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The conditions underlying citizen support for the implementation of environmental policies

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The conditions underlying citizen support for the implementation of environmental policies



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Abstract: *I analyze the factors that influence support for environmental policy proposals. Emphasis of the study is on the effects of three characteristics of the policies themselves - the required personal efforts, expected period before one benefits from the policy, and fairness of the policy. Background variables and factors based on environmental beliefs are also included in order to develop a complete model. Using an experimental survey design, data collected on Dutch high school students shows that the three characteristics tested do not significantly influence support for the environmental policies. For most policies, knowledge of environmental problems and general opinions about the importance of the environment compared to the importance of the economy have the strongest impact on support for the policies.*

Key Words: Environmental policy characteristics, Environmental perceptions, Referendum, Experimental design

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1. Introduction: Research question and relevance

With disruptive climatic change becoming almost inevitable, it is not surprising that research related to prevention of an ecological crisis has increased exponentially over the last decades (De Geus 2003; Jones and Jacobs 2007). Within political science, subfields such as public choice theory and green political thought have dealt extensively with environmental problems and their solutions. However, the discussion concerning which type of policies or regimes are better able to prevent an environmental crisis remains on a highly theoretical level. Surprisingly, only a relatively small body of literature reports empirical research that investigates from the actor's perspective which types of policies will be acceptable to prevent an environmental crisis. In a democracy, the quintessential condition for an environmental policy to work is citizen support. Nevertheless, empirical research about citizen perceptions of environmental problems and their real preferences concerning solutions to those problems is not fully developed yet. This study will contribute by examining the following research question:

Under which conditions will citizens support government policies that imply constraints on the citizens' domain of freedom in order to solve environmental collective action problems?

In order to give this study a unique focus three successive steps are taken: 1) By exclusively looking at environmental policies that can be enforced by a government this study goes beyond the context of environmental problems as collective action problems. 2) Instead of studying the effects of voter characteristics on support for the policies the main focus of this study lies on the impact of certain characteristics of the proposals themselves 3) The most distinguishing aspect of the study is its innovational methodology. Instead of making indirect causal inferences based on aggregate data, this study aims at making direct causal claims using an experimental survey design to collect individual level data. Those steps will be fully explained in the following sections.

As the result of this study we are going to learn whether citizen support for environmental policies is influenced by the following conditions: the size of the efforts that citizens are required make by the policy; the expected duration before citizens start to benefit from a policy; and the fairness of the individual contributions required by certain policies. Being able to predict what kind of environmental policies can be expected to find higher/majority support among citizens can therefore improve the prospects of successfully implementing certain environmental policies and such findings can serve as important policy recommendations for governments. Looking at the extent of the environmental challenge for current societies the significance of this project is evident.

2. Background: Normative framework/context of the empirical question

The current century is characterized by Thomas Friedman as the “Energy-Climate Era”. “The convergence of global warming, global flattening and global population growth is the most important dynamic shaping the world we live in today” (Friedman 2008, 26). Key problems emanating from this process are the growing demand for ever scarcer energy supplies and natural resources, disruptive climate change and rapidly accelerating biodiversity loss (2008, 26). Over the last decades it has become almost indisputable that anthropogenic influences – i.e. increasing atmospheric concentrations of greenhouse gases due to human activities - are a major cause of contemporary climatic change (e.g. UNFCCC 1992; Jones and Jacobs 2007). Parties united in worldwide organizations on climatic change now agree that dangerous anthropogenic interference with the climate system should be prevented.

According to many politicians, the optimal solution to deal with environmental problems could be qualified as a ‘win-win’ strategy in which sustainability comes together with economic growth and technological innovations (De Geus 2003, 139-141). However, there now seems to be a general consensus among scientists that “the fundamental characteristic of today’s environmental problems is that they are extremely tenacious and seem irremediable by ‘win-win’ strategies” (2003, 13). This is definitely the case if we acknowledge the fact that there are biophysical limits to growth in the ecosystem Earth: “Infinite growth in a finite system is an impossible goal and will eventually lead to failure” (Daly 2004, xxiv). “We should integrate economy and ecology in a way that acknowledges that the carrying capacity of the Ecosystem Earth is finite” (Jones and Jacobs 2007, 100). The final conclusion drawn by many environmental scholars is that “unlimited production and consumption are at the root of our current environmental decay; people will have to lead more ecological lives and will have to consume less in order to achieve a green environmentally safe and sound society” (De Geus 2003, 13). In order to deal effectively with our environmental problems we have to implement far-reaching measures that will reduce dangerous emissions by constraining our consumption patterns.

The quest for the implementation of effective environmental measures is complicated by the nature of environmental issues as problems of collective action, or also ‘environmental dilemmas’. A first type of collective action problem emerges with the production of public goods. A public good is a good that, “if it is available for consumption at all by any members of a group, it is available for consumption in equal measure by all members of the group” (Laver 1997, 32). This implies that actors who do not want to contribute to the production of a public good cannot be excluded from its merits and will ‘free ride’ on the efforts of others. When many people have the incentives to free ride the joint production of a collectively desired public good will never happen (Laver 1997, 36). Based on these characteristics of public good dilemmas, Mancur Olson (1971, 2) famously developed his ideas about the ‘logic of collective action’, which claims that rational

actors will not act to advance their common or group objectives unless they are coerced to do so. The reason is that cooperation is costly, while incurring the cost does not have a noticeable impact on the attainment of the common objective. These features of the situation will move a rational actor to avoid the cost, whatever the other citizen is doing (Pellikaan and Van der Veen 2002, 6). A second type of collective action problem is the 'Resource dilemma'. In general terms, the 'Resource dilemma' refers to a situation in which a group shares a scarce resource from which the individual members can harvest, and the group runs the risk that excessive harvest lead to depletion of the resource (Van Dijk and Wilke 1999, 111). As long as actors continue to behave as 'maximisers' of their own interests regarding common pool resources like clean soil, air and water, Garret Hardin's well-known 'Tragedy of the Commons' will constantly reappear in problems of pollution (Hardin 1973, 139).

