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ECONOMIC INEQUALITY, CORRUPTION, AND PERSONAL ENVIRONMENTAL RESPONSIBILITY IN EUROPE

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Abstract

Climate change represents a serious challenge to all societies, not least in Europe. For so long the elephant in the room, the scientific evidence for anthropogenic climate change is now accepted by an overwhelming majority of Europeans. So, how should Europeans address the issue? It is argued that personal environmental responsibility (PER)—a sense of personal obligation toward the environment and individual accountability for environmental outcomes—is an important factor in facilitating the collective action required to address climate change. Using data from the European Social Survey, a cross-country multilevel regression analysis and structural equation modelling were performed to explore various factors that influence PER. The results indicate that economic inequality and corruption are significant predictors of PER in Europe and that social trust plays a significant mediating role in these relationships. These findings are a useful addition to the body of empirical evidence that should be utilised by European policy makers to help formulate effective pro-environmental approaches at all levels. In addition, they provoke further discussion of the importance of personal responsibility within large-scale collective action problems.

Keywords: Economic inequality, corruption, social trust, responsibility, collective action, environment, climate change.

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1. Introduction

The United Nations Intergovernmental Panel on Climate Change's 2018 Special Report examining the impact of a global warming of 1.5° celsius above pre-industrial levels notes that anthropogenic climate change has already led to an increased frequency and intensity of extreme weather events (IPCC 2018). While technically possible, it is “extremely improbable, absent a real sea change” that the global community will manage to limit temperature rises to just 1.5°, in which case even more damage will be done: More species will be lost, water resources will become more scarce, and mortality rates will increase to list but a few of the myriad negative outcomes (Millman 2018; IPCC 2018).

Many important features of the environment constitute common goods and their deterioration presents a serious threat to societies who should have an interest in protecting and sustaining natural resources required to maintain and improve living standards.¹ Yet some are better than others at managing common goods: Why do some societies fail while others succeed? It is argued in this paper that personal responsibility is an important factor in facilitating the collective action required to address climate change. This study will therefore focus on the variables that shape feelings of personal responsibility and thus by extension affect norms and behavioural outcomes, rather than on the behavioural outcomes themselves. In which social contexts do individuals feel greater or reduced personal environmental responsibility (PER)? For the purposes of this paper, PER is defined as an individual's sense of a personal obligation toward the environment and that their individual actions matter.

The numerous stakeholders that share responsibility for addressing environmental problems can be categorised broadly into: State and supranational institutions (for example, the EU and its Member States); regional organisations, private companies and interest groups; and individuals. The EU, encompassing less than 7% of the world's population, is responsible for over 15% of global income and export volume. At the same time, only two of the EU28—Sweden and Austria—produce more than 50% of their energy using renewable sources and the vast majority are net importers of energy created from the burning of fossil fuels. Furthermore, the EU accounts for at least 14% of global greenhouse gas emissions

¹ A common good is non-exclusive (i.e. anyone can use it) but rivalrous (consumption by one person affects supply to others)—examples include fish stocks and forests. A public good is also non-exclusive but is non-rivalrous (consumption by one person does not affect supply to others)—examples include sunshine, public parks, or knowledge.

(Climate Watch 2018; Europa.eu 2019). A primary focus on trade within the EU's sustainable development strategies inhibits environmental policy development while the nature of climate change questions means they cannot be placed into traditional bureaucratic categories and often overlap numerous policy areas (Lightfoot and Burchell 2005; Poletti and Sicurelli 2012; Afionis and Stringer 2014). This has caused confusion as to who should actually speak for the EU, ultimately leading to reduced efficiency (Lightfoot and Burchell 2005).

Legislation at the EU level influences the actions of private organisations that must comply with it and who often go further than simple compliance through corporate social responsibility programmes that are increasing in importance.² At the individual level, motivations for pro-environmental behaviour are best described as a combination of rational self-interest (for example acting to protect one's own health) and broader pro-social concerns (for example acting to preserve common resources) (Bamberg and Möser 2007). These two perspectives find their roots in Azjen's (1991) theory of planned behaviour (TPB) and Schwartz's (1997) norm activation model (NAM).³ Individual pro-environmental behaviour is not always the product of pro-environmental personal norms and in certain circumstances a lack of knowledge may even result in pro-environmental intentions leading to environmentally detrimental behaviour. Ultimately, behaviour is determined by multiple variables that sometimes overlap with each other (Stern 2000).

The climate change debate is increasingly focusing on individual responsibility (Eriksson 2019). To be responsible for something is to accept personal accountability for an outcome. To execute actions—whether passive or active—that are the product of independent decision making also requires an evaluation of one's individual agency. Student participation in recent worldwide 'school strikes' is one example that shows individuals are conscious of their personal roles in influencing global environmental matters. The dismissive responses of some governments, themselves staffed by precisely the types of people held to be most culpable for insufficient environmental action over recent decades should only strengthen the feeling, particularly among younger people, that individual actions are now more

² However, it should be noted that many of these corporate programs are themselves ineffective, are simply 'greenwash', or are only superficially pro-environmental (Lyon and Montgomery 2015; Chan et al. 2018; Walenta, 2018).

³ See literature review part 2.1 for a more detailed explanation of these theoretical models.

important than ever.⁴ Large organisations such as the state can in many cases no longer be relied on to provide the necessary solutions.

There is room for further investigation of the relationships between environmental issues and social context, and the mechanisms through which such relationships are facilitated. Numerous factors will be explored, though economic inequality and corruption at the contextual level and social trust at the individual level will be of particular interest. To re-frame as a research question: Do economic inequality and corruption impact individuals' feelings of PER? The theorised mechanism under investigation is that greater economic inequality and corruption create larger distances between different segments of society and reduce social cohesion, therefore reducing individuals' willingness to take personal costs for the collective good. In other words, economic inequality and corruption are expected to reduce PER, partly or fully as a result of their negative influences on levels of social trust. This also implies that reduced social trust is an important factor in the development of inequality and corruption.

17 of the 20 best-performing countries according to the 2018 Environmental Performance Index (EPI), which ranks 180 countries on numerous indicators relating to environmental health and ecosystem vitality, are in Europe (Wendling et al. 2018). Inequality is also lower in Europe than in any other world region (Alvaredo et al. 2018). 14 of these 17 best-performing European countries per the 2018 EPI are in the EU, and income inequality is below the EU average in all but two of those countries (Eurostat 2018). Some of the most unequal EU countries—such as Romania and Bulgaria—are also among the EU's worst EPI performers. A similar trend can be observed with respect to corruption: The EU countries in which corruption was perceived to be a total or widespread problem by over 80% of people generally perform worse on the EPI compared to countries where corruption is lower than the EU average (European Commission 2017a; Wendling et al. 2018).⁵ Given that economic inequality and corruption are positively correlated (Gupta et al. 2002), it is useful to include both in the analysis so that their effects can be observed separately.

This investigation will make a valuable contribution to the literature because although there are many studies focusing on the effects of economic inequality and corruption and many

⁴ For example, the UK government was critical of a recent school strike involving over 10,000 students across 60 cities. However, when MPs were offered the opportunity to debate climate change in the House of Commons two weeks later (the first Commons debate on the subject in two years), the government benches were conspicuously empty (Laville 2019).

⁵ With the notable exceptions of Spain and Italy.

more focusing on pro-environmental behaviour and PER, there are, to the best of the author's knowledge, none that focus specifically on a mechanism linking economic inequality and corruption with PER. The conclusions of this study will be useful for policy makers: If support is found for the theorised relationships, policy makers hoping to reach environmental goals should focus on policies that address economic inequality and corruption, thereby achieving an indirectly positive environmental result. It may be easier to convince the public to accept broader social and economic policies with pro-environmental spillover than to convince them to accept explicitly environmental legislation.

This paper is structured as follows: The next section will consist of a review of the relevant literature on PER, inequality, corruption, and social trust. A theoretical framework and hypotheses will be provided in the section three. This will be followed by an explanation of the methodology, validity, data, and operationalisation of concepts and variables. The limitations of the study will be presented in section five, with the results of the analysis reported in section six and an in-depth discussion of the results provided in section seven. The final section will contain conclusions drawn from the findings as well suggested avenues for future research.

2. Literature review

2.1 Personal environmental responsibility

Many natural resources are considered to be common goods. Therefore, individual actions to protect or preserve them are encapsulated within collective action dilemmas. If all members of a society incur personal costs to contribute toward sustainable management of a common good, then all receive a positive pay-off that exceeds the individual contribution. However, if an individual chooses not to contribute (i.e. incurs no personal cost) yet still receives a pay-off, that individual's gains are optimised at the expense of the marginal gains of all other individuals, thus contributions are no longer rational for anyone (Ostrom 1998).

If an actor is aware of a collective action issue but feels little or no personal responsibility, they may be less likely to act or may act less effectively. A well-known example of this is the 'bystander effect', describing the tendency for an individual to react more slowly or not react at all to an emergency situation in the presence of multiple other bystanders (Darley and Latané 1968). The authors suggest that the individuals are not necessarily *refusing* to act, rather that their decision making is significantly inhibited by the fear of incurring a personal cost outweighing the potential benefits of the action. If an individual feels no personal responsibility, the same essential outcome that results from a lack of awareness—inaction—is reached even when the individual is aware of an issue. However, if an individual is more strongly connected to the group of 'bystanders', this effect should be less prevalent.

Similarly, Keinan and Bereby-Meyer (2017) have examined the role of personal responsibility in the assessment of passive (latent, perceived) and active (immediate, tangible) risks. Passive risk-taking—defined by the authors as “foregoing an opportunity to act to reduce outcome variance” (Keinan and Bereby-Meyer 2017:999)—requires less personal effort even though potential costs are the same or even magnified compared to when individuals respond actively. The authors show that underestimation of passive risks (like climate change) is partly due to the reduced feeling of personal responsibility associated with these types of risks. Adherence to social norms is one explanation for passive behaviour, and feelings of personal responsibility can reduce the influence of these norms on pro-environmental behaviour (Dwyer et al. 2015). On the other hand, Obradovich and Guenther (2016) found that emphasising collective responsibility was more effective in

eliciting pro-environmental monetary donations and behavioural intentions (though monetary donations in themselves are arguably a way of buying one's way out of accountability).

Numerous theoretical frameworks have been utilised to try and explain pro-environmental behaviour: Azjen's (1991) TPB has been an influential starting point for many and Stern et al.'s (1999) value-belief-norms (VBN) model offers a differing yet similarly authoritative perspective. TPB is a rational choice model that emphasises the influence of expected personal outcomes on an individual's willingness to engage in a certain behaviour: Positive expected personal outcomes increase engagement in a behaviour and vice versa. On the other hand, the VBN is more positive about the possibility for collective action in asserting that feelings of moral obligations, normative influences and collective interests are important in producing environmentally significant behaviour (Jagers et al. 2017). Both the TPB and the VBN build partly on Shwartz's (1977) NAM, in which personal norms are held to be foundational to behavioural outcomes and the norms themselves are determined by both an awareness of the consequences of and a feeling of responsibility for behavioural actions (or inaction) (Onwezen et al. 2013).

Stern et al. (1999) point out that the VBN model is dependent on ascription of responsibility: that individuals are aware that their actions can (positively or negatively) impact the situations of others. This dynamic has been referred to in psychology literature as an individual's locus of control. An internal locus of control indicates that the individual is confident their actions make a difference; an external locus of control suggests an individual believes the opposite—that their actions are insignificant—and may encourage individuals to pass on or delegate responsibility instead (Kollmuss and Agyeman 2002). An internal locus of control is necessary if values are to manifest as behaviour (Gifford and Nilsson 2014).

The importance of information framing and context to individual environmental values and feelings of PER is also worth noting. The type and quality of information available to individuals affects the shaping of environmental values (Dietz, Dan and Shwom 2007). An individual's values dictate the way they interpret information on issues like climate change by acting as an information filter and recent developments in the climate change debate show that many argumental positions are based on an individual's values rather than the actual scientific fact (Corner, Markowitz and Pidgeon 2014). Competing worldviews that form the foundations of arguments can also increase the distance between two sides (for

example those that feel personally responsible for the environment and those that do not) to the point where debate is so polarised that neither side is able to engage in reasoned or meaningful dialogue (Hoffman 2011). In such situations, an individual's locus of control may become externalised.

2.2 Inequality

Economic inequality has long been at the centre of debates on the distribution of goods. Liberal thinkers such as John Rawls (1993:6) have argued that inequalities are justified providing that they are “attached to positions and offices open to all under conditions of fair and equal opportunity... [and are] to the greatest benefit of the least advantaged members of society”. In other words, inequality ‘lifts all boats’ as the rich are incentivised to benefit from opportunities they ‘create’ for the less well-off in society. In reality, however, positions and offices are not open to all under conditions of fair and equal opportunity even in the world’s most equal societies.

A number of studies have examined the relationship between inequality and trust. Many find that inequalities emphasise structural divisions within society, leading to situations where different groups do not coexist: they attend different schools, shop at different stores, live in different neighbourhoods and consume different media (e.g. Buttrick and Oishi 2017). The association between reduced trust and increased income inequality at the national level may be due to the fact that wealthier people have a vested interest in keeping institutions from strengthening and distributing resources more fairly (Wilkinson and Pickett 2010).

Paskov and Dewilde (2012) examined relationships between income equality and social trust framed as solidarity (measured as the willingness to promote the welfare of people). The authors drew a theoretical distinction between calculated and affective solidarity: In calculated solidarity, an individual is only willing to promote the welfare of another person if there is a chance to improve their own welfare as a result. Affective solidarity refers to behaviours that promote the welfare of others motivated instead by a feeling of moral duty. The authors’ findings confirmed the expectation that externalities of increasing inequality—for example widened social gaps—lead to weakened solidarity. Notably, the negative relationship between solidarity and income inequality held when controlling for social status, indicating that inequality reduces trust among rich people as well poor.

