the fact that four out of six control variables are not significant. Focusing on the main

explanatory variable first, the coefficient for redistribution preferences remains constant compared to the first three models. There is a statistically significant negative relationship between support for environmentally related taxation and redistribution preferences in developing countries. As support for environmentally related taxation goes up in developing countries, redistribution preferences goes down with 0.006, indicating more individualistic redistribution preferences in relation to support for environmentally related taxation in developing countries as well. Environmental attitudes remain similar, albeit slightly lower, to the first two models, with a statistically significant effect at the 0.01 level indicating a 0.193 unit increase in environmental attitudes with each increase in support for environmentally related taxation in developing countries. This effect of environmental attitudes is lower in developing countries compared to developed countries. The effect of trust in government institutions in developing countries is similar to the third model as well, with a 0.033 unit increase in trust in government institutions with each unit increase in support for environmentally related taxation, which is significant at the 0.01 level. In comparison to developed countries, the effect of trust in government institutions is lower at 0.033 versus 0.042 in developed countries. The largest differences in the fifth model with the other four models lies in the control variables. Only two out of the six control variables are significant: age, gender, ideology and location are all insignificant. Education level has a statically significant effect at the 0.01 level with a 0.014 unit increase in education level with each unit increase in support for environmentally related taxation. This is quite a big difference compared to the effect of education level in developed countries (0.037), which is about twice as high. Income is the second control variable that has a significant effect at the 0.01 level with a coefficient of 0.014 indicating that with each unit increase in support for environmentally related taxation there is a 0.014 unit increase in education level for individuals in developing countries. Again, there is a big difference between developed and developing countries, with the effect of income being higher in developing countries (0.014) compared to developed countries (0.005).

With all the results now presented, we can move on to the discussion of these outcomes in relation to the literature previously reviewed, make a decision on the hypotheses, and discuss possible policy implications in the next chapter.

DISCUSSION

With the main results presented in the previous chapter it is time to move on to the discussion of these results in the context of the reviewed literature and take into consideration possible policy implications. Before discussing the results in the context of the literature and previous empirical results, a decision needs to be made on the hypotheses formulated in the theoretical framework. To refresh, the first hypothesis stated the following:

> *H1: There is a negative relationship between redistribution preferences and tax support, meaning that more egalitarian individuals are less supportive of environmentally related taxation.*

The results show a consistent negative relationship between redistribution preferences and support for environmentally related taxation in all five models, suggesting that indeed the more egalitarian individuals are less supportive of environmentally related taxation. As such, on the basis of the results discussed in the previous chapter this hypothesis cannot be rejected and thus it is indeed likely that individuals who hold more egalitarian views are less supportive of environmentally related taxation. More specifically, the results show that more egalitarian individuals are less supportive of environmentally related taxation, while higher environmental attitudes and higher trust in government make individuals more supportive of environmentally related taxation. In addition, higher support for environmentally related taxation correlates with higher education levels, being female, and being more left-wing on the political left-right divide. There are smaller positive effects of income and location as well, suggesting that some individuals who are more supportive of environmentally related taxation have slightly higher incomes and live in larger cities or more populated areas. As for the second hypothesis central to this paper, which was formulated as follows:

> *H2: There is a negative relationship between redistribution preferences and tax support in developed countries and there is a positive or neutral relationship between redistribution preferences and tax support in developing countries, meaning that more egalitarian individuals in developed countries are less supportive of environmentally related taxation compared to individuals in developing countries.*

In the context of this second hypothesis the results paint a different picture. There is a negative relationship between redistribution preferences and tax support in developed countries, however the same is true for developing countries. In other words, there is no difference in the relationship between redistribution preferences and support for environmentally related taxation for individuals from developed and developing countries. As such, on the basis of these results this hypothesis cannot be accepted and thus it is likely that there is less difference between individuals from developing and developed countries in terms of the effect of redistribution preferences on support for environmentally related taxation than the literature suggests.

The largest differences between developed countries and developing countries can instead be found in the relationship between environmental attitudes and support for environmentally related taxation, as well as in the effect of the education level and income bracket an individual falls in. Where for individuals from developed countries environmental attitudes has a larger effect on support for environmentally related taxation than individuals from developing countries. The same goes for education level when comparing individuals from developed and developing countries. The opposite is true for the effect of an individual's income on support for environmentally related taxation. Higher support for environmentally taxation for individuals from developing countries is accompanied by higher incomes compared to individuals from developed countries.