Emanating from the nature of environmental problems as collective action dilemmas it is often stated that only some overriding power, most likely a state, can effectively enforce cooperation in the creation of common goods (Ophuls 1977, 226-227). As a result, governmental policies are not suggestions, but directives for individual behavior. If a policy is implemented this will necessarily result in some form of coercion and/or enforcement. Ideally, we want an overriding power that combines the implementation of effective environmental policies with maintaining the individual liberties that are valued so much in contemporary democracies. But it is undeniable that an acute tension exists between effectively implementing environmental policies and fundamental liberties that are common in liberal democracies (De Geus 2003, 61). Effective environmental policies require at least constraints on the individual's freedom to consume. Those constraints will most likely exist of some physical or financial requirements. Despite the fact that we can think of states in which fundamental rights like political participation and legal protection of citizens do not come to an end with the implementation of substantive environmental policies, there will certainly be a constraint on the domain of 'negative' freedom in which a citizen can be free¹. Restricting the freedom to consume means a decreasing area in which the individual is free to do or be what he is able to do or be, without interference by other persons (restriction of negative freedom). "The political-ecological belief that there is a right way to live the green 'good life' (positive freedom) is incompatible with the value pluralism normally associated with liberal democracy" (negative freedom) (Dobson 2000, 114).

Normative green theorists address the question: what type of democratic state will be best able to implement effective environmental policies? We can distinguish here between 'popular' types of democracies in which policies are mainly initiated by the citizens (bottom-up) and 'elite' or 'expert' types of democracy in which policies are initiated by elites and experts (top-down)². It is

¹ On the concepts of negative and positive freedom see: Berlin 1958, Two Concepts of Liberty

² See Schumpeter (1954) on the difference between 'the classical doctrine of democracy' and 'another theory of democracy'.

often argued that bottom-up implementation of harsh environmental measures is unlikely because the people in general lack the knowledge to understand the complexity of the environmental problems (Ophuls 1977, 162) and they are continuously stimulated by the capitalistic system to follow the never ending cycle of consumption (Schor, 1998, 145). With a majority of the citizens being unlikely to initiate environmental measures, governments are the prime actors to take responsibility. Top-down styles of government are believed to fit better with the consequentialistic nature of the green objectives (Goodin 1992, 124; Dobson 2000, 122). Political experts, who govern *for* the people will more likely foresee the consequences of environmental disasters and initiate certain policies in response. However, everyday experiences indicate that political leaders are afraid to lose support when they implement environmental measures that deviate too much from the opinions of average citizens. In a democratic regime, defending a policy that is not supported by popular support is a risky line to take (Pellikaan and Van der Veen 2002, 9). Short-term electoral interests overrule long-term environmental interests in everyday politics. Politicians will most likely only initiate environmental policies if the average citizen supports this (De Geus 2003, 25). This indicates that in democratic societies, governments can only take the initiative to implement environmental policies if they can mobilize popular support for those coercive policies. But how likely is it that citizens will voluntarily support government policies that contain constraints on their domain of freedom in order to save the environment? Looking at these background conditions, the importance of studying popular support for environmental policies as an important addition to normative theory can hardly be stressed more.

As the framing of the research question specifically incorporates the government as a possible enforcer of cooperation in environmental dilemma's, assessing the question whether citizens will support/not support environmental policies goes beyond the traditional cooperate/not cooperate structure of citizen behavior in collective action problems. We are dealing here with two different kinds of dilemma. When a majority of citizens support the implementation of an environmental policy, all citizens become obliged to cooperate. When there is no majority for such a policy, the policy is not implemented and all citizens remain free to decide for themselves whether they will make contributions to a common good. In the case that a proposed policy is rejected, supporters of the policy are not worse off than citizens who did not support the policy because being a supporter does not necessarily mean that one has to make an actual contribution. This is contrary to cooperating in an environmental dilemma where cooperation is the worst strategy when others defect (Pellikaan and Van der Veen 2002, 61). The worst situation - in which a citizen cooperates but in which at the same time the common good is not established due to free riders - is not an option when deciding whether one will support government policies.

The only dilemma that a citizen faces when government involvement can solve the problem of the logic of collective action is whether the citizen really wants the government to solve the problem. It is mainly a problem of preference orderings.

Does the individual really prefer the production of the common good over maintaining his freedom to consume? “Many citizens may be opposed to both voluntary collective action and to governmental regulation of their behavior, even if they are aware of environmental issues, and even if they are not indifferent about the risks involved” (Pellikaan and Van der Veen 2002, 8-9). Different environmental qualities such as air quality or biodiversity are valued very differently by citizens (Miller 1999). Some people simply do not care when species, glaciers and islands disappear, or at least they do not think it is worth the costs to prevent it. For non-pollution to become a common objective, there must be an agreement that the collective cost of achieving the less polluted state of the environment should be perceived as worth incurring (Pellikaan and Van der Veen 2002, 8). In discussing the question under which conditions citizens will support environmental policies, we should keep in mind that some citizens will never support environmental measures and others will always support environmental measures.

3. Literature review

Empirical research on public attitudes towards environmental issues started during the 1970s. The central theme in those early studies was to determine the sociodemographic bases of concern for environmental quality. However, those studies reported considerable dissensus with respect to both the evidence itself and its interpretation (Dunlap and van Liere 1978). In a 1980 article, Van Liere and Dunlap summarized what was known about five general hypotheses - the age, social class, residence, political, and sex hypotheses - as well as the theoretical explanations offered for each of them. Youth were expected to be more concerned about environmental quality than older people because they are less integrated into the economical and social system. When integrated in the system it is harder to change it, which must happen in order to protect the environment. Social class as indicated by education, income, and occupational status is expected to be positively associated with environmental concern. Urban residents are more likely to be environmentally concerned than rural residents because generally they are exposed to higher levels of pollution. The political hypothesis states that citizens with liberal views are more concerned about environmental quality than their conservative counterparts. Lastly, males were expected to be more concerned about environmental issues because they are more likely to be involved with community issues than woman (Van Liere and Dunlap 1980: 182-186). Considerable evidence in the hypothesized direction could only be found for the age hypothesis and for level of education. With regard to other factors, Van Liere and Dunlap (1980: 181) claim that trade-offs between environmental quality and other widely valued ends such as economic growth and private property rights suggest the fruitfulness of examining differential commitments to the latter as determinants of environmental concern.