More equal communities may more effectively avoid the ‘tragedy of the commons’ and more effectively build and maintain the trust on which collective action depends. Cardenas (2007) found communication to be a key factor in cooperation, building trust, and achieving common goals. When all members of a heterogeneous group in rural Columbia were equally dependent on a common resource, inequality and wealth distance made communication and therefore cooperation more difficult. This result replicated previous studies showing a negative correlation between free-riding behaviour and effective communication between different groups.

The impact of economic inequality on the environment has been extensively explored. Studies on this topic can be grouped into two broad categories: those implying that inequality has a negative impact on the environment, and those suggesting that greater inequality can result in reduced environmental pressures (Berthe and Elie 2015). In the first category, possible explanations include that in unequal societies, individuals develop consumerist attitudes toward the environment, policies focus more on growth than on sustainability, and power becomes invested in the rich who have little interest in protecting the environment and can afford to maintain their levels of consumption while displacing environmental costs. The opposing argument is that the economic activity of the richest percentiles creates less environmental strain and that rich groups actually encourage environmental protection policies. This argument, which indicates the existence of an environmental Kuznets curve, appears to be the more contested of the two⁶, though the idea that environmental and economic development can complement one another has received empirical support (e.g. Etsy and Porter 2005).

Newman and Fernandes (2015) demonstrated that environmental loci of control and, more broadly, beliefs associated with the environment, are significantly correlated with individual income levels, even when levels of awareness increase. They suggest this may be because lower-income individuals have fewer opportunities to exercise pro-environmental behaviour (due to social gaps created by inequality) and therefore fewer opportunities to reinforce their internal locus of control. This shows how a person’s environmental values—which are often important prerequisites for environmental behaviour (Stern et al. 1999)—might be affected by economic inequality.

⁶ Contested in the sense that it provides a useful excuse for those wishing to pursue exclusively economic development: It implies environmental standards, protections etc. will be ‘dragged up’ once economic development hits a certain level (thus no extra effort need be spared on direct environmental action).

If increased inequality has the effect of breaking down trust throughout all social strata, then it follows that motives for pro-environmental collective action, such as personal responsibility, should be negatively affected. Bamberg and Möser's (2007) comprehensive meta-analysis of studies exploring psycho-social determinants of environmental behaviour produced similar results to the Hines et al. (1987) study that it was replicating, namely that knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and an individual's sense of responsibility are associated with responsible environmental behaviour. Given the lack of temporal overlap between these two meta-analyses, the consistent findings suggest that motives for pro-environmental behaviour are not so significantly affected by shorter-term social change, and instead are predicted more accurately by factors that remain relatively 'sticky' over longer periods, such as economic inequality.

2.3 Corruption

Corruption is the abuse of entrusted power for private gain (Transparency International 2018b). Level of corruption is often used as one indicator for assessing quality of government, as a corrupt government is less likely to fairly and efficiently manage common goods for the benefit of all. Among the identified socially detrimental outcomes of corruption are increased levels of economic inequality and poverty (Gupta et al. 2002), reduced levels of voter engagement in political processes (Chong et al. 2015), and reduced social trust. Trust and corruption can even be seen as diametrically opposing concepts: Trust is the foundation of cooperation with others; corruption is the expropriation of resources that belong to others (Uslaner 2002). Corruption reduces social trust, while social trust can also act as a counterforce against corruption (Richey 2009; Graef and Svendsen 2013). It follows that more trusting societies are likely to also be less corrupt.

Numerous studies have also explored the relationship between corruption and environmental outcomes. For example, while differing levels of corruption do not remove the environmental kuznets curve, they do influence the curve's 'turning point': the point at which increasing income levels become associated with decreasing pollution levels. This threshold is higher, and further from the optimum, where levels of corruption are higher (López and Mitra 2000; Leitão 2010). Also related to income levels, Cole's (2007) findings indicate that reducing corruption would have the most positive environmental effect in high-income countries. Furthermore, Povitkina (2018) found that CO₂ emissions were generally lower in

democracies than in authoritarian regimes, but only if corruption was also low, suggesting that people's willingness to engage in collectively-beneficial behavior is reduced in high-corruption contexts. People in such situations may feel reduced PER as they perceive their commitment to collective issues as not being matched by other individuals.

Environmental policy processes are also generally inhibited by corruption. Pellegrini and Gerlagh (2006) reached the rather depressing conclusion that corruption is a significant determinant of environmental policies and that democracy is not, suggesting that lobbying and bribery are successful in pushing environmental policy in the preferred directions of the respective actors. Harring (2014) demonstrated that individuals perceive economic policy instruments to be less effective in more corrupt countries (and also more economically unequal countries). One possible result of this could be that individuals feel greater PER as they are reluctant to rely on the adherence of others to pro-environmental policies, though they equally may feel less PER living in a rigged system they feel powerless to change.

Oguzhan and Fredriksson's (2018) investigation of environmental regulatory policy is of particular interest. In line with Fredriksson and Mani (2002), the authors found the stringency of environmental policies is reduced when corruption increases, but, most importantly, levels of social trust were found to mediate this effect to the extent that the negative relationship between stringency of regulation and corruption even reversed with high levels of social trust. One explanation they suggest is that environmental interest groups are relatively diverse and dispersed when compared to industry organisations. Higher levels of social trust are required for environmental groups to organise, putting the industry organisations at a competitive advantage when trust is low. This advantage is eliminated when trust reaches high enough levels to allow environmental groups to organise effectively.

In sum, corruption is associated with social as well as environmental degradation both directly through increased pollution and indirectly through reduced environmental policy effectiveness. The suggestion that social trust mediates the negative effect of corruption suggests that even in corrupt settings, individuals are still willing to take personal costs for the greater good if the level of social trust is sufficiently high to assure them that their sacrifice will be matched by others. For the same reason, an absence of social trust implies a reduced willingness on the part of individuals to engage in environmentally responsible actions. High levels of social trust may be uncommon in highly corrupt contexts, though

social trust is perhaps more likely to persist in such settings than other types of trust, such as political trust.

2.4 Social trust

Olson (1965) states that rational individuals will not voluntarily act in the common good absent some form of pressure or encouragement from a third party. The fact that game theory experiments consistently underestimate real-life levels of voluntary cooperation appears to confirm a “strong rejection of the predictions derived from a complete model of rationality” (Ostrom 1998:5; Putnam 1993). However, the nature of this ‘third party’ is the subject of debate. On one hand, the presence of impartial, high-quality institutions is held to be key to the development of generalised (social) trust and, by extension, social capital (Rothstein and Stolle 2008). On the other hand, Putnam (1993) argues that social capital itself is a ‘soft solution’ to collective action problems. Institutional quality, while facilitating the beneficial management of common and public goods, is a public good in itself and is therefore subject to the same fundamental dilemma: Some sort of force must be present to ensure the “sovereign does not defect” (1993:167). This is a second-order collective action problem as a government cannot be relied on to coerce itself to implement greater self-monitoring and the force required to keep a government in check is therefore external (Knack 2002).

It seems clear from the above that social capital is central to the success of collective action. The question is then how is social capital produced or developed? Definitions of social capital draw attention to the central role played by trust (e.g. Putnam 1993; Adger 2003). Trust, in particular social trust, is becoming increasingly relevant as technological advances enable increasingly frequent communication between individuals from wholly different social groups, while at the same time reducing the face-to-face interaction held by Ostrom (1998) to be crucial for efficacious communication. Other key components of social capital related to trust include reputation and reciprocity: An actor’s reputation is built on repeated and consistent trustworthy behaviour; reciprocity depends on one individual’s belief that if they take a personal cost for another’s benefit, they will eventually receive a benefit in return that at least neutralises their cost. Putnam (1993) illustrates this using the example of rotating credit associations. As the number of participants in a particular group or community increases, the importance of indirect reciprocity—the central mechanism of social trust—also increases. Nowak and Sigmund (2005) note that it is, after all, the pay-off or benefit itself

that matters, not who provides it, and that improved information about the reputation of other actors improves cooperation.

Brehm and Rahn (1997) operationalised social capital at the individual level, reasoning that it is at this level that social capital must be present in order to sustain collective action at the community level. They highlighted a reciprocal relationship between civic engagement and social trust as the foundation of social capital and showed that the most active community participants also felt most positively toward the helpfulness, trustworthiness and fairness of their fellow citizens. With respect to environmental questions more specifically, Jones et al. (2009) also found social capital to be positively associated with a willingness to pay for environmental causes, and that this individual-level trait was a far better predictor of willingness to pay than any macro-level variable such as GDP growth rate or actual environmental conditions.

Social capital also shapes institutional responses. For example, a state may have the capacity to put in place the necessary infrastructure to mitigate the detrimental effects of environmental changes, but this infrastructure must be compliant with prevailing social norms and other contextually specific factors. Furthermore, the development of institutional quality as a product of social capital encourages more effective localised responses to problems such as climate change (Adger 2003). In other words, individuals should be more easily able to understand the impact of their activities on regional, national, and global issues in societies with greater social capital. The formation of social capital in rural communities has been linked to improvements in natural capital, as social institutions based on trust and reciprocity (such as watershed/catchment management, microfinance delivery, and forest management) mediate unconstrained private action (Pretty and Ward 2001). However, Grafton and Knowles (2004) point out that the success of social capital in fostering positive local-level environmental outcomes does not necessarily translate to success at the regional and national level. Overall, the implication here is that higher social capital should result in better management of common pool natural resources and increased engagement in pro-environmental behaviour. These conclusions underline the complexity of the relationship between social capital and environmental protection and highlight the impact of national-level contextual differences.

Levels of trust are also a modifying factor from a policy implementation perspective. For example, higher levels of trust are associated with acceptance of rewarding policies, such as

subsidies, while lower levels of trust are associated with a desire for increased regulation and harsher punishments for rule breakers (Harring 2018). When trust is high and individuals are confident that their costly activities will be suitably reciprocated, engaging in activities to protect the environment is less risky and so less invasive policies are needed. In other words, high levels of both social and institutional trust reduce the tendency for free-riding. Fairbrother (2016) identifies a gap between people's concerns about the environment and their support for pro-environmental policies: The majority of people accept that climate change is a real and serious issue but far fewer are willing to act to mitigate it. Regardless of their level of concern, however, more trusting individuals are more supportive of environmental protection. Thus, policies aimed at improving social trust may be indirectly more effective for environmental protection than simply working to raise awareness of environmental issues among those who are already fairly aware.

Institutional trust is held by Rothstein and Uslaner (2005) to be the precursor to the development of social trust in a society. Although numerous other studies provide support for this theory (e.g. La Porta 1999; Knack 2002; Charron and Lapuente 2013), it is still a little difficult to ascertain exactly how the causal chain was set in motion in the first place: If high institutional trust creates social trust and not the other way around, what trust context allowed for the development of high-quality states in the first place? It seems unlikely that a society would trust a government if its citizens do not trust each other to begin with. For this reason, social trust, as a foundation from which other types of trust emanate, is of central importance to this study, though institutional (political) trust clearly presents an interesting avenue of exploration in itself.

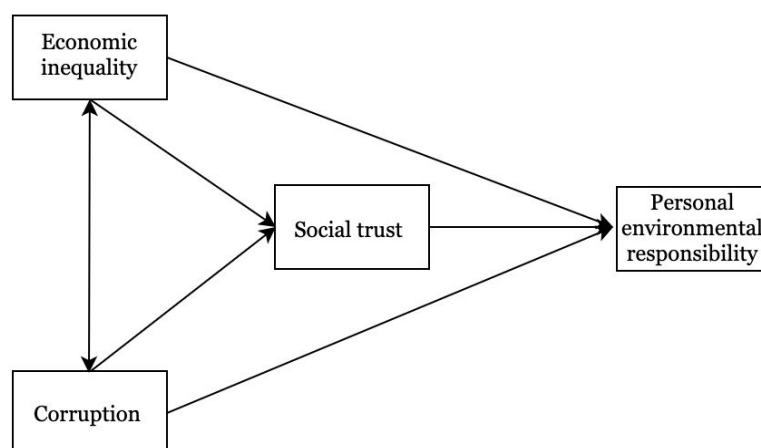
Higher levels of social trust, leading to more efficacious collective action, may increase feelings of PER. It is harder to justify being the only non-cooperative individual in a cohesive society than in a dysfunctional one with lower generalised trust. Social trust is a key building block for the development of social capital and negative externalities of economic inequality and corruption are both reflected in and influenced by reduced social trust. Social trust is therefore expected to exert an important influence on the relationships between economic inequality and corruption at the contextual level and PER at the individual level.

3. Theoretical model and hypotheses

There should be value in investigating how the effects of individual-level factors vary across different country-level contexts. Of particular interest is the theorised impact of economic inequality and corruption on PER, and how this relationship may be mediated by levels of social trust (Figure 1).

As the existing research presented above shows, links between economic inequality, corruption, and various individual-level variables have been extensively covered. Likewise, the relationships between these two contextual variables and environmental degradation and behaviours have also been examined.⁷ However, possible relationships between economic inequality and corruption at the contextual level and PER—an individual's sense of a personal obligation toward the environment and that their individual actions matter—at the individual level do not seem to have been investigated yet. A step will be taken in this direction by testing the first two hypotheses. Economic inequality and corruption are expected to be negatively correlated with PER as social cohesion and intergroup interactions are reduced in highly unequal and corrupt contexts, thus individuals are less likely to believe that taking a personal cost for the common good will be reciprocated or that their individual actions are significant or worthwhile.

Figure 1. Hypothesised relationships between economic inequality, corruption, social trust, and PER.



⁷ Though economic inequality and corruption influence each other, this relationship is not the primary focus of this model.

H1: Economic inequality is negatively correlated with personal environmental responsibility.

H2: Corruption is negatively correlated with personal environmental responsibility.