This sums up the general conclusions that can be drawn from the results presented in the previous chapter. The following sections will discuss the results more in depth and focus on the theory and previous empirical studies for each explanatory variable.

REDISTRIBUTION PREFERENCES

In relation to the main explanatory variable of redistribution preferences, the literature showed that distributional effects and concerns such as fairness in terms of burdens on households and purchasing power effects play a large role in the support for environmentally related taxation (Maestre-Andrés et al., 2019). These such concerns are most often held by individuals with more egalitarian worldviews, those who believe all people are equal and deserve equal rights and opportunities (Leiserowitz, 2006; Smith & Leiserowitz, 2013). The results affirm this view to a certain degree, suggesting that more egalitarian individuals are less supportive of environmentally related taxation. The effect estimated is rather small, however, with

a coefficient of -0.006. This effect is especially small in comparison with the other two explanatory variables included in the model. A possible explanation for the limited effect of redistribution preferences on support for environmentally related taxation could be the slight paradox that can be found in the views of egalitarian individuals and more individualistic individuals. While egalitarians believe there should be equality, individuals do not want their individual freedoms impeded upon (Leiserowitz, 2006; Smith & Leiserowitz, 2013); and thus, egalitarian individuals will most likely be opposed to environmentally related taxation on the basis of fairness and distributional effects of possibly regressive policies while individualists might be opposed because they do not favour such distortionary policies as taxation imposed by government. As such, the negative or positive effect of either end of the spectrum of redistribution preferences might be cancelled out as a result, explaining the limited effect of redistribution preferences on environmentally related taxation.

While the theory suggested that egalitarian individuals in high-income or developed countries would be less supportive of environmentally related taxation due to concerns over distributional implications and fairness, the results paint a different picture. While individuals in developed countries spend a larger portion of their income on carbon- and pollution-intensive goods (Dorband et al., 2019; Klenert et al., 2016), there is no difference in the relationship between redistribution preferences and support for environmentally related taxation for individuals from developed and developing countries. As such, the distributive concerns individuals may have about environmentally related taxation that comes forward from the theory is not present in the sample at hand. One explanation for this could be that the literature found on these distributive and regressivity concerns are all from the past decade or so, while the data itself spans from 1994 to 2009. It can be argued that carbon- and pollution-intensive consumer goods have become increasingly important over the past 10-20 years, of which the data only grasps roughly nine years and thus such trends might not be visible yet. In addition, as touched upon before, a stronger operationalisation of the concept of redistribution preferences with a larger reach might paint a more accurate picture.

In terms of policy implications, the results show that redistribution preferences have a statistically significant negative effect and thus plays a role in support for environmentally related taxation. To increase support for environmentally related taxation, policymakers can thus make sure to include progressive elements in their

policy proposals to gather support from the more egalitarian individuals in society. Such progressive elements could be the earmarking of revenues from the policy itself for targeted transfers or designing the instrument in such a way that it does not disproportionately target low-income households (such as taxing high-end luxury items or activities that are generally out of reach for low-income households such as air travel). Nevertheless, it cannot be ignored that in absolute terms the effect is rather small (-0.006), and the model shows that environmental attitudes and trust in government institutions have larger effects on the support for environmentally related taxation. As such the support for environmental taxation policies will most probably remain mostly dependent on these factors.

ENVIRONMENTAL ATTITUDES

The link between environmental attitudes and environmentally friendly behaviour has been demonstrated numerous times in empirical studies (Fielding & Hornsey, 2016; Gifford & Sussman, 2012; Li et al., 2019; Poortinga et al., 2019). In their literature review of determinants of pro-environmental behaviour, Li et al. (2019, p. 30) found that: "Generally, most studies suggest that environmental attitude is the major determinant of environmental behavior". This is reflected in the results. Individuals who are more supportive of environmentally related taxation have higher levels of environmental attitudes. In other words, individuals who care more or exhibit concern for the environment are more supportive of environmentally related taxation. More importantly, environmental attitudes has the highest effect on support for environmentally related taxation compared to the other two explanatory variables included in the model.