When research on public attitudes towards environmental issues evolved, the attention extended to explaining pro-environmental behavior. One component of pro-environmental behavior is voluntary contributions to solving environmental problems. Pellikaan and Van der Veen (2002: preface xiii) surveyed citizens' responses to environmental collective action problems, in order to report on the effectiveness of 'self-regulation policy' in the environmental policy plans of the Netherlands. In one part of their analysis they questioned respondents on six different situations of environmental behavior with regard to topics such as chemical waste collection, energy saving behavior and shopping. The determinants that explained behavior in most of the six cases are age, gender, religion, environmental involvement and environmental interest (Pellikaan and Van der Veen 2002: 141). Overall, the explained variance of their model with demographic, cultural and economic attributes was poor. Yi *et al.* (1999: 152) argue that two sets of factors tend to be separated in public efforts to influence voluntary environmental behavior; some emphasize education and persuasion as the best tools for changing behaviors, while others suggest reliance on regulations or taxes to change behaviors. However, their research reports that no major structural factors could be identified in a multi-country comparison of household recycling decisions. Those decisions seemed to be highly influenced by contextual factors (Yi *et al.* 1999).

We now turn to existing studies explaining voting intentions for environmental policy proposals. Kahn (2002) studied how demographics help explain observed differences in support for environmental ballots in California using individual-level survey data. He found that higher educated and minorities tend to support environmental regulation while people employed in businesses that cause pollution oppose environmental regulation (2002: 59). However, different authors claim that environmental concern is actually widespread in society, indicating a limited utility of demographic variables in explaining variation in environmental concern (e.g., Van Liere and Dunlap 1980: 193). Compared with other potential explanations "the collective impact of demographic variables in multivariate models has been quite limited" (O'Connor *et al.* 1999: 462).

In a series of studies based on the same US based data, O'Connor, Bord and Fisher (1999; 2000; 2002) studied several determinants of support for hypothetical government actions to address environmental problems. Those hypothetical government actions were proposed to the respondents as referendum items. In addition to the traditional demographic variables, those studies first of all studied the effects of a set of 'cognitive' variables on support for government actions. A subdivision is made between 'specific environmental perceptions' and 'general environmental beliefs'. Although the difference is mainly theoretical, 'general environmental beliefs' refer to non-issue-specific cognitive environmental orientations whereas 'specific environmental perceptions' focus concern on specific issues or outcomes (O'Connor *et al.* 1999: 462). Two types of variables classified as 'specific environmental perceptions' are 'risk perceptions' and 'knowledge of global warming'. Those variables focus their attention on specific

issues (O'Connor *et al.* 2002: 2). The assumption is often made that “people who perceive a relatively high likelihood of an adverse event are more likely to take personal meliorative steps and support government initiatives to do likewise, even in the face of required sacrifice. This assumption, however, has seldom been tested, especially for the case of long-term, uncertain environmental risks such as global warming” (O'Connor *et al.* 1999: 461). Knowledge of environmental issues and problems may also be a predictor of pro-environmental attitudes or behavior. Accurately identifying the causes of environmental problems - especially climate change - is expected to be positively related to support for government initiatives to solve those problems. With complex environmental problems, information and awareness are essential for recognizing the problem and its solutions. Not knowing that greenhouse gasses are causing climate change and not being able to identify behavior that generates greenhouse gasses make it unlikely that a person will support policies that reduce greenhouse gas emissions (O'Connor *et al.* 2002: 1-3).

The results of the above mentioned analyses show first of all that “people are neither ‘non-believers’ who oppose all government efforts, nor are they ‘believers’ who promise to vote for every government proposal” (O'Connor *et al.* 1999: 461). The average citizen is in the middle, favoring some actions and opposing others (O'Connor *et al.* 1999: 469). Multivariate analyses to detect the determinants of voting intentions show that demographics only explain 1% of the variance in the dependent variable. Respectively adding the risk perceptions and knowledge variables or the general environmental beliefs increases the explained variance up to 26% and 27%. Accurately identifying the causes of climate change and expecting bad consequences from environmental problems makes it more likely that government initiatives will be supported. The knowledge effect is supported by earlier findings (e.g., Arbuthnot 1974; Vinning *et al.*, 1992). When people expect a policy to contain limitations of personal freedom or expect a policy to have negative consequences for the economy the likelihood of support for the policy strongly drops (O'Connor *et al.* 2002: 1). The final conclusion states that despite related ‘risk perceptions’, ‘knowledge’, and ‘general environmental beliefs’ are somewhat independent predictors of voting intentions (O'Connor *et al.* 1999: 470).

Apart from studying response to hypothetical referendum items, some Swiss based studies looked at actual referenda to explain voting patterns. In September 2000, 4.7 million Swiss citizens were invited to vote for three proposals for taxes on fossil energy. The results showed that 80% of the voters voted in block either against all three proposals or in favor of all three of them (Thalmann 2004: 190). Closer study showed that few voters paid attention to the fine differences in tax rate and revenue recycling made between the proposals. (Thalmann 2004: 179). Some important results of this study were that citizens who have regular employment and citizens who think the redistribution of the revenues of the environmental taxes is fair are more likely to support the proposals while voters with one or more cars are less likely to support the green tax reforms (Thalmann 2004: 180-182, 206).