The level of social trust is theorised to be one mechanism through which economic inequality and corruption impact PER. As economic inequality increases, social gaps widen, social trust is reduced, and individuals become less willing to engage in collective action. Existing literature indicates that increased corruption has a similar effect to economic inequality with respect to social cohesion and it is therefore expected to have a similarly negative effect on PER. The theorised mechanism suggests that the effects of economic inequality and corruption on PER can partly or fully be explained by the role of social trust.

H3: Reduced social trust has a mediating effect on the relationship between economic inequality and personal environmental responsibility.

H4: Reduced social trust has a mediating effect on the relationship between corruption and personal environmental responsibility.

4. Methodology, data, and operationalisation

4.1 Method

4.1.1 Multilevel regression analysis

An OLS regression model is suitable for identifying the significance and strength of a relationship between two or more variables. Economic inequality is a concept that describes the relative difference in economic status between certain individuals within a certain group (in this case individuals within countries) and corruption describes another type of relationship between individuals or groups, so both are therefore contextual variables. Within each country context, individual-level data describes personal opinions and attitudes. If differences in individual-level data are a systematic result of country context, then the assumed independence of variables that is required for a regression to produce accurate results is not met. Generally, violation of the independence assumption results in calculated standard errors being too low, therefore generating spurious significant results (Hox 2010). In such a situation, given that a normal OLS regression is only suitable for investigating single-level data, a hierarchical (or multilevel) model must be used.

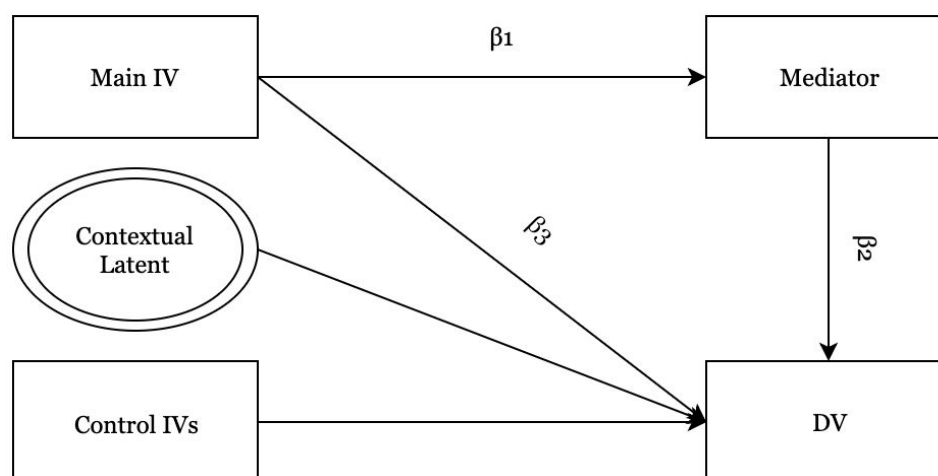
The intraclass correlation coefficient (ICC) indicates the proportion of the variance explained by the grouping structure in the population (Hox 2010). A coefficient of 0 indicates that there is no effect at the country level (conditions specific to a certain country do not systematically affect the individual-level data) and a coefficient of 1 indicates that variation is caused entirely by country-level context. For the data being used for this investigation, the ICC is 0.056. This indicates that 5.6% of residual variance is caused by country-level factors, which, although not particularly high, is sufficiently high to warrant the use of a hierarchical model (LeBreton and Senter 2008).

4.1.2 Structural equation modelling

Although a multilevel regression analysis is useful for ascertaining the relationships between certain variables under specified conditions, it provides less information on how any relationship might be formed. Running multiple models with the exclusion/inclusion of particular predictors can provide some more useful insight, but a more efficient way to investigate these types of questions is through mediation analysis. Mediating variables are

“behavioral, biological, psychological, or social constructs that transmit the effect of one variable to another variable” (MacKinnon, Fairchild and Fritz 2007:594).⁸ Structural equation modeling (SEM) combines path analysis with factor analysis and familiar regression techniques to allow for the investigation of covariance within multivariate structures (Hox 2011), therefore making it a useful tool for conducting mediation analysis. Stata’s generalised SEM (GSEM) framework allows for the creation of multilevel models. A simplified GSEM model for investigating mediation effects is shown in figure X below:

Figure 2. Simplified GSEM mediation model.



where β_3 is the direct effect of the main independent variable on the dependent variable and $\beta_1 \cdot \beta_2$ is the indirect effect of the main independent variable on the dependent variable through the mediator. The total effect is therefore: $\beta_3 + (\beta_1 \cdot \beta_2)$. The contextual latent variable in this case is the country code.⁹

There has been some debate over how mediation effects should be interpreted, or in what circumstances they are worthwhile to investigate. Baron and Kenny’s (1986) influential contribution was for a long time the starting point for any researcher interested in investigating mediation effects. However, recent literature has encouraged a move away from their guidelines. Zhao et al. (2010) argue that the ‘full, partial, or no mediation’ typology suggested by Baron and Kenny (1986) is misleading and that mediating relationships should

⁸ MacKinnon, Fairchild and Fritz (2007) also draw an important distinction between mediators and moderators: A mediator is part of a causal sequence between two variables; a moderator is not.

⁹ A latent variable is not observed or explicitly measured, but instead is inferred from other data. This concept is useful for categorising data in multilevel analysis.

instead be described as competitive, complimentary, or indirect-only.¹⁰ Rucker et al. (2011) further contend that unnecessary emphasis is placed on the ‘X on Y’ relationship and provide empirical evidence for significant effects even when total or direct effects are absent.

4.2 Validity

A number of assumptions must be met in order for a multilevel regression to be a valid method of investigation. One thing worth clarifying to begin with relates to the nature of the survey item responses used for measuring individual-level variables. Responses are recorded on ordered categorical scales, which at first glance makes the data unsuitable for a multilevel linear regression. However, so long as there are at least five systematically distributed response categories, treating the data as continuous does not introduce any significant bias, therefore the use of this method is still valid (Hox 2010). In general, the same assumption checks as for a single-level OLS regression—linearity, normality, homoscedasticity and independence of errors—should be investigated for multilevel models. The treatment of the dependent variable as continuous means there is no violation of the assumption of linearity (Williams 2019) and the residual and predicted values are sufficiently normally distributed.¹¹ The nature of the survey item variables means that heteroscedasticity is not possible to ascertain and a multilevel model should by definition account for independence of errors.

A model containing variables that cannot be estimated uniquely is said to be non-identifiable, a state that is most commonly caused by multicollinearity (Gelman and Hill 2006). Multicollinearity can be diagnosed by measuring the variance inflation factor (VIF), which shows how much the variance in a particular predictor has been ‘inflated’ as a result of a linear dependence with other predictors in the model (Allison 2012).¹² The VIF values for all variables in the model are well below the threshold at which they may be of concern and any issues arising from multicollinearity can be safely dismissed.¹³

Finally, it is useful to check whether there are any influential outliers in the data. Given that there is a relatively small number of groups (i.e. countries) at the contextual level, any significant outliers may be problematic. Estimating Cook’s distance indicated that a number

¹⁰ Complimentary: mediated and direct effects both significant in the same direction. Competitive: both effects significant but in opposite directions. Indirect-only: significant mediating effect but insignificant direct effect (Zhao et al. 2010).

¹¹ See Appendix B, figures B1–B3.

¹² VIF values are obtained by running a multiple linear regression including all predictors and as well as a robust variance estimator to account for within-cluster correlation.

¹³ See Appendix B, table B1.

of countries exceeded the threshold: Israel returned by far the highest value and so warranted further investigation. The most simple way to determine whether Israel has a significant effect on the model is to run the full model, followed by the full model excluding Israel, and compare the results.¹⁴ The results of this test showed that the exclusion of Israel did not make a sufficiently substantive change to the interpretable outcome to justify excluding it from the model.

4.3 Data

Individual-level data is taken from round eight of the European Social Survey (ESS) which focuses on exploring attitudes, beliefs and behaviour patterns of diverse populations in Europe (ESS, 2019).¹⁵ The ESS is a biennial survey participated in by 37 countries since its establishment in 2001. Core questions are included in each iteration of the survey and other items addressing various other topics are included on a rotating basis. The relevant items for this investigation were included in ESS 8 in the rotating module ‘Public Attitudes to Climate Change’. This was the first systematic exploration of public attitudes toward climate change and the questions are broadly based on the foundations provided by Stern et al.’s (1999) VBN model (Poortinga et al. 2018). The fieldwork for ESS 8 took place between August 2016 and December 2017 and covered 23 countries: 18 EU countries, three countries outside the EU but within the European Economic Area (EEA), Israel, and Russia.¹⁶ After removing missing and invalid observations, responses to a total of 30,227 questionnaires were included in the analysis. The ESS places strong emphasis on methodological robustness with the particular aim of allowing accurate and informative cross-national measurements to be made, making it a suitable source of individual-level data for the purposes of this study.¹⁷

Data for both economic inequality and the country-level control GDP per capita data were taken from a dataset compiled by the United Nations Development Program (UNDP) for the organisation’s Human Development Index (HDI). The HDI is “a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and hav[ing] a decent standard of living” (UNDP 2019). The index combines multiple variables relating to basic needs and quality of life with more traditional economic metrics to create a measurement for overall development. Data for corruption is

¹⁴ Regression results excluding Israel provided in Appendix C.

¹⁵ Multilevel data is available for previous ESS rounds, though unfortunately not yet for round eight.

¹⁶ See Appendix F for list of participating countries.

¹⁷ An in-depth explanation of the methodology used can be found on the ESS website: <https://www.europeansocialsurvey.org/methodology/>

taken from Transparency International's Perceived Corruption Index, an annual worldwide index of perceived public-sector corruption based on expert-opinion (Transparency International 2018a). Data from 2015 is used for all country-level variables as this is the closest complete year of data prior to the commencement of ESS 8 fieldwork.

4.4 Operationalisation of variables

4.4.1 Dependent variable

The dependent variable for this study is *personal environmental responsibility*. It is captured using an ESS 8 survey item which asks respondents to what extent they feel a personal responsibility to try to reduce climate change. Responses are recorded on an 11-point scale, with 0 indicating the respondent does 'not at all' feel any responsibility, and 10 indicating that the respondent feels 'a great deal' of responsibility. The question does not focus on a particular activity or cost-sacrifice (for example paying a green tax, turning heating down, or buying energy-efficient appliances). This is useful as although some activities may have a pro-environmental outcome, motivations for them may not be grounded in a feeling of personal responsibility for the environment and therefore more specific questions would less accurately capture PER. Furthermore, climate change is arguably the most recognised and salient environmental issue both locally and globally and is suitably broad in scope to capture feelings of environmental responsibility more generally.

4.4.2 Independent variables¹⁸

The Gini coefficient will be used to measure *economic inequality*. The Gini coefficient is a statistical measure of dispersion that is the most commonly used method for measuring inequality (Lorenzi 2016). Gini coefficients for two countries with vastly differing GDPs may be similar, while the coefficient for two countries with similar GDPs may differ significantly, thus inequality is theoretically isolated regardless of a country's economic strength. Numerous different measures for economic inequality have been proposed and used by social scientists. For example, Palma (2014) has suggested that a better measure of inequality is the percentage income share of the top 10% divided by the bottom 40% (now referred to as the Palma ratio), arguing that this measure is more sensitive to changes at the extremes.¹⁹

¹⁸ All independent variables have been standardised, i.e. transformed so that they all have a mean of zero and a standard deviation of one. This allows for simple comparisons between independent variables measured on different scales.

¹⁹ For robustness, the regression model was also tested using the Palma ratio to operationalise economic inequality with no substantive difference in interpretable results (see Appendix C).

However, given that the Gini coefficient is the most commonly used measure of economic inequality, its use in this study will therefore allow for easy comparisons with the existing literature. Any value from 0 to 100 can be recorded, with a Gini coefficient of 0 representing perfect equality and 100 representing perfect inequality. Gini coefficient has been log-transformed to account for skewed distribution.

There is less controversy with respect to the operationalisation of *corruption* given that Transparency International's Perceived Corruption Index is one of three widely used indexes for measuring quality of government that correlate at the 0.90 level (Holmberg et al. 2009). The scores range from 0 to 100, with a score of 0 indicating that a country is extremely corrupt and a score of 100 indicating a country is very clean/uncorrupt. However, to simplify interpretation, the scale of this variable was reversed so that higher values indicate higher levels of corruption. *Social trust* was captured using an ESS8 item that asks respondents whether they think that, on a scale of 0-10, 'most people can be trusted' (0 on the scale), or that 'you can't be too careful in dealing with people' (10 on the scale). A binary dummy variable was then created to represent those respondents who, on balance, were more trusting: Responses above five on the scale were coded (1) to represent respondents who consciously described themselves more trusting than not. Although creating dichotomous variables from categorical (treated as continuous) data arguably means 'losing' data, making an attempt to isolate respondents describing themselves as more trusting than not was deemed more useful for interpretation than having to determine the significance or importance of a one-point increase or decrease in the variable, for example from a response of 2 to 3 or from 9 to 8.

4.4.3 Control variables

4.4.3.1 Individual-level control variables

Awareness that climate change is detrimental is one important individual-level control. The term 'awareness' is more suitable than 'belief' in this context, given the weight of evidence that shows beyond doubt that the effects of anthropogenic climate are indeed broadly negative (IPCC 2018). The vast majority of respondents to ESS 8 are aware that climate change is happening and a similar number also agree that these changes are at least in part caused by human activity. However, in some countries, this number drops below 90% and there is even greater country-level variation in the percentage of respondents that believe the impacts of climate change will be bad (Poortinga et al. 2018). Numerous factors can impact

an individual's awareness of the negative effects of climate change (Rudman et al. 2013; Akerlof et al. 2013). As explained in section 2.1 above, awareness of consequences and a feeling of responsibility can shape norms and therefore influence behaviour.