When comparing developed and developing countries and the effect of environmental attitudes the results show that environmental attitudes have a larger effect for individuals from developed countries compared to individuals from developing countries. In other words, for individuals from developed countries the support for environmentally related taxation comes with higher levels of environmental attitudes. This does not mean that individuals from developed countries are more concerned about the environment, but that support for environmentally related taxation in developed countries is requires higher levels of environmental attitudes. This is important in the context of policy implications as it suggests that individuals in developed countries with lower levels of environmental

attitudes are less supportive of environmentally related taxation compared to individuals from developing countries with similar levels of environmental attitudes. Environmental taxation policies in developed countries will thus require higher levels of environmental attitudes among its citizenry in order to gather support. This means that next to sound policy design, policymakers also have to make sure make apparent the need for environmental (taxation) policies in such a way that speaks to people and helps them realise the urgency that needed with these kinds of policies in order to comply with internationally binding agreements as well as ensure livelihoods.

TRUST IN GOVERNMENT INSTITUTIONS

As the literature already showed, if people trust their government, they will trust them to implement sound and effective policies and act responsibly with the added revenues from environmentally related taxation (Criqui et al., 2019; Harring & Jagers, 2013). In addition, trust in government institutions is especially of importance for environmentally related taxation as a specific policy compared to other emission reduction policies (Rhodes et al., 2017). The results corroborate this: individuals who are more supportive of environmentally related taxation have higher levels of trust in government institutions including the government itself as an entity, the parliament, and political parties. In terms of differences between individuals from developed and developing countries the effect of trust in government institutions on support for environmentally related taxation is about equal. The effect is a little bit higher in developed countries compared to developing countries, but not substantially larger.

The effect of trust in government institutions is not as large as environmental attitudes in the context of support for environmentally related taxation but can, however, give important insights into why perhaps previous policies have failed and how to communicate about new policies to make clear to people how the added revenue is spent. By being transparent about the workings of the policy and its instrument government can increase citizens' trust, while also increasing further support. For instance, policies including taxation receive more public support when their revenues are earmarked for further efforts in the same policy domain or to alleviate affected groups (Braathen, 2012; Criqui et al., 2019; Klenert et al., 2018; Steg et al., 2006). To create higher acceptance rates these revenues could be used for targeted transfers to diffuse the concentrated costs of environmentally related taxation while also creating interest groups that will enduringly support the policy and create

path-dependency (Klenert et al., 2018). This will also speak to the group of individuals opposed to environmentally related taxation that hold more egalitarian views, as targeted transfers will reduce the regressivity of a tax and thus reduce the inequality that it might create.

REFLECTION ON EMPIRICAL METHOD

At this point it is also appropriate to reflect back on the empirical method used to achieve these results and conclude on some limitations that became clear through the practical application of the methodology. First, to get more insight into the exact relationship between redistribution preferences and support for environmentally related taxation a broader measure of redistribution preferences could be used. The current operationalisation used through an individual's income equality preferences is rather limited and could be extended to include broader socio-political and socio-economic indicators of the concept of redistribution preferences. In addition, a more recent sample could give some interesting insights into how individuals' preferences and support for environmentally related taxation have changed over the years, especially now that climate change, sustainability, and the environment are frequently found on the political agenda and in the media.

These are just some reflections on the empirical method itself, other extensions and improvements of the research are also possible, which will be discussed in the following chapter: the conclusion. The conclusion will also serve as a summary of the entire paper and present concrete answers to the research question and following policy recommendations, as well as indicate further research avenues.

CONCLUSION

Adapting towards and mitigating climate change is perhaps one of the biggest social and political issue we currently face. Reducing emissions on local, national, and international levels is crucial in order to reach 1.5°C goals set in the 2015 Paris Agreement (IPCCC, 2018). People and companies need to change their behaviour, politicians and civil servants need to come up with sound policies, and international cooperation is needed to tackle this issue. Knowing the makeup of individual attitudes towards environmentally related taxation can help policymakers, politicians, and researchers in devising policy and choosing the right instruments and the way to communicate about their decisions. Many economists see taxation as one of the most cost-effective and efficient instruments available to deal with the negative externalities that are created due to environmentally harmful behaviour (Barde & Godard, 2012; Braathen, 2012; Criqui et al., 2019; Milne & Andersen, 2012; Sairinen, 2012; Tol, 2018). Yet, in practice, environmental related taxes are some of the least used environmental policy instruments in the world (Bovenberg & Goulder, 2002; Carattini et al., 2018; Kallbekken & Sælen, 2011).