In an analysis of the same Swiss referendum data Halbheer *et al.* (2006) focused explicitly on the effects of the properties of the proposals themselves on their acceptance chances. The authors differentiate themselves from earlier studies by claiming that those earlier studies are mainly concerned with the effects of voter characteristics on environmental behavior and voting intentions. Their own study also incorporates that individuals weigh the costs and benefits when they decide on environmental proposals but they do not link this to characteristics of the voters but to characteristics of the proposed policies. “Because of the relatively large number of different proposals in our sample, we can say more about the relationship between the characteristics of the proposal and the electoral support it receives” (Halbheer *et al.* 2006: 444). The main findings suggest that proposals that restrict consumer sovereignty have a low probability of being accepted. In times when environmental problems are generally considered to be important, environmental proposals meet with high support. And whether proposals contain a tax has no significant effect on voter behavior (Halbheer *et al.* 2006: 443, 455). However, the reliability of the findings could be improved as the whole analysis is based on aggregate data. Bornstein and Lanz (2008: 430-433) added a study that underlines the importance of including variables pertaining to the notion of ideology in the analyses of Swiss voting patterns. Normative perceptions influence economic cost benefit calculations. The findings show that controlling for ideology tends to reduce the estimated magnitude of price effects (Bornstein and Lanz 2008: 438).

4. Theory building and hypotheses

One of the differentiating aspects of this study is that it studies the effects of characteristics of environmental policies themselves on public support for the policies. As Halbheer *et al.* (2006) foremost indicated, studying this type of explanations offers good opportunities for new insights, as they are not included in existing models and substantially differ from explanations based on voter characteristics. Including this type of explanations into multivariate analyses can possibly increase the relatively low levels of explained variance found by previous studies that only included background variables and environmental perceptions. Studying the influence of characteristics of the policies themselves and comparing this influence with the influence of other factors in explaining support for the environmental policies offers new insights what type of factors governments should try to influence in order to increase public support for environmental measures. In this section three different characteristics of environmental policies are discussed: the efforts that they require, the duration of the production of the environmental good and the fairness of the measure. Hypotheses with regard to every characteristic are developed.

4.1 The effort required

Citizens can contribute in many different ways to solving environmental problems. However, those contributions will always require a certain physical or financial effort of the citizen. With regard to voluntary contributions to environmental collective goods the 'logic of collective action' leads us to expect that citizens will never voluntarily cooperate. Nevertheless, Pellikaan and Van der Veen (2002) found that, contrary to what the logic of collective action predicts, citizens accept environmental self-regulation policies in some instances. However, a distinction between soft cases and hard cases was observed in terms of personal significance. When larger amounts of personal interests of citizens are involved in a certain policy, the efforts that citizens have to make in order to cooperate also become larger. High individual costs of compliance are expected to decrease the likelihood of compliance (2002, 27). Using three different cases of household behavior that can be recognized as having the structure of an environmental dilemma, Pellikaan and Van der Veen (2002, 10) showed that citizens were significantly more likely to voluntarily cooperate with recycling toxic waste and economizing on energy at home than they were likely to voluntarily give up foreign holiday destinations to reduce air pollution. The final conclusion is that the case of 'holiday destinations' is a harder case than the others because the required efforts that citizens have to make in order to cooperate are larger than the efforts required to cooperate with the other cases. The case of holiday destinations is ineffective in stimulating voluntary contributions and is therefore subject to the logic of collective action (Pellikaan and van der Veen 2002: 27).

Unlike the aforementioned study this study explicitly investigates support for policies that become directives. However, it can be expected that the role of personal significance of a policy and the efforts required are not substantially different when deciding on supporting a directive policy compared to deciding on voluntary contributions. Deciding on support for a policy that can be enforced by the government still requires a cost-benefit calculation in which the costs are represented by the individual efforts that the policy requires. Non-equivalence of support for policies that contain different efforts can be expected. However, this study will go a step beyond the research methodology of the previous studies. This study will provide a direct test of the hypothesis instead of an indirect test. Pellikaan and van der Veen did not explicitly test the hypothesis that the efforts required influence the likelihood of making voluntary contributions to environmental goods. Their research design was not designed to test this hypothesis. On the basis of their finding that different dilemmas received different levels of support they concluded that the individual efforts and the level of private significance involved in a certain dilemma influenced the behavior in a dilemma. A further complication between the three dilemmas used in their study is that the differences in terms of the required efforts are very large. The occasional disposal of toxic waste is of a totally different order than making the effort of not traveling

by air for environmental reasons. This study will provide a direct empirical test of the influence of the required individual efforts by using an experimental design. By doing so, the study will only focus on physical efforts instead of financial efforts. Based upon the aforementioned considerations this research hypothesizes:

Hypothesis 1) Citizens are more likely to support environmental policies that imply constraints on the individuals' domain of freedom when this requires relatively small efforts rather than large efforts.

4.2 The time frame of the policy

One of the characteristics of solving environmental problems is that it takes time to reverse most environmental processes. For example, reversing the trend of global warming will probably take more than one hundred years. Short-term environmental measures can be expected to pay off as a common good only distant in the future. Those different time frames constitute a tension between short-term private benefits and long-term common goods. Is it likely that citizens will support policies in which they have to give up some of their short-term private benefits in order to produce a common good of which it is unsure whether they will ever profit from it? Models of rational choice would say that support for such policies is not likely as they help us understand humans as self-interested, short-term maximizers (Ostrom 2000, 472). In order to maximize our utilities efficiently, it is rational to strive for short-term gains because we are never sure whether long-term gains in the form of common goods will be established, as we are dependent of the cooperation of others. "Collective efforts that hinge on voluntary contributions collapse when the actors involved make short-term self interested calculations" (Green and Shapiro 1994, 73). Also under the condition of government enforcement of a policy after its approval - a condition under which we can be sure that the common good will be produced - we still have to consider whether we will voluntarily constrain some short-term economical private interests in favor of the production of a common good in the future. It is often noted that in a short-term oriented area such as the economy, more votes can be won than with long-term ecologically oriented policy programs (Schneider and Volkert 1999: 129). As it remains unsure whether we will be alive when the collective good is established short-term maximization and fulfilling our own private interests seems to remain the most likely strategy for a lot of people. This view also corresponds with ideas from evolutionary biology. From the Darwinist perspective of gene survival – the ultimate Darwinian value - short-term benefit is all that matters. The values of sustainability are not built into us by natural selection because restraining oneself from short-term benefits will make oneself impotent against all others who ignore long-term sustainability (Dawkins 2001: 2-8). "Prudence is not an evolutionarily stable strategy" (2001, 9).