Awareness was centered on the group mean. Group mean centering, or centering within clusters, is suitable in this context because variance from the cluster-specific means is far more useful for interpretation than absolute values (Mazza 2015). For example, consider the survey item used to capture awareness, which asks respondents to rank the general impact of climate change from extremely bad (0 on the scale) to extremely good (10 on the scale). A respondent from country A and a respondent from country B might select position four on the scale. Without taking clustering into account, these respondents ostensibly hold the same opinion about the impact of climate change. However, if the mean response for country A is three and the mean response for country B is five, this indicates that the respondents vary from their country means in opposite directions. The scale has been reversed for ease of interpretation: Respondents who see the impact of climate change as generally good (i.e. they lack awareness) are now at 0 on the scale. Thus, higher awareness is identified by higher values.

Numerous studies have found evidence showing that *political orientation* influences the framing of moral judgements and is becoming increasingly significant with respect to the climate change debate (Graham et al. 2009; McCright and Dunlap 2011; Feygina et al. 2010). The literature suggests that conservative-linked traits can be explained as a result of system justification behaviour and a wish to maintain the status quo. Conservatives could, then, be expected to feel lower PER if it assumed that preserving the status quo is a more passive position than engaging in activity to enact some sort of change. Feygina et al. (2010) do, however, point out that conservatives may still engage in pro environmental behaviour, provided that such an activity is framed conservatively as one that preserves existing conditions. Political orientation was centered on the group mean.

Household income will also be useful to include in the models. Franzen and Meyer (2010) found strong support for a link between income levels and environmental concern, with those individuals with high incomes relative to the country average showing increased concern than those with below-average incomes. Conversely, many contributions to the environmental justice literature have argued that wealthier people benefit disproportionately from behaviour that is environmentally unsustainable (Boyce 2007). Regardless of levels of

concern, those who can afford to push their environmental impact away may hold different views on their personal responsibilities than those who are unable to avoid the negative externalities. Household income was centered on the group mean.

An individual's' opinion on the *fairness* of large income differences may impact how economic inequalities impact their values and attitudes. For example, if an individual believes large differences in income are acceptable in a society to reward good performance and encourage competition, then it is perhaps less likely that economic inequality will affect their values in the ways described in the literature review above. On the other hand, the values of individuals who believe large income differences can not be justified may be affected more strongly by economic inequality. A dummy variable was created with respondents that agreed or strongly agreed with the statement: "Large differences in people's incomes are acceptable to properly reward differences in talents and efforts" coded 1.

Some studies have failed to find a strong link between *religiosity* and environmental issues (e.g. Hayes and Marangudakis 2000); others have found evidence for a positive correlation between religiosity and reduced concern (Sherkat and Ellison 2007; Arbuckle and Konisky 2015; Muñoz-García 2014). Whether environmental concern is affected in the same way as personal environmental responsibility will be interesting, given that they overlap but are not the same thing. It has also been shown (e.g. Biel and Nillson 2005) that situational context affects whether religious values impact judgement of environmental issues, further justifying its inclusion as a control. Religiosity was centered on the group mean.

Socio-demographic variables such as *education*, *gender*, and *age* are commonly implemented in social science studies and are also mentioned in the relevant literature on the environment, inequality, corruption, and trust. Links have been identified between education level and trust (Alesina and Ferrara 2002), improved environmental outcomes (Boyce et al. 1999), policy support (Dietz et al 2007), inequality (Wilkinson and Pickett 2010) and corruption (Gupta et al. 2002). A dummy variable was created with those educated to degree-level or higher coded 1. Older people are also more likely to express solidarity (Paskov and Dewilde 2012), but the reduced commitment shown by young people to traditional social orders and economic growth means they generally show more concern for environmental protection than older people (Olli et al. 2001). Age was centered on the group mean. Gender was also significant in Paskov and Dewilde's (2012) exploration of solidarity, with women showing more solidarity than men. Though women are often found to show greater

environmental concern and aware for environmental issues, they are also less likely to be aware of some pro-environmental technologies such as microgeneration systems (Claudy et al. 2010). A dummy variable for ‘female’ (coded 1) was created.

4.4.3.2 Country-level control variable

Given the relatively small number of country-level observations used in this study, addition of numerous control variables at this level risks overfitting a model according to the ‘one-in-ten rule’, i.e. that there should be at least ten observations for each predictor at each level (Harrell et al. 1996). However, there is not a consensus on the usefulness of the one-in-ten rule: Austin and Steyerberg (2015), for example, suggest that just two observations are required per variable in linear regression. Besides, the inclusion of no control variables at the country level would limit the validity of any conclusions. Therefore, *GDP per capita* was included as control.

According to Ingelhart’s (1997) postmodernist approach, GDP per capita should be an important predictor of individual personal responsibility for the environment. Variability in access to material resources has far less serious consequences in developed, richer countries than it does in poor countries, therefore an individual’s economic situation should be much more important to their decision making in poorer countries (Kemmelmeier et al. 2002). Those in more affluent countries can also generally expend more effort acting on abstract and less localised issues such as climate change and the environment. Evidence from various studies supports for the claim for a general link between GDP per capita and environmental attitudes and outcomes (Franzen and Vogl 2013; Franzen and Meyer 2010; Holmberg et al. 2009), however, others have failed to find environmental concern to be a “luxury only afford by the wealthy” (Schultz and Zelezny 1999: 258; Dunlap and York 2008). Also of interest is how high-GDP countries may be affected disproportionately by the inhibiting effect that inequality has on environmental technological development. According to Vona and Patriarca (2011:2202), “inequality harms the full development of environmental innovations... pins down the emergence of appropriate environmental regulations... [and] hampers the development of knowledge complementary to environmental-friendly behavior”. These findings are of particular relevance in a European context given that many of the solutions to environmental issues will require technological innovations, coupled with the fact that the authors also showed this effect to be strongest in the most developed countries that are closest to the technological innovation frontier. GDP per capita was log-transformed to account for skewed distribution.

5. Limitations

One of the most disappointing limitations of this study is the fact that data for the complete group of European Union countries was not available. Although Special Eurobarometer 468 (European Commission 2017b), which focused on attitudes of European citizens toward the environment, included items that are very relevant to the broader discussion of social responses to, and responsibility for, the environment, there were unfortunately no items that could have been suitably operationalised to capture individuals' general feelings of PER.

The missing EU countries also mean that the conclusions drawn in the following section should be approached with some caution. For example, two countries which could be expected to be fairly influential in this investigation but could not be included are Denmark and Bulgaria. These two countries represent essentially opposite ends of the spectrum. Denmark is an environmental pioneer and a green energy trailblazer while also having a relatively high GDP per capita. On the other hand, Bulgaria is an environmental laggard and has one of the lowest GDPs per capita in the EU. Furthermore, the lack of the full suite of EU countries in the analysis prohibits, to some extent, conclusions being drawn about the impacts of EU policy.

Although the ESS, as explained, goes to some length to ensure methodological robustness, there are still some limitations that are difficult or impractical to avoid. One of these is the central tendency that has been observed in single-scale rankings formats. For example, Albaum et al. (2007) found that two-stage scales elicited more responses at the extreme ends of the scale and that this format produced the strongest correlation between attitudes and expected behaviour. This also relates to the wider point about the correlation, or lack thereof, between self-reported behaviour and actual behavioural outcomes.

This study is cross-sectional: it captures a situation at a discrete moment in time. This means that even if strong correlations between variables are observed, it is not possible to draw any conclusions with respect to causality and only theoretical assumptions can be relied on in this respect. Longitudinal data is required in order to investigate causality, however the analysis of the indirect pathways between independent variables does allow for inferences to be made with respect to some of the mechanisms at work in the theoretical model. It should also be noted, though, that the GSEM path analysis presented in section 6.2 is also limited in

the sense that only one potential mediator has been investigated and it was found to only partially mediate the relationships in question. A complete investigation of any and all mediating effects is beyond the scope of this (or any) study and it is worth remembering that statistical models are by nature not complete and that subjective decisions on what to include and what to dismiss are unavoidable in any statistical research (Agler and De Boeck 2017).

6. Results

6.1 Multilevel regression analysis

The results of the multilevel regression analysis are presented in table 1 below. The first two models are ‘null’ models including only the dependent variable and the main independent variables economic inequality and corruption. Models 3, 4, and 5 include all individual-level variables with the country-level independent variables added one at a time. The fixed-effect correlation coefficients can be interpreted as the change (measured in standard deviations) in the dependent variable given a one-unit increase in the relevant independent variable, all other things held constant. The fixed-effect constant, or y-intercept, is the expected mean value of the dependent variable if the value of all independent variables is equal to zero. The random effects part refers to the variation from the fixed-effects constant at the country-level.

Table 1. Fixed and random effects of country- and individual-level predictors on the dependent variable.

DV: Personal environmental responsibility	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Fixed effects</i>					
Country level					
Economic inequality (log)	0.045	0.234	0.067	0.244	0.271*
	(0.187)	(0.128)	(0.182)	(0.131)	(0.126)
Corruption		-0.676***		-0.634***	-0.407*
		(0.124)		(0.127)	(0.186)
GDP per capita (log)					0.305
					(0.191)
Constant	5.757***	5.848***	5.760***	5.846***	5.850***
	(0.191)	(0.128)	(0.187)	(0.131)	(0.124)
Individual level					
Social trust (more trusting) ^b			0.205***	0.204***	0.204***
			(0.015)	(0.015)	(0.015)
Awareness ^a			0.245***	0.245***	0.245***
			(0.014)	(0.014)	(0.014)

Political orientation ^a			-0.144***	-0.144***	-0.144***
			(0.014)	(0.014)	(0.014)
Household income ^a			0.187***	0.187***	0.187***
			(0.015)	(0.015)	(0.015)
Fairness (agree) ^b			-0.055***	-0.055***	-0.055***
			(0.014)	(0.014)	(0.014)
Religiosity ^a			0.210***	0.210***	0.210***
			(0.014)	(0.014)	(0.014)
Education (high) ^b			0.167***	0.167***	0.167***
			(0.015)	(0.015)	(0.015)
Gender (female) ^b			0.097***	0.097***	0.097***
			(0.014)	(0.014)	(0.014)
Age ^a			-0.162***	-0.162***	-0.162***
			(0.014)	(0.014)	(0.014)
<i>Random effects</i>					
Constant	0.836	0.364	0.800	0.380	0.342
	(0.248)	(0.109)	(0.238)	(0.113)	(0.102)
Residual	6.052	6.052	5.738	5.738	5.738
	(0.049)	(0.049)	(0.047)	(0.047)	(0.047)
Log likelihood	-70159.155	-70149.654	-69354.278	-69345.848	-69344.631
Chi-bar-squared distribution	3861.72***	1809.58***	3885.16***	1978.62***	1743.75***
N (country level)	23	23	23	23	23
N (individual level)	30,227	30,227	30,227	30,227	30,227

* $p < .05$ ** $p < .01$ *** $p < .001$. Standard errors in parentheses. *Economic inequality and GDP per capita are log-transformed. Independent variables are standardised.* ^a: group mean centered, ^b: reference category.

The results in table 1 show that economic inequality is not a significant predictor of PER in the first four models, but becomes significant when GDP per capita is controlled for in the full model (model 5). Corruption is highly significant both in model 2 without individual variables and model 4 with individual variables. It becomes slightly less significant (but still significant) when GDP per capita is controlled for in the full model.²⁰

²⁰ See Appendix E for country-level variable margins plots.

It is unsurprising that so many of the individual-level factors are significant to such a degree. When conducting investigations using large samples, p-values tend toward zero as the power of the test increases and more impractical, smaller effects are identified (Khalilzadeh and Tasci 2007). Therefore, the p-values are not particularly useful without an exploration of the actual size of the effect of the significant variables. Effect sizes can be a little more tricky to calculate in a multilevel model as compared to a regular OLS regression, however, in this case the coefficients of the independent variables can simply be compared to one another as they have all been standardised.

Figure 3. Coefficient plot of significant predictors.

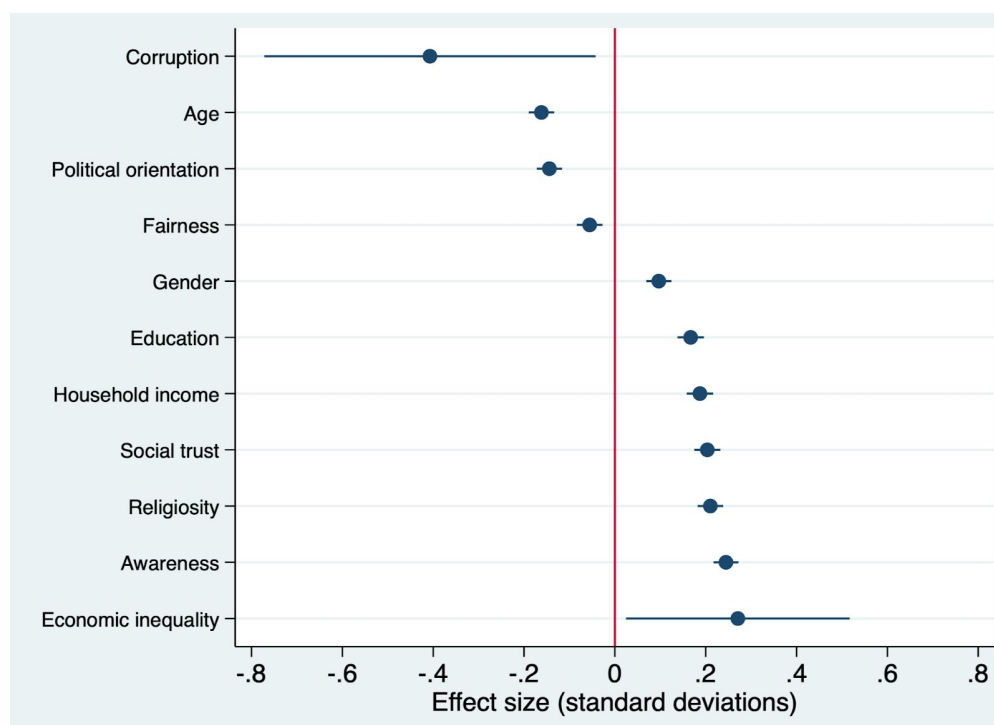


Figure 3 shows that corruption and economic inequality have the largest effect sizes, although the 95% confidence intervals for these two variables are much wider due to the much smaller sample size at the country level. The direction of the effect of economic inequality indicates that individuals feel higher PER when economic inequality is higher. On the other hand, individuals feel greater PER when levels of corruption are lower.