Due to the nature of environmentally related taxation as an instrument and the way such policies are perceived by individuals, support for environmentally related taxation is made up of complex dynamics. Many factors play a role in whether an individual supports environmentally related taxation or not. There is an extensive literature on the determinants of public support or opposition for environmentally related taxation, with many focusing on the perception individuals have of taxation (Carattini et al., 2017; Dresner et al., 2006; Heres et al., 2013; Kallbekken et al., 2011; Klenert et al., 2018), the distributional implications and fairness of taxation (Criqui et al., 2019; Jaccard, 2012; Jagers & Hammar, 2009; Kallbekken & Sælen, 2011), and the influence of the level of trust in government institutions (Criqui et al., 2019; Dresner et al., 2006; Harring & Jagers, 2013; Jagers & Hammar, 2009; Klenert et al., 2018). With the possible negative effects of environmentally related taxation on lower income households, environmentally related taxation is a double-edged sword that on the one hand reduces negative environmental externalities and welfare, yet on the other hand can very easily increase inequality if not implemented and designed correctly. The

preference for regressive or progressive taxation is influenced by the way an individual perceives the world and believes the way it should work. More egalitarian individuals who favour equality for all are generally more in favour of environmentally related policies, as opposed to individuals holding more individualistic worldviews who do not want their individual freedoms impeded upon, especially by the government (Drews & van den Bergh, 2015; Leiserowitz, 2006; Smith & Leiserowitz, 2013). The research puzzle that this paper thus tried to grapple with was whether more egalitarian individuals will also be more in favour of environmentally related *taxation* as compared to general environmental policies. More egalitarian individuals would in principle oppose environmentally related taxation due to its inherent regressiveness as an instrument in this policy area.

In order to uncover what role there is for redistribution preferences in explaining support for environmentally related taxation the main research question was as follows: *What is the relationship between redistribution preferences and support for environmentally related taxation?* With this research question the aim was to analyse the effect of redistribution preferences on individuals' support for environmentally related taxation. A secondary, sub-question also follows from the theory which focuses on the difference between developed and developing countries: *Are more egalitarian individuals from developed countries less supportive of environmentally related taxation?* With this sub-question the aim was to extend and strengthen the research and gather more insights into the dynamics of the relationship between redistribution preferences and support for environmentally related taxation in the context of developed and developing countries. In order to test the accompanying hypotheses and come up with an answer to these questions this paper made use of a quantitative approach making use of the World Value Survey data. Some limitations of the design were the limited measure of redistribution preferences and the age of the data. The measure used to approximate an individual's redistribution preferences was solely based on their stance on income equality. A broader measure with multiple data points to indicate other socio-political and socio-economic indicators such as stances on equal opportunities or government intervention could prove more insightful in the dynamics of redistribution preferences. In addition, the data is between 12 and 27 years old, a couple of decades in which there has been many changes in the world and

how environmental issues are perceived. As such, very different results are possible on the basis of newer data due to these societal shifts.

The results show a consistent negative relationship between redistribution preferences and support for environmentally related taxation, meaning that indeed more egalitarian individuals are less supportive of environmentally related taxation. More specifically, the results show that more egalitarian individuals are less supportive of environmentally related taxation, while higher environmental attitudes and higher trust in government make individuals more supportive of environmentally related taxation. In addition, higher support for environmentally related taxation correlates with higher education levels, being female, and being more left-wing on the political left-right divide. There are smaller positive effects of income and location as well, suggesting that some individuals who are more supportive of environmentally related taxation have slightly higher incomes and live in larger cities or more populated areas. In the context of the sub-question the results paint a different picture. There is a negative relationship between redistribution preferences and tax support in developed countries, however the same is true for developing countries. In other words, there is no difference in the relationship between redistribution preferences and support for environmentally related taxation for individuals from developed and developing countries. The largest differences between developed countries and developing countries can instead be found in the relationship between environmental attitudes and support for environmentally related taxation, as well as in the effect of the education level and income bracket an individual falls in. For individuals from developed countries environmental attitudes has a larger effect on support for environmentally related taxation than individuals from developing countries. The same goes for the education level when comparing individuals from developed and developing countries. The opposite is true for the effect of an individual's income on support for environmentally related taxation: higher levels of support for environmentally taxation for individuals from developing countries is accompanied by higher incomes compared to individuals from developed countries.