Despite these pessimistic predictions, real world observations show that it is not all doom and gloom. Long-term common goods are actually realized and many citizens show willingness to give up some of their private interests in favor of the establishment of environmental goods. Some Darwinists admit that hope for long-term environmentalism lies in the unique human capacity to use our brains with our forward simulating imaginations that helps to improve our gene survival in the long run (Dawkins 2001: 5-11). All in all, balancing short-term private benefits against long-term environmental goods does not always necessarily lead to an ecologically negative outcome. Under certain circumstances citizens are willing to adopt policies that force them to adopt a more ecologically oriented lifestyle. When it is true that the time it takes for most environmental policies to gain any results is a major hindrance for citizens in their cost-benefit analysis, it is likely that shortening the period of establishment of the common good should lead to more support for a policy. Therefore I will hypothesize:

Hypothesis 2) Citizens are more likely to support environmental policies that imply constraints on the individuals' domain of freedom when the expected time after which citizens will start to benefit from the production of the common good becomes shorter.

4.3 Fairness of the policy

It is often thought that citizens are not necessarily unwilling to give up some of their private interests but that they are unwilling to do so if the policies are unfair by not placing the same constraints on others. An unequal distribution of the means to fulfill our desires in society leads to interpersonal tensions and feelings of envy. It is argued by Rawls (1999, 469) that: "the least favored tend to be envious of the better situation of the more favored the greater their feeling that the least favored cannot improve their own prospects." In relation to the implementation of environmental policies, the aforementioned considerations would predict that policies that increase inequality without improving the position of the least favored will lead to envy in a society and will be perceived by most of the citizens as unfair. A fair measure is here understood as a measure that preferably decreases existing inequalities, but certainly does not increase inequalities in a society without improving the position of the least favored. This specific idea of fairness as stabilizing or decreasing inequality should not be confused with fairness as equal treatment of citizens. Some believe that a policy is fair when a policy applies equally to all citizens. However, policies that apply equally to all citizens can have very unequal distributional implications. This mechanism can for example be seen in the working of most environmental taxes.

Taxation on domestic energy and transportation is seen as a one of the most flexible and efficient policy instruments to achieve environmental targets (e.g. Connelly and Smith 1999: 166; Scrimgeour and Piddington 2002: 2). Taxes create a

continuous financial incentive to decrease pollution because taxpayers are able to reduce or avoid the tax by changing their behavior (EEA 1996). The idea of green taxes is that citizens pay equal costs for an equal use of certain products or for equal amounts of emissions. This would be the case when all citizens pay the same environmental tax rates on fuel and energy. However, it is argued that such an equal tax rate increases inequalities in society because such a measure will have a regressive effect. A regressive effect indicates a falling share of income used for environmental taxes with rising income (Jacobsen, Birr-Pedersen and Wier 2003: 484). With regressive effects, existing financial inequalities increase. International studies find evidence that most implemented environmental taxes have regressive effects, especially the green taxes on water, gas and CO₂ emissions (e.g. Speck 1999: 659; Scrimgeour and Piddington 2002: 5; Jacobsen et al. 2003: 477- 485). Taxes can also have mixed effects. For example, higher taxes on car usage will be progressive across the population as a whole, (since the poor cannot afford cars), but regressive among car-drivers (Tindale and Hewitt 1999: 235). In this way, environmental taxation is at odds with social justice and hurt the poor. For this reason some argue against environmental taxation while public support for the concept of fair taxation remains strong (Tindale and Hewitt 1999: 235). In order to decrease social inequalities, the outcome of environmental taxes should be progressive; meaning here that with rising income levels, a higher percentage of the disposable income goes to environmental tax payment. This would reduce inequalities by having the strongest shoulders bearing the heaviest burden. Substantial majorities in all EU countries support the concept of progressive taxation (Tindale and Hewitt 1999: 236). It is also argued that individuals obtain moral satisfaction from making polluters pay (Johnson 1999: 313) In order to investigate whether the same principle applies for environmental measures the following hypothesis will be tested:

Hypothesis 3A) Citizens will be more likely to support environmental measures if the outcome in terms of the financial constraints that those measures contain have progressive effects.

However, there is an even stronger interpretation of fairness. Imagine an environmental policy that makes air travel more expensive by increasing air tickets with 100 Euro. Citizens in the lower income segments of society will become unable to fly if 100 Euros is the threshold between an affordable and an unaffordable ticket. For citizens in the higher income segments of society 100 Euros is not a threshold and they will still be able to fly. This environmental policy is effective because the number of passengers and flights will be reduced. Citizens are also equally treated by this policy; everyone pays 100 Euro more. But many citizens will perceive the measure as unfair because the domain of possible choices for citizens is not equally restricted for all citizens. On some citizens this policy only imposes financial constraints, while for other citizens the policy imposes that they are unable to travel by plane, which is a restriction of the

domain in which they are free to consume what they want. Citizens will probably see this as two different 'levels' of constraints. The envious 'less well situated' citizen will think that it is unfair that others still fly while he is forced to give up his holidays. Richer citizens should not only be hit by the policies in financial terms, their possibilities of flying should also be restricted. When policies that discourage air travel really want to be fair in this interpretation of fairness, the equal outcome of the policies should be that everybody has to reduce their number of flights independent from their financial position. In this case the outcome of the policy is that the consumption patterns of all citizens become restricted by a 'quota' type policy. In order to test whether citizens are likely to support this interpretation of fair environmental measures I will test the following hypothesis:

Hypothesis 3B) Citizens will be more likely to support environmental measures if the outcome of the measure contains equal constraints on consumption patterns instead of equal constraints in financial terms.