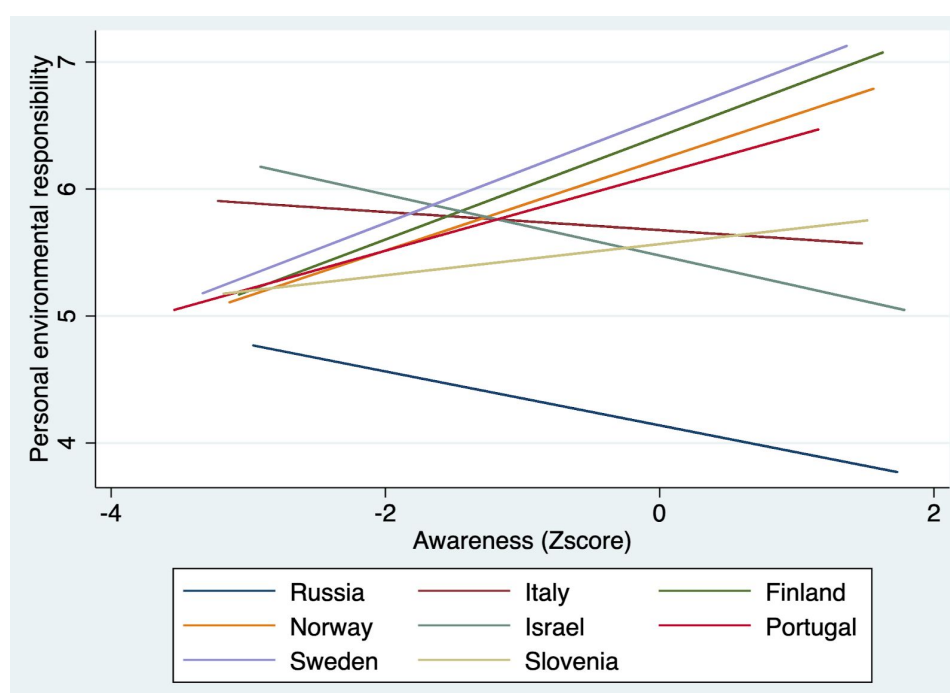
Of the individual-level variables, awareness has the largest effect, with the direction indicating that individuals who are more aware of the negative impacts of climate change feel greater PER.²¹ The second- and third-largest effect sizes relate to religiosity and social trust:

²¹ As this variable has been group-mean-centered, 'more aware' means more aware than the average respondent in the individual's own country.

Individuals who are more religious and more trusting of other people report higher feelings of PER. To a lesser degree, household income, education, and gender are positively correlated with feelings of PER, whereas younger people, more left-wing people, and people who think large differences in income are justifiable tend to report lower feelings of PER (though the effect size of the latter is very small).

The variance partition coefficient (VPC) indicates that 5.6% of the variance in this model is produced as a result of country-level clustering.²² This confirms the ICC reported in section 4.1, indicating that there is sufficient country-level variation to justify a multilevel model. The likelihood ratio test can be used to ascertain the significance of the country-level random effects. In this case they are significant at the 99% level. The chi-squared distribution is sufficiently large to show that the model is a good fit for the multilevel data. The between-country differences are perhaps most interesting in relation to awareness. Figure 4 below shows the fixed effects of awareness on PER for selected countries. Given that economic inequality and corruption were significant at the country level, the countries included in figure 4 are the two most and least economically unequal, and the two countries where corruption is perceived to be highest and lowest.

Figure 4. Fixed effect of awareness on PER (selected countries).



²² The random-effects VPC is calculated by dividing the between-country variance (constant) by the total variance.

The overall effect of awareness is positive, i.e. those who are more aware of the detrimental effects of climate change also feel greater PER. However, in the two countries perceived to be the most corrupt (Russia and Italy), awareness is negatively correlated with PER. This is also the case for Israel which is by far the most economically unequal country in the dataset. Though the effect is much weaker, religiosity is also negatively correlated with PER in Israel and Portugal, the second-most economically unequal country, despite the overall effect of religiosity being positive. The individual effects of these selected countries are more uniform with respect to social trust.²³

6.2 GSEM: mediation analysis

Table 2 shows the results of the GSEM analysis performed to determine whether social trust mediates the respective effects of economic inequality and corruption on PER. The indirect effect coefficient refers to the change in the dependent variable when the independent variable is held fixed but the mediating variable moves by the amount (measured in standard deviations) it would have moved had the independent variable increased by one unit, thereby isolating the effect of the mediator from the effect of the independent variable (Pearl 2001). The direct effect is the same as the coefficient reported in the regression analysis in section 5.1 above, namely the change (measured in standard deviations) in the dependent variable given a one-unit change in the relevant independent variable, all other things held constant. The total effect equals the sum of the direct and indirect effects.

Table 2. Mediated effects of economic inequality and corruption on PER.²⁴

Mediator: Social trust	Economic inequality	Corruption
Indirect effect	-0.022***	-0.043***
	(0.002)	(0.003)
Direct effect	0.271*	-0.407*
	(0.126)	(0.186)
Total effect	0.250*	-0.450*
	(0.126)	(0.186)

* $p < .05$ ** $p < .01$ *** $p < .001$. Standard errors in parentheses.

²³ See Appendix E for graphs showing fixed effects of religiosity and social trust.

²⁴ See Appendix D for full GSEM models.

Table 2 shows that the indirect effect of economic inequality on PER through social trust is highly significant and is also negative. The total effect is weaker than the direct effect, indicating that, to use the terminology suggested by Zhao et al. (2010), this is a case of competitive mediation where the mediated effect and direct effect are both significant and point in opposite directions. The indirect effect of corruption on PER through social trust is also highly significant and negative. However, in this case the total effect is stronger than the direct effect. As per Zhao et al. (2010), this is a case of complementary mediation as the mediated effect and direct effect are both significant and point in the same direction. Babyak (2009) clarifies that both these relationships qualify as mediation as in both cases the mediating variable (social trust) can potentially be a causal consequence of the independent variable.²⁵ Social trust can be described as a partial mediator in each case, as the direct effects of both economic inequality and corruption on PER remain significant after the inclusion of the mediator. These findings will be discussed further in section seven below.

²⁵ As opposed to a confounding relationship in which the third variable through which the indirect effect travels cannot logically be a causal consequence of the independent variable (for example, age).

7. Discussion

As discussed, the country-level observations should be interpreted with caution due to the relatively small sample size. However, the results show that both economic inequality and corruption at the country level are significant predictors of PER at the individual level. The theoretical background led to an expectation that economic inequality and corruption would reduce individuals' sense of PER due to the association between these contextual variables and a breakdown in social trust, increased social distances, reduced outgroup interactions, and reduced opportunities to express pro-environmental sentiment (hypotheses 1 and 2). Individuals would display a reduced willingness to engage in collective action as a result of reduced PER. The analysis shows that while the effect of corruption on PER supports hypothesis 2, the outcome for economic inequality in fact indicates the opposite relationship: Where economic inequality is higher in Europe, individuals feel greater PER, therefore no support is found for hypothesis 1.

The relationship between economic inequality and PER is not completely at odds with the literature, though, and a plausible explanation can be posited. While reduced social cohesion and increased widening of existing structural divisions caused by economic inequality may reduce individuals' willingness to engage in pro-environmental action, it may not make them feel any less PER, especially if their locus of control remains internal. In a more equal society, an individual may feel that their individual actions are less crucial, given that they are more able to rely on others to effectively manage common goods in a fair and responsible manner. The individual can afford to be more passive. Conversely, in situations of greater inequality, where individuals cannot rely on others, more emphasis is placed on individual agency. An individual could therefore be expected to have a more internalised locus of control and feel greater personal responsibility for everything, not just the environment. Perhaps feelings of PER are only rising with inequality out of *necessity*, because people feel they cannot afford *not* to take personal responsibility for things if they are to compete.

The result may also describe a reaction to the negative environmental externalities caused by economic inequality. If higher levels of economic inequality result in less desirable environmental outcomes, it follows that individuals may feel more obliged to act. This reaction may also be due to the fact that worsening environmental conditions can also reduce psychological distance between individuals and the environment. Van der Linden et al.

(2015) argue that to frame climate change as an “experiential, local and present risk; define and leverage relevant social group norms; highlight the tangible gains associated with immediate action; and... appeal to long-term motivators of pro-environmental behavior and decision making” would reduce psychological distance and produce effective policy. This would make sense in light of Stern et al.’s (1999) argument that norm-based actions stem partly from a belief that those norms are valuable and under threat. PER may also increase up to a certain point at which states or other organisations feel obliged to take responsibility themselves. For example, if feelings of PER among voters help to make environmental issues more salient, then parties vying for power may shift to more pro-environmental policy positions, after which individuals can better rely on such organisations to take responsibility for the environment. In other words, PER encouraged by social trust could increase institutional trust.

It was argued that corruption emphasises social divisions and creates new ones, reduces community engagement and standards of living, inhibits the effectiveness of pro-environmental policies, and increases levels of pollution. It is therefore more intuitive that the results of the regression analysis show that where society is more corrupt, individuals feel a reduced sense of PER. That the effect of corruption moves in the opposite direction to economic inequality indicates that corruption negatively affects society in a different way. This could also be explained by thinking about individual agency and loci of control. In a society that is more corrupt, an individual may be less likely to consider their own actions to be worthwhile or important: What I do doesn’t matter anyway, so why should I bother taking any personal responsibility? In other words, the individuals’ locus of control has been externalised as a result of the way that corruption causes social division. With respect to environmental questions, this outcome seems to fit with Duit’s (2010) finding that institutional quality is a significant predictor of participation in some types of collective environmental behaviours (if norms and attitudes are held to be prerequisites for behaviour).

Social trust is positively correlated with both economic inequality and corruption (i.e. social trust decreases as economic inequality and corruption increases) in line with the theoretical prediction. The mediation analysis showed that the indirect effects of both economic inequality and corruption on PER mediated through social trust are significant, lending support to hypotheses 3 and 4: Reduced social trust plays an important role in the

relationships between these contextual variables and PER.²⁶ In both cases, when the independent variables are constrained but social trust moves the amount it would have moved if the independent variable were to increase by one unit, the indirect effect is negative. The mediating effect of social trust slightly weakens the positive effect of economic inequality on PER, whereas the mediating effect of social trust slightly strengthens the negative effect of corruption on PER. To relate to the explanations above, in both relationships it could be argued that the reduced social trust externalises individuals' loci of control: It makes individuals feel less PER despite economic inequality encouraging them that their personal contributions are necessary; and it exacerbates individuals' feelings that their personal contributions are worthless in corrupt societies. These findings fit with the theoretical expectation that reduced social trust partly explains the detrimental outcomes of economic inequality and corruption.

As each is a case of partial rather than perfect mediation (the direct effect remains significant after the inclusion of the mediator) and the mediating effects are not particularly large, there are clearly many other mediating factors that influence the complete paths to PER from economic inequality and corruption. Therefore, although it is significant, it would be premature to declare that social trust is the key mechanism through which these relationships occur. It is also worth noting that the direct effect of social trust on PER is relatively uniform across the countries compared to the other individual variables with strong effects (awareness and religiosity).²⁷ It suggests that the mechanism involving social trust is consistent regardless of country context and this further supports the GSEM analysis.

The fact that GDP per capita was not a significant predictor of PER in this model is at odds with postmaterialist theory that expects generally more financially secure individuals to have a greater capacity and desire to engage with issues that are not directly related to their immediate basic needs. One reason for this may be that GDP per capita may not be such an extreme differentiator when applied to a relatively small sample of countries that in many cases share sovereignty over important political and social questions. Even though there is a large difference between the GDP per capita in Norway and the level in Romania, the latter is still categorised by the UNDP as a country that enjoys a 'very high' level of human development. The fact that GDP per capita is insignificant but also reduces the significance

²⁶ These results suggest that the mediator identified is consistent with the hypothesised theoretical framework (Zhao, Lynch and Chen 2010).

²⁷ Appendix E figure E1.

of corruption slightly may be because the correlation between GDP per capita and corruption is strong (-0.76).

Although its prevalence in social science studies as a proxy for ‘progress’ more generally justifies its implementation as a control in this paper, it is also worth remembering that GDP per capita is explicitly a measure of formal economic development. It is relatively blind to volunteering, household work such as childcare, advances in knowledge, grey and black markets, and human suffering (Bregman 2016). Environmental pollution even does a “double duty” when it comes to GDP: “One company makes a mint by cutting corners while another is paid to clean up the mess. By contrast, a centuries-old tree doesn’t count until you chop it down and sell it as lumber” (Bregman 2016:156). The significant positive effect of household income would seem to underline this point, given that household income is a more direct measure of individual wealth and capacity to follow a postmaterialist lifestyle. In sum, further investigation is certainly required before we can confidently reject the implication of these findings with respect to postmaterialist theory.