On the basis of these results, and in answering the main research question, it can be concluded that there is negative relationship between redistribution preferences and support for environmentally related taxation. This negative relationship shows that individuals who hold more egalitarian worldviews are more opposed to

environmentally related taxation. On the basis of this the literature would suggest that this is because of the often regressive nature of environmentally related taxation which would make more egalitarian individuals oppose such policies due to their redistributive implications and effects on equality. In answer to the sub-question regarding the difference between developed and developing countries, the results show that there is no difference in the relationship between redistribution preferences and support for environmentally related taxation for individuals from developed and developing countries. The main policy implication of these results is that more egalitarian individuals who in general are more supportive of environmental policies are more opposed to environmental taxation. This shows how important the design of policies is in gathering support. Policymakers could earmark the revenues of environmentally related taxation—which on its own already contributes to higher support (Baranzini & Carattini, 2017; Braathen, 2012; Carattini et al., 2017; Criqui et al., 2019; Klenert et al., 2018; Steg et al., 2006)—for individuals or households that are disadvantaged by the tax. There is a large role for communication in this: many studies have already shown that understanding of policies and their instruments is vital in gathering support for environmentally related taxation (Chiroleu-Assouline & Fodha, 2014; Dresner et al., 2006; Kallbekken & Sælen, 2011). This kind of transparency from government can also help increase trust in government and its institutions which further contributes to support for environmentally related taxation. Additionally, being clear in the communication about the need for these kinds of policies in combatting climate change and environmental degradation could raise more awareness and increase environmental attitudes. In sum, creating environmental policies remains a complicated endeavour, however, and as shown by the results in this paper there are many factors to be taken into consideration.

Further research can help contribute to analyse and provide insights into these complicated endeavours, such as the exact workings of why certain individuals oppose environmentally related taxation and others do not, and how such concerns could be alleviated in order to increase support. For instance, using broader measures of redistribution preferences, environmental attitudes, and trust in government institutions to see where the exact causal relationship lies—whether it is trust in the government as a whole, or just one of its entities that causes individuals to be less supportive of environmentally related taxation; and which environmental concerns

are most salient among certain groups of individuals. More insights into what exact aspects of environmentally related taxation policy individuals do not support could also prove fruitful in recognising flaws in policy designs and improving them. Another interesting extension of this research could be to look at countries that are especially vulnerable to climate change, such as Small Island Developing States (SIDs) or other highly vulnerable countries to see whether the vulnerability of these such countries affect individuals' support for environmentally related taxation. Many avenues of further research are thus possible, and more research is also needed in order to create effective, science-based environmental and climate policy that does not disproportionately affect certain groups in society, which is so desperately needed.

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APPENDIX I. PCA TRUST IN GOVERNMENT INSTITUTIONS

To operationalise trust in government institutions as widely as possible, three variables are being used: trust in government, trust in parliament, and trust in political parties. The descriptive statistics of these variables are summarised in Table 3 below. Respondents were asked how much confidence they have in each of these organisations and could answer based on a four-point Likert-scale from (1) no confidence at all, (2) not very much, (3) quite a lot, and (4) a great deal of confidence. As such, higher values on these variables indicate that an individual has higher trust in their parliament, government, and political parties.