5. Research design and methods

This paper examines a model that links the reported factors to hypothetical votes regarding environmental policies employing an experimental survey design. For each of the three main factors of interest in this study, the total sample is randomly split in two experimental groups that are exposed in parallel investigations to two different levels of the experimental factor. By manipulating the levels of the experimental factors direct causal evidence can be produced as we can observe whether respondents exposed to different levels of the factor show different levels of support holding all other conditions equal. This method validly measures the effect of the experimental factors as long as the experimental groups are randomly composed and are treated in exactly the same way (Cobb 1997: 123; Petersen 2008: 323). Besides being able to demonstrate the causal effects of one experimental factor by isolating the effect of the factor, the experimental design also has the advantage that respondents do not make a conscious comparison, but instead only assess one particular level of a factor (Petersen 2008, 325). Compared to a normal correlational survey design, in which respondents can be asked to indicate how different levels of a factor will influence the likelihood that they will support a policy, the experimental design avoids biases/response effects in expressed opinions as a result of conscious comparisons of the given options.

The hypotheses are tested by including four questions in the survey that ask whether the respondent will support a certain environmental measure when this measure would be proposed to the respondent in a referendum. Presenting the measures as referendum items resembles best the context of this study in which governments can enforce the policy after popular approval. Three of those four referendum items contain a manipulated experimental factor. In order to prevent

Table (I): Factorial crossing of the factors over the different versions of the survey

<i>Version</i>	<i>Physical Effort</i>	<i>Pay-off period</i>	<i>Tax-system</i>
A	10 minutes	5 year	Regressive
B	10 minutes	5 year	Progressive
C	10 minutes	20 year	Regressive
D	10 minutes	20 year	Progressive
E	40 minutes	5 year	Regressive
F	40 minutes	5 year	Progressive
G	40 minutes	20 year	Regressive
H	40 minutes	20 year	Progressive

including three different experimental factors within one survey design from making it impossible to isolate the effects of one factor from the effects of the other factors, the survey design adopts the principle of full factorial crossing. Factorial crossing allows comparing the effects of two or more sets of conditions in the same experiment by including the set of all possible treatment combinations in the design (Cobb 1997: 19). With three experimental factors this will lead to a design with $2^3 = 8$ possible combinations of the different levels of the factors (table I). The big advantage of the factorial design is that the factorial design is very efficient because it allows the effect of several factors and even interactions between them to be determined with the same number of required respondents as are necessary to determine any one of the effects by itself with the same degree of accuracy (Shadis *et al.* 2002: 263-265). However, the current design deviates from the traditional factorial design in the sense that this design does not test the effects of different factors on one dependent variable. The effect of each factor is separately tested on separate dependent variables. The main purpose of the factorial crossing is to be able to control whether exposure to a certain level of a factor in a previous question has an effect on the answers to following questions. Further, a whole set of independent control variables is added to the survey in order to examine the validity of the main effects of the experimental factors on the dependent variables.

5.1 Participants and execution of the survey

In July 2010, a total number of 211 Dutch high school students (approximately 17-19 years old) completed the survey questionnaire while they were attending special training courses for their final exams. The subgroup of students in this age category was chosen for several reasons. As the main goal of the study is to examine the effects of the experimental factors on support for certain measures instead of providing general tendencies of support for environmental measures in the Netherlands, the disadvantage that using high school students makes generalization towards the Dutch population as a whole difficult is taken for granted. A major advantage of using a smaller subgroup of the population is that several demographic characteristics of the population that might interact with the

relation between the experimental factor and support for environmental measures can be controlled. The youth participating in the survey fall within the two highest levels of high school education and they more or less have the same age. Holding those variables constant strengthens the experimental character of the survey and simplifies the execution of the study, as surveying the whole population requires a higher number of respondents. Dutch high school students of this age can be expected to have fully developed attitudes towards environmental issues comparable to other citizens as those issues are very salient in Dutch public debate, those issues will be treated at school and as those issues are most likely to influence the quality of life of their generation. Respondents of 18 year and older are also allowed to vote in Dutch elections.

As most questionnaires were completed simultaneously, during collective class sessions, the response rate was close to 100%. The different versions of the questionnaires were randomly handed out to students in order to fulfill the requirements of a completely randomized design in which each combination of treatments gets assigned to the same number of respondents. The students filled in 5 pages with closed questions and almost all participants completed the questionnaire without any problems. No additional information was provided. Respondents were asked to follow the original order of questions. As the respondents completed their surveys anonymously without deliberating with others the problem of giving social desirable answers – sometimes reported in relation to face-to-face surveys (e.g. Milfont 2009: 264) – should be marginal.³

5.2 Measures

5.2.1 Dependent variables and manipulated experimental factors

The dependent variables are the four hypothetical referendum questions. Following previous studies (O'Connor *et al.* 1999; 2002) the respondents can report support for the proposed measures on a four point scale; 1(definite opponent), 2(probably opponent), 3(probably supporter), 4(definite supporter).⁴ Table II provides the exact wording of the questions with the applied manipulations. The first measure deals with the issue of waste collection; the other three measures are related to energy generation and energy consumption. Contrary to issues that are more selectively applicable to respondents such as car usage, all students have to deal with the chosen issues in their daily lives. This

³ Milfont's study shows that social desirability concerns do not have a strong effect on the way people respond to questions addressing environmental issues (2009: 268).

⁴ Although slightly deviating from the traditional bipartite referendum structure, the four point scale is preferred over a simple oppose/support dichotomy because it allows for more variance in the dependent variable.

reduces the chance of response effects as a result of indifference or non-applicability.

A further note is necessary on the context in which the students answered the referendum questions. First of all the questions are hypothetical questions. With hypothetical questions the response is to a great deal dependent on the information provided by the questionnaire. However, as the proposed measures deal with very realistic and actual problems certain context knowledge of both the causes of the problem and potential consequences of the measures is presumed. The items assume governments to be able to guarantee certain outcomes of the policies. But many environmental problems are on a global level and difficult to solve by a national governments alone (Pelikaan and Van der Veen 2002, 4). In order to make the cases realistic total solutions of environmental problems by the government are never proposed and the targets of the policies are not too ambitious. Furthermore, all the proposed measures contain a certain constraint on the individual freedom to consume.