Despite the overall effect of awareness on feelings of PER being positive—as expected—in some of the dataset’s very unequal and very corrupt countries this effect is reversed, most notably with Russia and Israel. These are the only two countries in the dataset that are not in either the EU or the EEA, which could indicate that there are certain policies and positions shared by EU/EEA countries that encourage individuals to feel more PER when they are more aware of the negative effects of climate change. That is also not to mention the fact that Russia and Israel are clearly very different to the EEA politically, geographically, and, to an extent, culturally. The above suggestion that increased corruption externalises individuals’ loci of control (makes them feel less confident of the influence of their individual actions) would fit with Russia: Corruption is so dramatically high in Russia compared to other countries in the dataset that people there feel less PER even when they are *more* aware than average of the negative effects of climate change. Similarly, economic inequality is so dramatically high in Israel compared to the other 22 countries suggesting that perhaps there is an upper threshold of inequality where even greater awareness does not encourage individuals to feel greater PER. Perhaps at such a threshold, the ‘inequality trap’ is more tangible and individuals begin to lose their internal locus of control.

The negative effect of political orientation is interesting. If conservatives are more interested than liberals in maintaining the status quo, for example, we might expect those who lean to

the right to feel less PER as the issue is not as important for them. However, the results show that, in fact, those who are on the left of the left-right spectrum (relative to the rest of their country) feel less PER. This can perhaps be explained using a similar argument advanced above in the discussion of the effect of economic inequality: More left-wing people are more likely to advocate for increased redistributive capacity of the state, therefore emphasising the importance of collective responsibility for the management of common goods, rather than personal. The negative effect of age indicates that younger people feel greater PER. This fits with literature that suggests younger people are more likely to show environmental concern, partly because they ultimately have the most at stake in the climate change debate. The negative correlation between fairness and PER (those who believe large income inequalities are justifiable feel less PER) is more or less in line with the theoretical arguments outlined in the literature review, though the effect is not particularly strong. Likewise, the finding that women feel slightly more PER than men is congruent with the existing literature.

The positive correlation between high education level and PER broadly follows expectations. It is likely that more highly educated individuals show a greater understanding of global-scale challenges, the logic of collective action, and the requirement for individuals to take personal responsibility for such action to work effectively. The literature suggests that the links between religiosity and religious concern are mixed, but the result here suggests that individuals who feel more religious than their country average also feel greater PER. Because the survey item used to measure religiosity explicitly does not specify or require the respondent to identify with any religion, this captures the broader feelings of faith, belief, sense of belonging and sense of purpose. Although religiosity is relatively low in Europe compared to other world regions, there is still an age gap where younger Europeans see religion as less important to their lives than older Europeans (Kramer and Fahmy 2018). Thus, age may be one compounding factor affecting religiosity as those who are more religious are also older and therefore more likely to hold positions of greater social responsibility in general. Perhaps the negative effect size of age would be even larger were older people not in such positions more often.

For all the discussion of standardised effect sizes, the question still remains: What is the significance of a one- or two-point change in the response to the survey question used to capture the dependent variable? This question has already been addressed in the explanation of the operationalisation of individual-level variables used in this study. For example, it was decided that using binary indicators for ‘highly educated’ and ‘more trusting’

was useful in those cases, while centering variables on their group means was more suitable in others. For the binary variables, subjective judgement is required to select the ‘cut-off’ point at which a respondent becomes ‘highly educated’ or ‘more trusting’. The effects of economic inequality and corruption translate to a roughly one-point increase and decrease in feelings of PER respectively.²⁸ The effect of economic inequality causes the average respondent’s feeling of PER to move away from the centre (i.e. a response of 5), while the effect of corruption moves the average response toward the centre. This may be an indication of how each factor affects the intensity of feelings of PER, suggesting that individuals in highly corrupt countries feel more apathetic toward the the issue of PER whereas individuals in highly unequal societies feel more strongly about it. Figure 4 in section 6.1 above shows that awareness in the most-equal countries and those perceived to be least corrupt increases the average feeling of PER by closer to two points, indicating that it could be a more useful indicator of PER than the country-level variables. One interesting avenue for future research to reduce this subjectivity would be to further explore the link between PER and pro-environmental actions so more clarity on the factors affecting the environmental value-action gap can be provided.

²⁸ Appendix E, figures E3 and E4.

8. Conclusion

The purpose of this paper was to further develop understanding of why some European societies are able to better manage common environmental goods than others. Under particularly scrutiny were the conditions that encourage engagement in the collective action required to address the issue of climate change, which poses a serious and immediate threat to all Europeans. PER was theorised to be an important facilitator of environmental collective action and the contextual factors that affect PER were therefore concentrated on. Focus was placed on the role of social trust in the relationships between contextual factors—specifically economic inequality and corruption—and PER. Due to their broadly socially detrimental effects, economic inequality and corruption were expected to reduce feelings of PER and by extension the willingness of individuals to engage in environmental collective action.

To return to the initial research question, the results show that economic inequality and corruption do have an effect on individuals' feelings of PER, however, the directions of these effects are not the same: While corruption was found to be negatively correlated with PER as expected, economic inequality was found to actually increase PER. One would be hard-pressed to find any politician seriously advocating for increasing the gap between the richest and poorest in society in order to save the planet, but this outcome can perhaps be explained by thinking about the different ways that economic inequality and corruption might influence an individual's locus of control (the belief that one's own individual actions are significant and influential). Increased economic inequality might encourage an individual to believe that they cannot rely on support from others and that they therefore must take personal responsibility. On the other hand, individuals in highly corrupt societies may become overwhelmed by the perceived futility of their individual actions in a system that is rigged to benefit a predetermined few. A mediation analysis confirmed that social trust is a significant factor in the relationships between economic inequality and corruption at the contextual level and PER at the individual level. However, the results are not sufficiently conclusive to be able to pinpoint social trust as the key mechanism. Further investigation into other mediating effects in these relationships is therefore required.

Given the unexpected finding that economic inequality increases feelings of PER, future studies could make useful contributions by examining whether economic inequality has a similar effect on feelings of personal responsibility for other collective action problems, such

as engaging in democratic voting processes. Are there some countries or regions where feelings of personal responsibility for collective action problems are more strongly related to shifts in policy positions of both public and private organisations? What are the particular features of those countries or organisations? Is the value-action gap wider for environmental issues than for other issues? Investigating these questions would shed more light on the importance of personal responsibility more generally in shaping norms that lead to collectively beneficial behavioral outcomes. On environmental collective action specifically, it would also be interesting to further investigate how the relative importance of PER changes across different contexts. One obvious addition to the literature would be to examine the contextual influences on PER across a greater number and variety of countries. As social trust was focused on exclusively in this paper, it would of course also be valuable to supplement the findings by focusing on other types of trust, such as political trust.

This study has shown that there is cross-country variation in PER and that levels of economic inequality and corruption go some way to explaining this variation, as do a number of interesting individual-level variables. However, what are the other possible factors? Postmaterialist explanations deserve further attention, perhaps using more indicative indicators of development than GDP per capita such as the human development index or even happiness indexes. Investigations focusing on countries' relationships with the EU could also improve understanding the efficiency of the EU's environmental policies. For example, do EU policies emphasise the importance of personal responsibility and action in regions where stronger top-down organisational intervention might be more useful, or vice versa? Do policies focus simply on raising awareness in countries where such an approach may not be effective (for example because awareness is already high)? Finally and perhaps most importantly, future work should continue to focus on the role that social trust plays in encouraging environmentally beneficial behaviours, and how acute collective action problems like climate change can be addressed through facilitating improvements in social trust in all types of societies.

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10. Appendixes

A. Descriptive statistics

Table A1. Descriptive statistics.

Variable	Construct	Mean	Min	Max	St. dev.	Source
Personal environmental responsibility <i>ccrdprs</i>	Survey item D23: “To what extent do you feel a personal responsibility to try to reduce climate change?” 11-point scale: Not at all = 0, A great deal = 10.	5.827	0	10	2.632	ESS 8
Social trust ^a <i>zy_ppltrst</i>	Survey item A4: “...generally speaking, would you say that most people can be trusted, or that you can’t be too careful in dealing with people?” Dummy (transformed): You can’t be too careful = 0, Most people can be trusted = 1.	0.000	-1.031	0.970	1	ESS 8
Awareness ^b <i>zgm_revccgdbd</i>	Survey item D25: “How good or bad do you think the impact of climate change will be on people across the world?” 11-point scale: Extremely bad = 0, Extremely good = 10. (Scale reversed)	0.000	-3.718	1.817	1	ESS 8
Political orientation ^b <i>zgm_lrscle</i>	Survey item B26: In politics people sometimes talk of “left” and “right”... where would you place yourself on this scale...?” 11-point scale: Left = 0, Right = 10.	0.000	-2.668	2.597	1	ESS 8

Household income ^b <i>zgm_hinctnta</i>	Survey item F41: "...please tell me which letter describes your household's total income, after tax and compulsory deductions, from all sources? If you don't know the exact figure, please give an estimate. 10-point scale: Lowest = 1, Highest = 10.	0.000	-2.017	2.251	1	ESS 8
Fairness ^a <i>zdfincacag</i>	Survey item E1: "Large differences in people's incomes are acceptable to properly reward differences in talents and efforts." Dummy (transformed): Disagree/neither = 0, Agree/strongly agree = 1.	0.000	-0.859	1.165	1	ESS 8
Religiosity ^b <i>zgm_rlgdgr</i>	Survey item C15: "Regardless of whether you belong to a particular religion, how religious would you say you are?" 11-point scale: Left = 0, Right = 10.	0.000	-2.129	2.540	1	ESS 8
Education ^a <i>zhiedu</i>	Survey item F15: "What is the highest level of education you have successfully completed?" Dummy (transformed): Not university-educated = 0, University-educated = 1.	0.000	-0.607	1.646	1	ESS 8
Gender ^a <i>zgenderf</i>	Survey item F2: "CODE SEX". Dummy (transformed): Male = 0, Female = 1.	0.000	-1.025	0.975	1	ESS 8
Age ^b <i>zgm_agea</i>	Survey item F3: "And in what year were you... born?" Dummy (transformed): Aged 31+ = 0, Aged 30 or under = 1.	0.000	-2.115	2.831	1	ESS 8
Economic inequality ^c <i>zloggini</i>	Gini coefficient 2015 (Human Development Report Office calculations based on World Bank data).	31.412	25.6	42.8	4.459	UNDP

	0 = perfect equality, 100 = perfect inequality.					
GDP per capita ^c <i>zloggdp</i>	GDP per capita 2015 (2011 PPP \$, data from World Bank.)	38170.1	23895	64451	10326.4 7	UNDP
Corruption <i>zrevticpi</i>	Transparency International Corruption Perceptions Index 2015 0 = extremely corrupt, 100 = extremely uncorrupt. (scale reversed)	69.197	29	90	15.771	Quality of Government Institute

All independent variables standardised. ^a: dummy/reference category, ^b: group-mean-centred, ^c: log-transformed.

B. Regression diagnostics

Figure B1. Distribution of residuals.

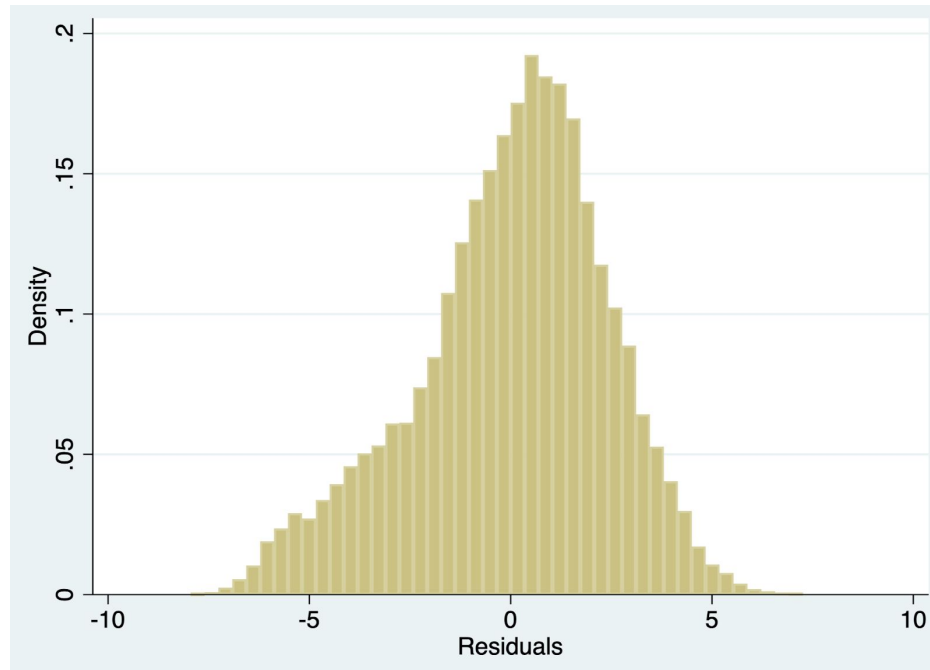


Figure B2. Q-norm: predicted values.