TABLE III. DESCRIPTIVE STATISTICS TRUST IN GOVERNMENT INSTITUTIONS

		N	*%*	*Mean*	*Mode*	*Std. Deviation*
Trust in Government	None at all (1)	35.733	18.18%	.	2	.9392268
	Not very much (2)	69.171	35.18%			
	Quite a lot (3)	64.693	32.91%			
	A great deal (4)	27.005	13.74%			
Trust in Parliament	None at all (1)	41.688	21.54%	.	2	.9240394
	Not very much (2)	73.758	38.11%			
	Quite a lot (3)	57.293	29.60%			
	A great deal (4)	20.790	10.74%			
Trust in Political Parties	None at all (1)	55.275	28.63%	.	2	.8596384
	Not very much (2)	85.283	44.18%			
	Quite a lot (3)	40.706	21.09%			
	A great deal (4)	11.771	6.10%			

For the variable trust in government a total of 196.602 answers were recorded, with 25.236 answers missing due to respondents not knowing or unwilling to answer. For the variable trust in parliament a total of 193.529 answers were recorded, with 28.309 answers missing due to respondents not knowing or unwilling to answer. Last, for the variable trust in political parties, a total of 193.035 answers were recorded with 28.803 answers missing due to respondents not knowing or unwilling to answer.

Across the three variables, trust in political parties is the lowest, with a total of 72.81% of the respondents having “not very much” or “no confidence at all” in political parties. Respondents’ trust in parliament and government is more evenly distributed over the scale, but still slightly skewed towards distrust as 53.36% and 59.65% of respondents having “not very much” or “no confidence at all” in parliament and government respectively.

Making use of a Principal Component Analysis (PCA) it was explored whether these three variables can be computed into one variable: trust in government institutions. This to account for possible issues of multicollinearity down the line. In carrying out this PCA the Cronbach’s Alpha test statistic was first calculated to test the internal consistency of the three variables. With a value of .8224 the Cronbach’s Alpha shows that the internal consistency of the three variables is rather good and can be assumed to not have been over-estimated because of the limited number of items within the variables. In carrying out the PCA, as expected 1 component with an Eigenvalue higher than 1 was extracted, with a value of 2.226 and explaining 74.19% of the total variance of the three variables.

TABLE IV. PCA STATISTICS

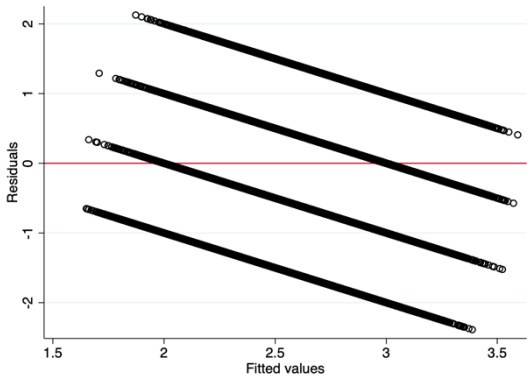
Cronbach’s Alpha	.8224
Eigenvalue	2.226
Explained variance in %	74.19%

On the basis of this, the three variables were computed into one variable using the SUM method. This new variable has a total of 181.129 recorded answers with 40.709 missings. No missings on any of the three base variables were allowed in the creation of the trust in government institutions variable and thus it has a range from 3 to 12, with 3 indicating low trust in government institutions and 12 indicating high support in government institutions. For the sake of interpretation this variable was recoded on a scale from 1-10. For this variable, the biggest group of respondents (24.50%) is found at a value of 4, indicating that most respondents are relatively distrustful of their government institutions. The relevant tables and statistics for the PCA and the base variables used to construct the trust in government institutions variable can be found in the appendix.

APPENDIX II. TESTING THE ASSUMPTIONS

Conditioning through a multivariate OLS regression puts some strong assumptions on the data and the relationships that are aimed to be uncovered. The following six assumptions have been tested: (1) uncorrelated residuals; (2) homoscedasticity; (3) no autocorrelation; (4) normally distributed residuals; (5) no multicollinearity; and (6) linearity. First, the residuals have to be uncorrelated. This is a simple assumption to reach, as the variables are selected on the basis of their theoretical relevance, and thus logically the residuals should not be correlated with any other independent variable not included in the model. Second, homoscedasticity. This means that the standard deviation of the residuals have to be the same for every independent variable. Figure 1 below shows that the variance of the residuals stays the same across the independent variables and thus the data is homoscedastic, meaning that the OLS method can be used.