As the wording of a survey question may have important consequences for the answers that are given in response all measures are presented in identical fashion.

In order to test the hypotheses each of the first three referendum items contains a manipulation of the experimental test factors. Four of the eight different versions of the survey list the required physical effort of waste separation as 10 minutes per week while the other four versions list the required effort as 40 minutes per week. In the second measure the pay-off term of the transition to sustainable energy is listed as 5 years in four versions while the other four versions list the pay-off term as 20 years. In one half of the surveys the third measure proposes a 15% environmental tax increase by means of a tax system that will have regressive effects while the other half of the surveys proposes a 15% environmental tax increase by means of a tax-system that will have progressive effects. In the first two manipulations there is a dilemma on what exact values to set the two levels of the factors. The relative distance between the values will influence the relation between the factor and support for the measures. It is obvious that required efforts of 1 minute a week or 100 minutes a week are of a totally different order. In determining the levels of the factors it was intended to place the levels on such a distance so that both levels are realistic within the context of the question. It was also intended that the relative distance between the levels of a factor should be recognizable for respondents but does not obviously lead to different levels of support. A pre-test of the manipulations showed that considerable variation in the answer patterns could be expected⁵.

Table II shows the grand averages of all observations from the four referendum items regardless of the manipulations.⁶ 'Waste separation' and 'transition to sustainable energy' generate higher levels of support than the two measures that

⁵ Two test versions of the questionnaire were pre-tested on 8 persons. On the basis of the results and their comments some questions were slightly adjusted.

⁶ It makes sense to compute the overall percentages of all the observations, as a kind of benchmark values that tell us the average percentages for the experiment as a whole (Cobb 1997: 27)

propose to reduce energy consumption. The energy quota receives lowest support of the four measures with only 3.8% of the respondents who definitely support the measure and 11.9% of the respondents who probably support the measure. The most popular measure is compulsory waste separation with 23.7% definite support and 44.5% probably support.

Table (II): Voting intentions

	<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Measure 1) In a referendum the government proposes to make separation of household waste compulsory. This measure requires an extra physical effort because you have to separate all your waste and you have to bring it to a collection point. Would you support this policy if it would cost you on average 10 (40 minutes) a week extra work in separating and disposing of your waste?	10.0 %	21.8 %	44.5 %	23.7 %
Measure 2) In a referendum the government proposes to start a large scale investment in sustainable energy sources to reduce the emission of CO ₂ . However, this measure requires every citizen <u>from today onwards</u> to make an extra monthly payment of €15 for the development and usage of sustainable energy. It should be noted that the transition to sustainable energy will cost some time resulting in a time loss of a couple of years before any benefits can be seen. Would you support this measure when investing in sustainable energy sources will lead to a substantial lower level of CO ₂ emissions in the Netherlands within a period of 5 (20 years)?	10.4 %	27.0 %	40.8 %	21.8 %
Measure 3) In a referendum the government proposes to implement extra taxes on the energy usage per household in order to give citizens an incentive to reduce energy use. Would you support a total extra tax burden of 15% on the energy usage of households by means of a tax through which you have to pay for every m ³ energy a fixed price of 15% extra? (Would you support a total extra tax burden of 15% on the energy usage of households by means of a tax system which increases the tax percentage per m ³ energy as you use more energy? Similarly to income tax, you will pay a low tax percentage of less than 15% over a first fixed quantity of energy, with any additional fixed quantity of energy use incurring an incrementing tax rate percentage above 15%).	28.9 %	46.4 %	20.4 %	4.3 %
Measure 4) In a referendum the government proposes to implement a quota on the energy usage per household. By means of this measure the energy usage per household can be forcibly reduced with the same magnitude as would be possible with the implementation of taxes on energy usage. A quota on energy usage entails that for every household a maximum quantity of energy will be available per person per month. A household will have to do with the available quantity of energy for the whole month. It is not possible to obtain extra energy by means of paying for extra energy. Would you support such a quota on energy usage?	53.8 %	30.5 %	11.9 %	3.8 %

Numbers vary from 210 to 211 depending on missing data

5.2.2 Independent control variables

Following previous studies, some socio-demographic measures are included as independent/control variables. As high school students are a very homogeneous group some common demographic measures such as age and income are not measured because any substantial variation is not expected. Gender, school-profile and having a secondary job are the only three variables measured. Gender is straightforward; the codes are 0 (male) and 1 (female). The sexes are spread equally over the sample with 50.5% male and 49.5% female. School-profile is included to control whether students who specialize in natural sciences have different opinions about environmental policies than student who specialize in social science courses. Originally four different profiles were coded. But as many students had a double profile this measure is recoded into a dichotomy with the labels 0 (societal profile) (53.1%) and 1 (natural science profile) (46.9%). The last variable measures whether students had a secondary job. The objective of this measure was to test whether students with a job would show more responsible behavior than students without a job as a result of being able to deal with money. However, as only a very small percentage of the youth reported not having a secondary job this variable is omitted from all further analyses.

Four measures are included that can be specified as ‘specific environmental cognitions’. Following Bord *et al.* (2000) two scale variables are included measuring personal and societal risk perceptions.⁷ The introductory questions state: ‘how likely are you, sometime during your lifetime, to experience a threat to your personal well-being as a result of one of the following?’ and ‘how likely is it according to you that one of the following will contain a threat for the well-being of the international society as a whole?’ The scale variables are constructed by summing five items with individual scores ranging from 1 (very unlikely) to 5 (very likely). The five items presented are ‘air pollution’, ‘global warming’, ‘shortage of drinking water’, ‘depletion of fossil fuels’ and ‘extinction of animal species’. The average responses to the individual items are reported in table III. Except from a shortage of drinking water the average student thinks that the probability that the stated problems will be a threat for his personal well-being is somewhere between neutral and likely. The average response to threats for the well-being of the international society as a whole indicates an even higher concern, conform the expectations by O’Connor *et al.* (2002). Outstanding is the difference between the reported personal risk level and the societal risk level of the threat of shortage of drinking water. Factor analyses show that the five items for both the personal as well as the societal risk scale load on one factor with eigenvalues of respectively 1.98 and 2.10. Reliability analysis produces a

⁷ A distinction between the effects of perceived personal and societal risks in relation to environmental problems was first observed by Bord *et al.* (2000: 209). “People view risk in a much larger context than only risks to themselves”.