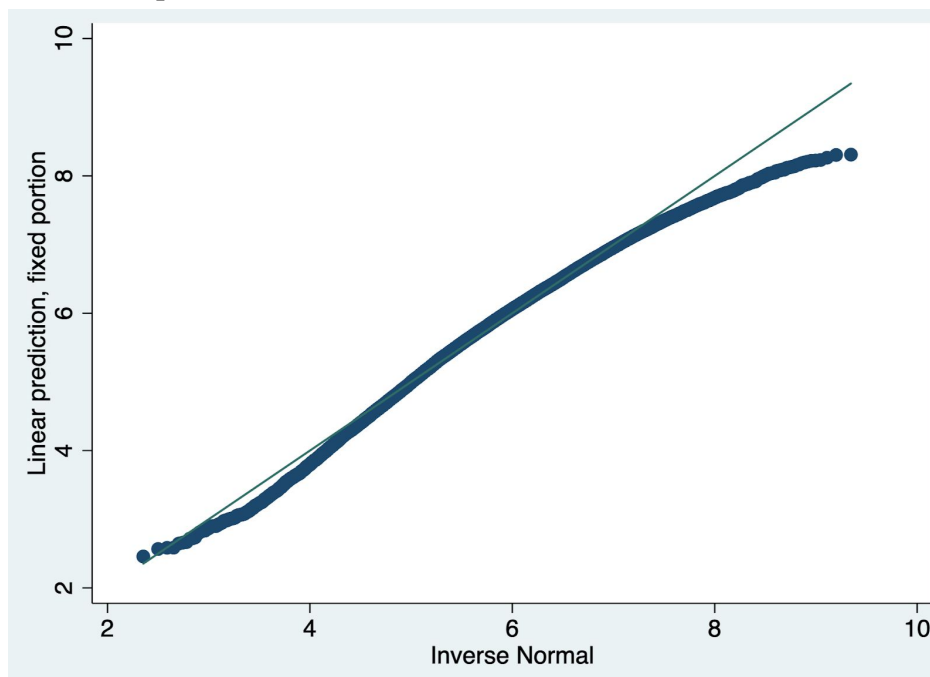


Figure B3. Q-norm: residuals.

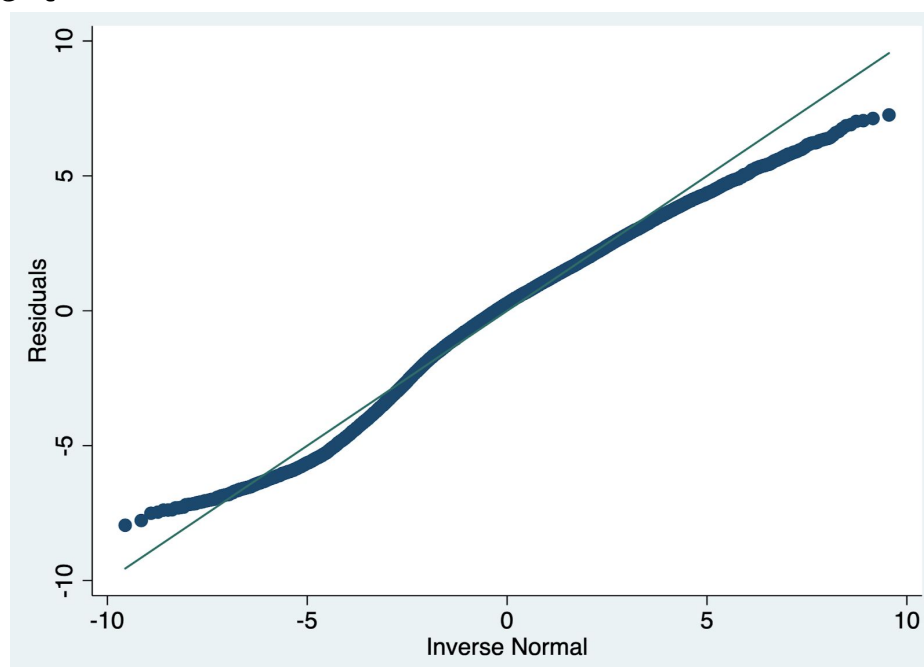


Table B1. Variable inflation factor.

Variable	VIF	1/VIF
Corruption	2.47	0.404663
GDP per capita (log)	2.45	0.408149
Household income	1.17	0.857187
Education	1.14	0.877311
Economic inequality (log)	1.13	0.884640
Social trust	1.09	0.918875
Religiosity	1.08	0.924341
Age	1.08	0.928818
Political orientation	1.06	0.942651
Gender	1.04	0.957240
Fairness	1.04	0.962839
Age	1.04	0.966009
Mean VIF	1.32	

Table B2. Cook's distance.

Country	Cook's D
Israel	1.632255
Estonia	0.5448765
Germany	0.5100073
Portugal	0.4371679
Czech Republic	0.3926787
Finland	0.3441109
France	0.3094478
Norway	0.1742217

C. Alternative models

Table C1. Multilevel regression analysis excluding Israel.

DV: Personal environmental responsibility	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Fixed effects</i>					
Country level					
Economic inequality (log)	0.108	0.316*	0.145	0.400*	0.378*
	(0.226)	(0.152)	(0.220)	(0.155)	(0.147)
Corruption		-0.681***		-0.638***	-0.399*
		(0.124)		(0.127)	(0.183)
GDP per capita (log)					0.322
					(0.188)
Constant	5.782***	5.881***	5.791***	5.883***	5.891***
	(0.200)	(0.132)	(0.195)	(0.134)	(0.126)
Individual level					
Social trust (more trusting) ^b			0.213***	0.212***	0.212***
			(0.015)	(0.015)	(0.015)
Awareness ^a			0.277***	0.277***	0.277***
			(0.014)	(0.014)	(0.014)
Political orientation ^a			-0.111***	-0.111***	-0.111***
			(0.015)	(0.015)	(0.015)
Household income ^a			0.194***	0.195***	0.195***
			(0.015)	(0.015)	(0.015)
Fairness (agree) ^b			-0.053***	-0.054***	-0.054***
			(0.015)	(0.015)	(0.015)
Religiosity ^a			0.223***	0.223***	0.223***
			(0.015)	(0.015)	(0.015)
Education (high) ^b			0.173***	0.173***	0.173***
			(0.015)	(0.015)	(0.015)
Gender (female) ^b			0.101***	0.101***	0.101***
			(0.014)	(0.014)	(0.014)
Age ^a			-0.164***	-0.164***	-0.163***
			(0.015)	(0.015)	(0.015)
<i>Random effects</i>					
Constant	0.864	0.363	0.815	0.376	0.332

	(0.262)	(0.111)	(0.247)	(0.115)	(0.101)
Residual	5.915	5.915	5.577	5.577	5.577
	(0.050)	(0.049)	(0.046)	(0.046)	(0.046)
Log likelihood	-66743.925	-66734.473	-65893.46	-65885.017	-65883.64
Chi-bar-squared distribution	3886.03***	1768.33***	3886.66***	1925.51***	1664.74***
N (country level)	22	22	22	22	22
N (individual level)	28,898	28,898	28,898	28,898	28,898

* $p < .05$ ** $p < .01$ *** $p < .001$. Standard errors in parentheses. Economic inequality and GDP per capita are log-transformed. Independent variables are standardised. ^a: group-mean-centered, ^b: reference category.

Table C2. Multilevel regression using Palma ratio as operationalisation of economic inequality.

DV: Personal environmental responsibility	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Fixed effects</i>					
Country level					
Economic inequality (log)	0.044	0.228	0.061	0.233	0.254*
	(0.189)	(0.130)	(0.184)	(0.133)	(0.128)
Corruption		-0.672***		-0.629***	-0.409*
		(0.125)		(0.128)	(-0.187)
GDP per capita (log)					0.294
					(0.192)
Constant	5.757***	5.848***	5.760***	5.845***	5.849***
	(0.191)	(0.128)	(0.187)	(0.132)	(0.125)
Individual level					
Social trust (more trusting) ^b			0.205***	0.204***	0.204***
			(0.015)	(0.015)	(0.015)
Awareness ^a			0.245***	0.245***	0.245***
			(0.014)	(0.014)	(0.014)
Political orientation ^a			-0.144***	-0.144***	-0.144***
			(0.014)	(0.014)	(0.014)
Household income ^a			0.187***	0.187***	0.187***
			(0.015)	(0.015)	(0.015)
Fairness (agree) ^b			-0.055***	-0.055***	-0.055***
			(0.014)	(0.014)	(0.014)

Religiosity ^a			0.210***	0.210***	0.210***
			(0.014)	(0.014)	(0.014)
Education (high) ^b			0.167***	0.167***	0.167***
			(0.015)	(0.015)	(0.015)
Gender (female) ^b			0.097***	0.097***	0.097***
			(0.014)	(0.014)	(0.014)
Age ^a			-0.162***	-0.162***	-0.162***
			(0.014)	(0.014)	(0.014)
<i>Random effects</i>					
Constant	0.836	0.367	0.797	0.387	0.351
	(0.248)	(0.110)	(0.236)	(0.115)	(0.105)
Residual	6.052	6.052	5.738	5.738	5.738
	(0.049)	(0.049)	(0.047)	(0.047)	(0.047)
Log likelihood	-70159.157	-70149.768	-69354.291	-69346.031	-69344.923
Chi-bar-squared distribution	3863.82***	1840.87***	3892.91***	2023.56***	1801.15***
N (country level)	23	23	23	23	23
N (individual level)	30,227	30,227	30,227	30,227	30,227

* $p < .05$ ** $p < .01$ *** $p < .001$. Standard errors in parentheses. Economic inequality and GDP per capita are log-transformed. Independent variables are standardised. ^a: group-mean-centered, ^b: reference category.

D. GSEM mediation analysis

Figure D1. Social trust mediating the effect of economic inequality on PER (hypothesis 3).

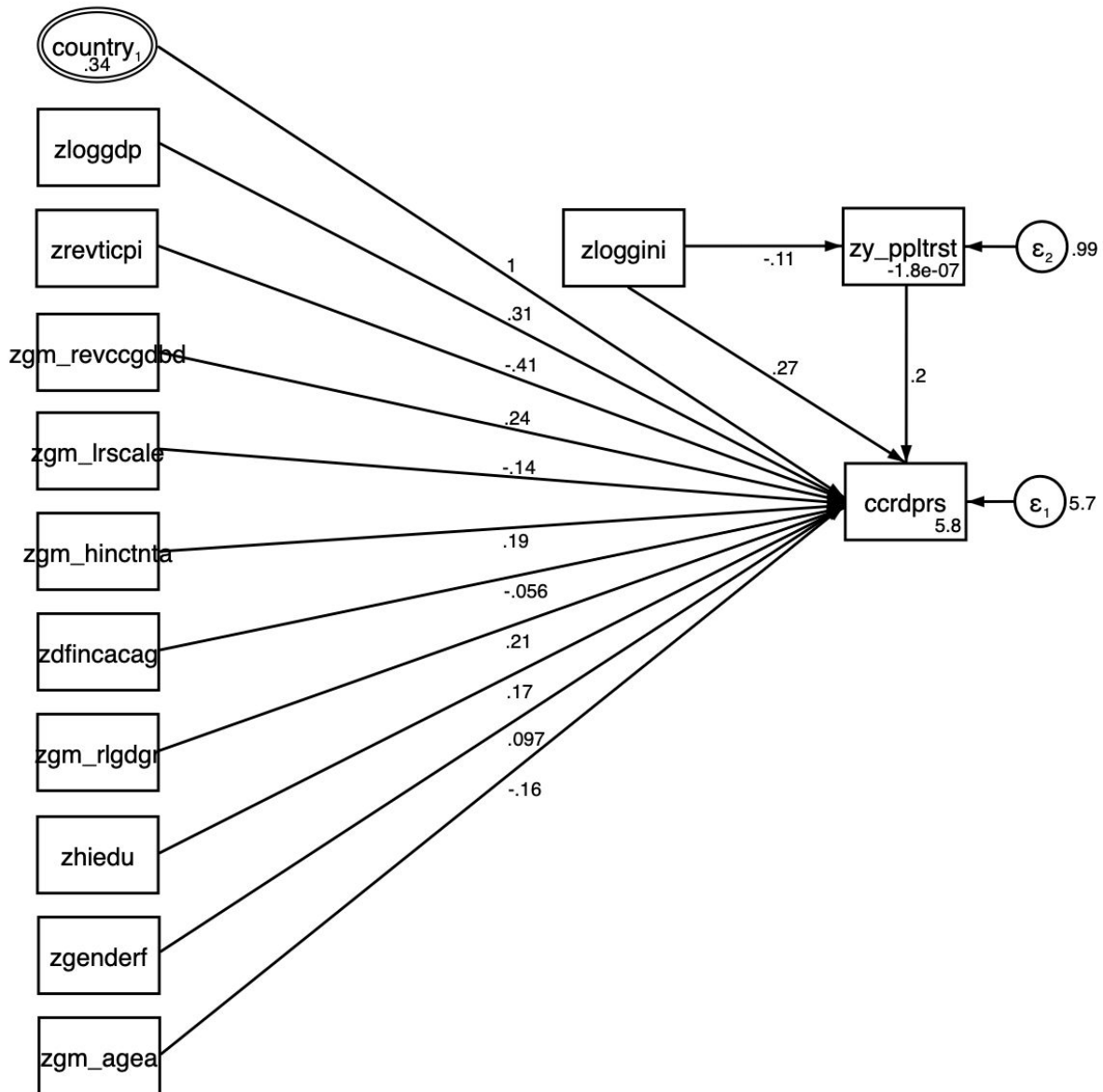
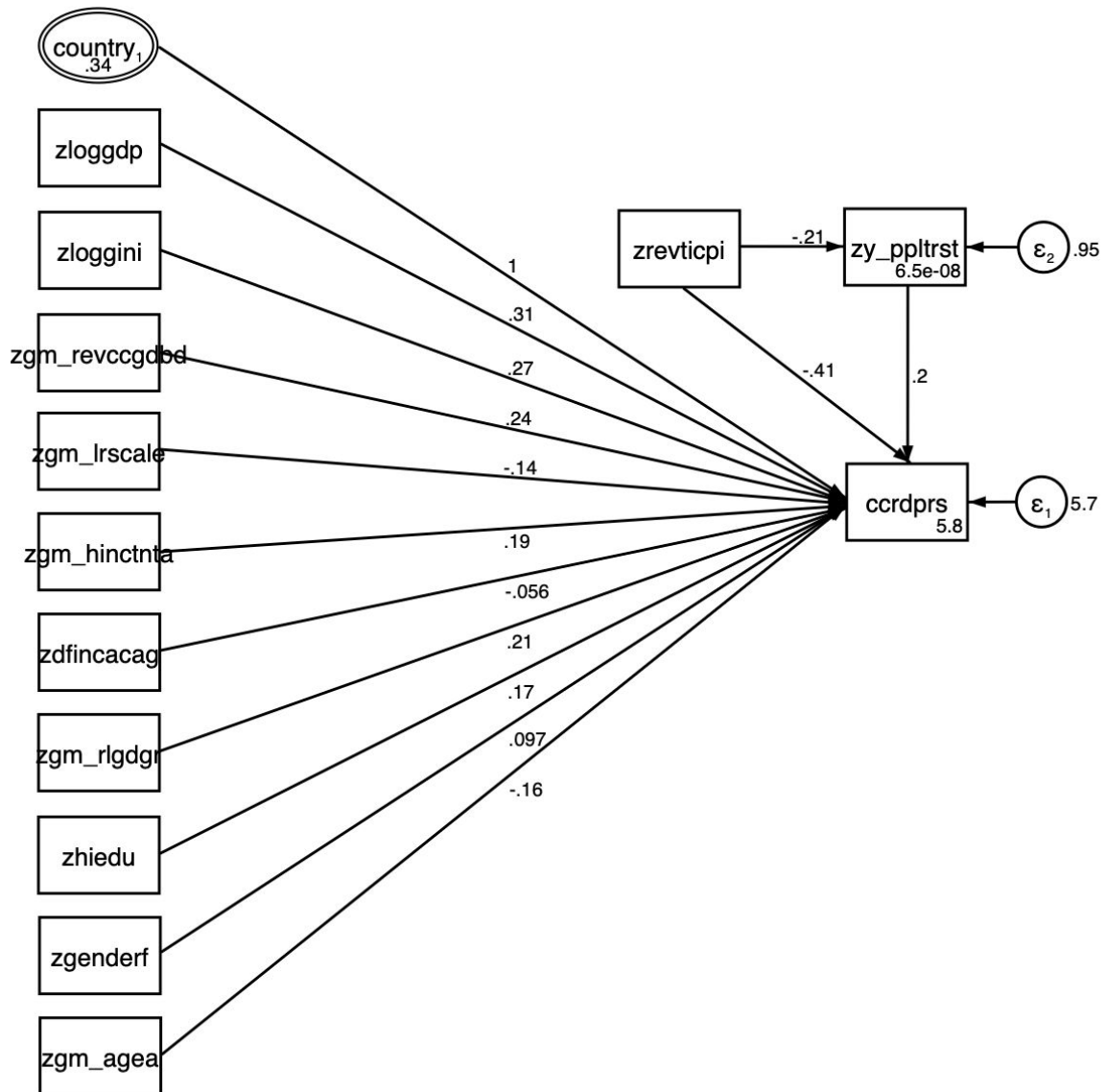