Figure 1. Homoscedasticity test



Third there can be no autocorrelation, meaning that there the residuals of individual respondents are not correlated. To detect this possible autocorrelation a Durbin-Watson test was carried out. This test-statistic ranges from 0 to 4, with a value of 2 indicating that there is no autocorrelation whatsoever, while values below 1 or above 3 indicate serious issues. The value for this dataset on the Durbin-Watson test is 1.137, which is within the acceptable range. Due to the sensitivity of the Durbin-Watson test to the ordering or sorting of the dataset, which when carried out was sorted on respondent number which groups respondents together on country, year of

interview, and survey wave. As such, the slight tendency towards positive autocorrelation is not that surprising and should not pose too many issues when also considering that the over- and underestimation of the standard error caused by this autocorrelation usually takes place at the same time and thus cancels each other out.

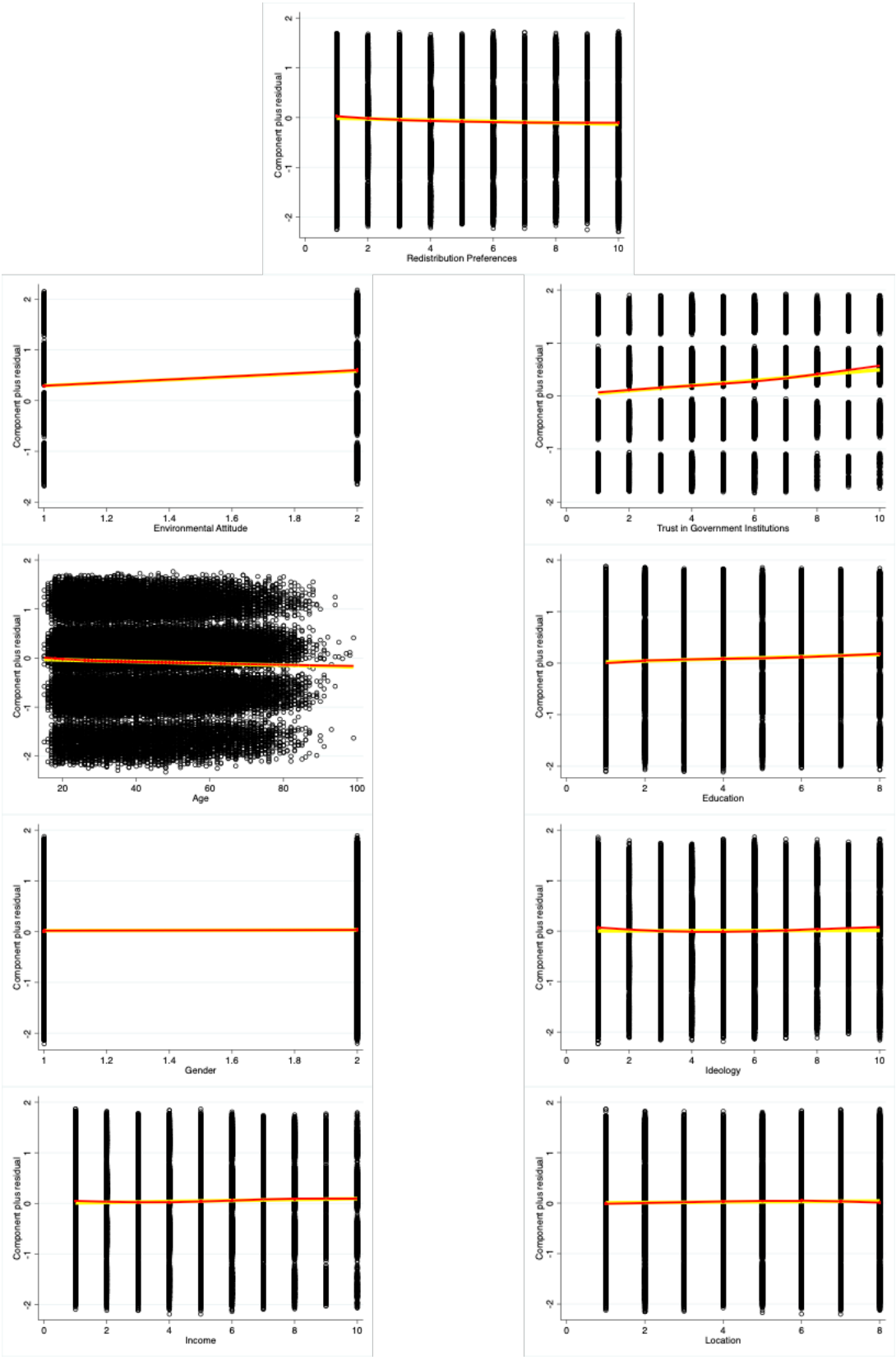
Fourth, the residuals of the regression model need to be normally distributed, otherwise it can affect the sampling distribution of the regression coefficient. However, since there is no autocorrelation or heteroscedasticity, and a relatively large dataset is used (N = 221.838), it logically can be assumed that the residuals are normally redistributed. Fifth, there can be no multicollinearity. This refers to the fact that the independent variables cannot be too intercorrelated with each other, or in other words, the independent variables cannot explain a large portion of each other's variance. To test for this the Variance Inflation Factor (VIF) has been calculated for the main explanatory variables. No values drastically higher than 1 have been reported, and thus the assumption of no multicollinearity holds. These values are reported in Table 5 below.

TABLE V. MULTICOLLINEARITY TEST

	VIF
Redistribution Preferences	1.04
Trust in Government Institutions	1.03
Environmental Attitudes	1.01
Age	1.04
Gender	1.01
Rural vs Urban	1.05
Income	1.12
Education Level	1.19
Political Ideology	1.05

The last assumption to be tested is linearity. Since regressions assume a linear relationship between the dependent and independent variables, it is important that this relationship that the model forces upon the data is indeed linear. This has been tested by comparing the Lowess-line with the linear regression line in the partial residual plots of all independents and the dependent. As can be seen in the Figure 2 below, the Lowess-lines in all partial residual plots are roughly linear. As such, it can be assumed that the data is indeed linear and an OLS regression is the best estimation model.

Figure 2. Linearity Test



APPENDIX III. COUNTRY DIVISION

TABLE VI. COUNTRY DIVISION

Country	*Developed/Developing*	*Economy in Transition*	*Major Developing Economy*
Albania	1 (=developed)	X	
Algeria	0 (=developing)		
Andorra	0		
Azerbaijan	1	X	
Argentina	0		X
Australia	1		
Bangladesh	0		
Armenia	1	X	
Bosnia Herzegovina	1	X	
Brazil	0		X
Bulgaria	1	X	
Belarus	1	X	
Canada	1		
Chile	0		X
China	0		X
Taiwan ROC	0		X
Colombia	0		X
Croatia	1	X	
Cyprus	0		
Czech Rep.	1	X	
Dominican Rep.	0		
El Salvador	0		
Ethiopia	0		
Estonia	1	X	
Finland	1		
France	1		
Georgia	1	X	
Germany	1		
Ghana	0		
Guatemala	0		
Hong Kong SAR	0		X
Hungary	1	X	
India	0		X
Indonesia	0		X
Iran	0		X
Iraq	0		
Israel	0		X
Italy	1		
Japan	1		
Jordan	0		
South Korea	0		X
Kyrgyzstan	1	X	
Latvia	1	X	
Lithuania	1	X	
Malaysia	0		X
Mali	0		

Mexico	0		X
Moldova	1	X	
Montenegro	0		
Morocco	0		
Netherlands	1		
New Zealand	1		
Nigeria	0		
Norway	1		
Pakistan	0		X
Peru	0		X
Philippines	0		X
Poland	1	X	
Puerto Rico	0		
Romania	1	X	
Russia	1	X	
Rwanda	0		
Saudi Arabia	0		X
Serbia	0		
Singapore	0		X
Slovakia	1	X	
Vietnam	0		
Slovenia	1	X	
South Africa	0		X
Zimbabwe	0		
Spain	1		
Sweden	1		
Switzerland	1		
Thailand	0		X
Trinidad and Tobago	0		
Turkey	0		X
Uganda	0		
Ukraine	1	X	
North Macedonia	1	X	
Egypt	0		X
United Kingdom	1		
Tanzania	0		
United States	1		
Burkina Faso	0		
Uruguay	0		
Venezuela	0		X
Zambia	0		