Figure D2. Social trust mediating the effect of corruption on PER (hypothesis 4).



E. Visualisations and graphs

Figure E1. Fixed effect of social trust on PER (selected countries).

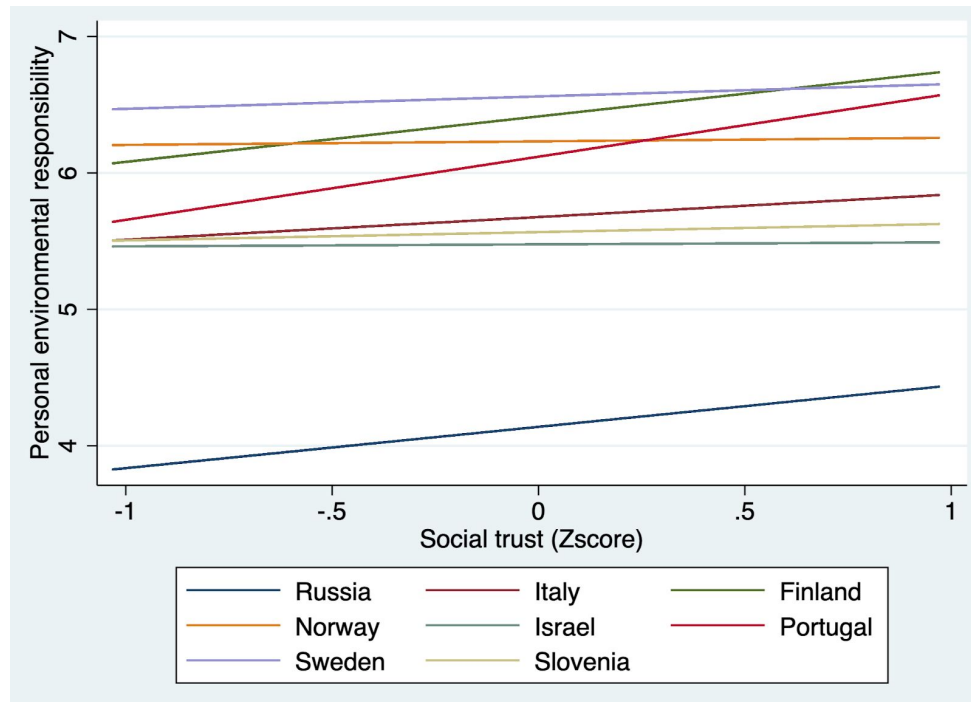


Figure E2. Fixed effect of religiosity on PER (selected countries).

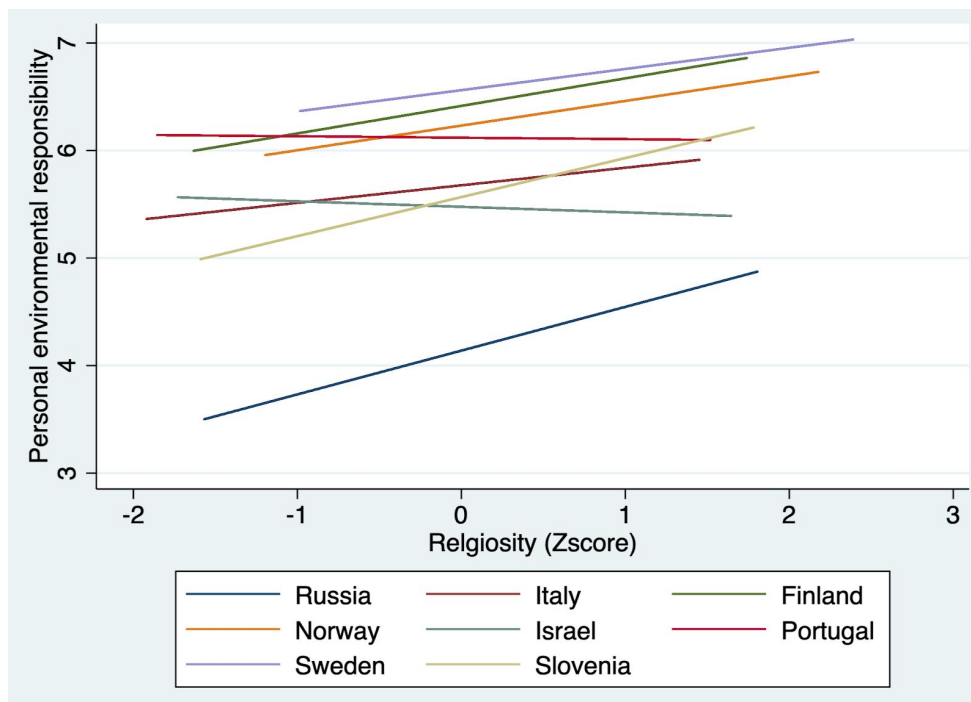


Figure E3. Predicted margins (with 95% confidence band): Effect of economic inequality on PER.

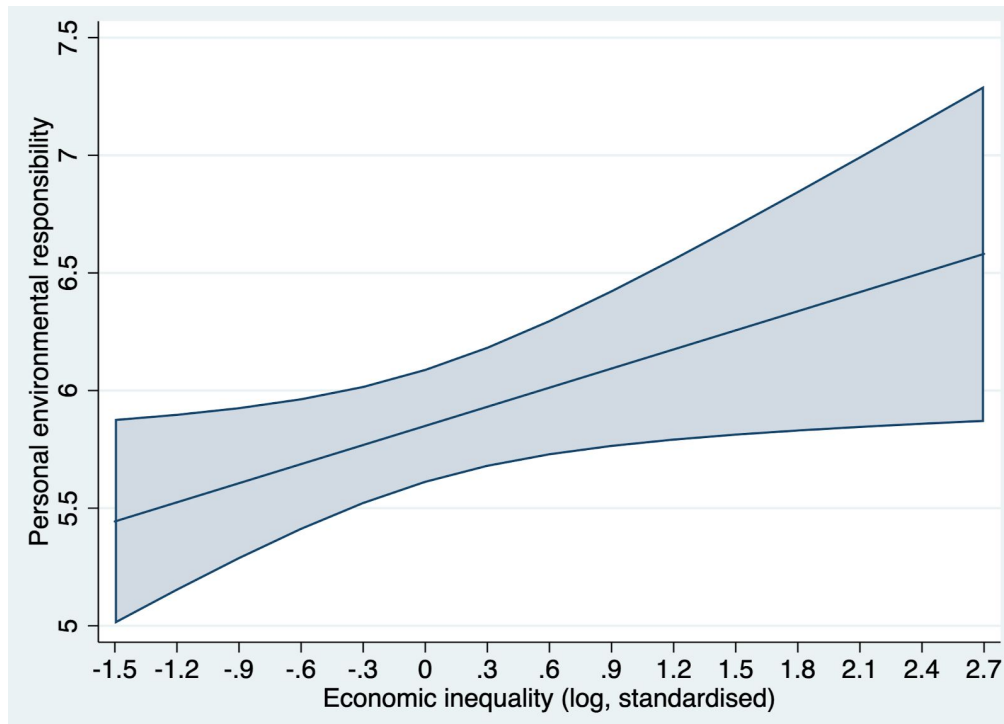
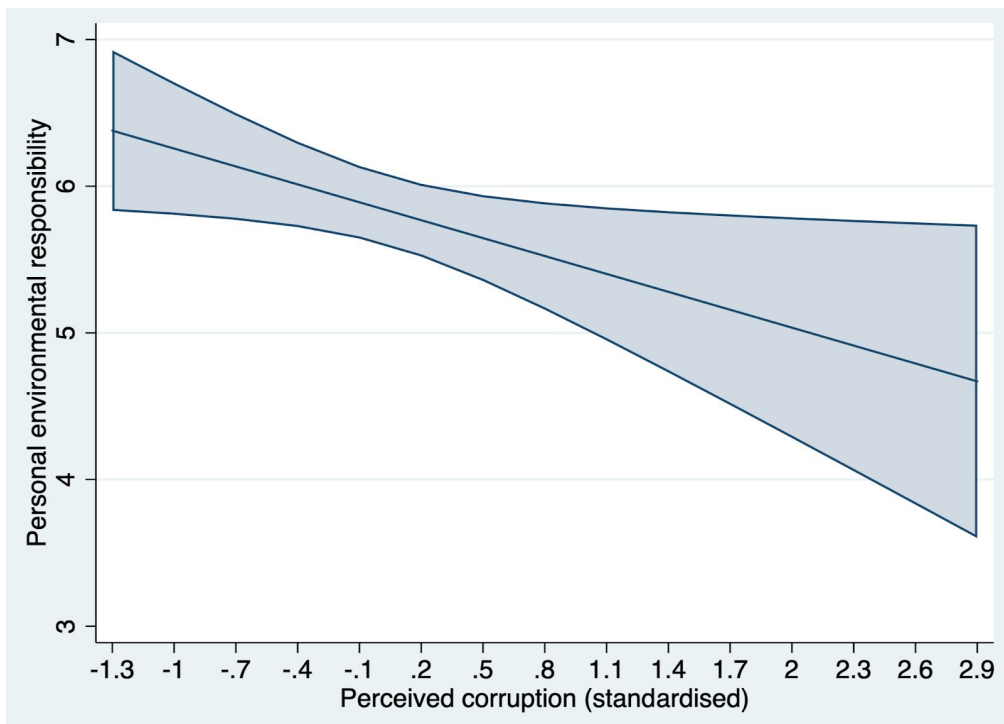


Figure E4. Predicted margins (with 95% confidence band): Effect of corruption on PER.



F. ESS 8 participating countries

Table F1. List of countries participating in ESS round 8 (2016).

Country	Fieldwork period	Number of interviews approved	Resp. rate*
Austria	19.09.16-28.12.16	2 010	52.5
Belgium	14.09.16-31.01.17	1 766	56.8
Czechia	24.10.16-19.12.16	2 269	68.5
Estonia	01.10.16-31.01.17	2 019	68.4
Finland	15.09.16-08.03.17	1 925	57.7
France	10.11.16-11.03.17	2 070	52.4
Germany	23.08.16-26.03.17	2 852	30.6
Hungary	14.05.17-16.09.17	1 614	42.7
Iceland	02.11.16-08.06.17	880	45.8
Ireland	25.11.16-08.05.17	2 757	64.5
Israel	10.09.16-08.02.17	2 557	74.4
Italy	11.09.17-19.11.17	2 626	49.7
Lithuania	04.10.17-28.12.17	2 122	64.0
Netherlands	01.09.16-31.01.17	1 681	53.0
Norway	22.08.16-17.01.17	1 545	52.8
Poland	07.11.16-22.02.17	1 694	69.6

Portugal	20.10.16-15.06.17	1 270	45.0
Russian Federation	03.01.17-19.03.17	2 430	63.4
Slovenia	21.09.16-11.01.17	1 307	55.9
Spain	16.02.17-23.06.17	1 958	67.7
Sweden	26.08.16-10.02.17	1 551	43.0
Switzerland	01.09.16-02.03.17	1 525	52.2
United Kingdom	01.09.16-20.03.17	1 959	42.8

Source: https://www.europeansocialsurvey.org/data/deviations_8.html