Cronbach's alpha of .612 for the personal risk scale and .641 for the societal risk scale.⁸

The other two 'specific environmental cognitions' are two knowledge scales. Following O' Connor *et al.* (1999; 2002: 10) 'knowing the real causes' is a scale comprised of identifying four accurate causes of global warming and 'knowing bogus causes' is a scale comprised of identifying four inaccurate causes of global warming.⁹ The eight causes are presented interchangeably. The wording of the question is: Please indicate whether you think each of the following is a cause of global warming? For each item, responses run from 1 (Cause), 2 (Not a cause) to 3 (I don't know). The accurate causes are people driving their cars, destruction of tropical forests, use of coal and oil for electricity generation, and people heating and cooling their homes. The inaccurate causes are nuclear power generation, depletion of ozone in the upper atmosphere, use of aerosol spray cans, and use of chemicals to destroy insect pests. Tables IV and V report the percentages of the respondents that correctly identified the real/bogus causes of global warming. The percentages indicate that respondents have more difficulties identifying the bogus causes than the real causes. But even the real causes are not recognized as real causes of global warming by a relatively large number of respondents. It is surprising, though, that a group of still 10% of the students does not recognize car usage as one of the causes of global warming. Looking at the bogus causes it is also surprising that a large group of the respondents think that depletion of the ozone layer is a cause of global warming while it is not.

Three variables can be classified as 'general environmental beliefs'. The first variable asks how important is it that the government takes action regarding environment problems? Scores range from 1 (really unimportant) to 5 (really important). Two comparable questions were asked for economic problems and problems with public safety (see table VI). In order to indicate differential commitments, the scores of those questions were subtracted from the scores of the environmental problems question in order to make two relative measures that indicate whether a person thinks environmental problems are more important, equally important, or less important than economic or safety problems. Those calculated variables run from -3 to 3 in which a negative score indicates the respondent evaluates economical problems or problems with public safety more important than environmental problems and a positive score indicates the opposite. The frequency distributions show (table VI) that the average respondent thinks the economy or safety on the street is a little bit more important than the environment.

⁸ The usual criteria for items to form a reliable scale are that factor analysis must show that these items form a single factor with an eigenvalue of at least 1.0. and reliability analysis must produce a Cronbach's alpha of at least .6. (O'Connor *et al.* 1999: 465)

⁹ Despite the fact that the concept 'environmental knowledge' is broader than 'knowledge of global warming', this last more specific concept is easier to measure and should be able to serve as a good indicator for a more general knowledge of different type of environmental processes.

The final measure is a variable that controls for general opinions on government interventions in society. Support or opposition of environmental policies can be a mere effect of a general feeling that the government should or should not regulate things in society. Scores range from 1 (government should regulate less) to 5 (the government should regulate more).

Table (III): Mean scores on Personal and Societal risk perceptions (5 point scale)

	<i>Personal risk</i>	<i>Societal risk</i>
Air pollution	3.43	3.93
Global Warming	3.15	3.85
Shortage of drinking-water	2.46	3.93
Depletion of fossil fuels	3.54	4.34
Extinction of animal species	3.39	3.67

Table (IV): Knowledge of the Real causes of global warming

	<i>Good answer</i>	<i>Wrong answer/Don't know</i>
People driving their cars	90.0%	10.0%
Destruction of tropical forests	69.2%	30.8%
Use of coal and oil for electricity generation	71.1%	28.9%
People heating and cooling their homes	43.6%	56.4%

Table (V): Knowledge of Bogus causes of global warming

	<i>Good answer</i>	<i>Wrong answer/Don't know</i>
Nuclear power generation	38.9%	61.1%
Depletion of ozone in the upper atmosphere	14.7%	85.3%
Use of aerosol spray cans	35.5%	64.5%
Use of chemicals to destroy insect pests	40.8%	59.2%

Table (VI): Importance of different problems

	<i>Really unimportant</i>	<i>Not really important</i>	<i>Neutral</i>	<i>Reasonably important</i>	<i>Very important</i>
Economic problems	.9%	1.4%	4.3%	45.0%	48.3%
Problems with public safety on the street	.5%	2.4%	16.6%	41.7%	38.9%
Environmental problems	2.4%	10.0%	19.4%	44.5%	23.7%

6. Results

6.1 The experimental factors

Simple bivariate analyses show that none of the three experimental factors have a significant influence on voting intentions for the relevant policies. Table VII reports voting intentions of the students per measure separated for the two levels of the corresponding experimental factors. The percentage of students supporting compulsory waste separation is not much higher in the group in which the required effort is specified as 10 minutes per week compared to the group in which the required effort is specified as 40 minutes per week. Chi-Square analysis shows there is no significant relationship between the required effort and support for compulsory waste separation. The second factor tested is the influence of the time period before the benefits of the policy can be observed. Support for a transition towards sustainable energy is almost equal in both experimental groups. No significant differences between the group exposed to a 5-year period and the group exposed to a 20-year period are observed. The energy tax measure shows a bigger difference in the distribution of the expressed voting intentions for the regressive tax group and the progressive tax group. Within the group of respondents that were asked whether they support a flat (regressive) tax rate 16.7% of the students indicate they will probably support this measure while this number is 24.3% for the group of students that were asked whether they support a tax system with an incrementing tax rate (progressive). This difference in voting intentions is in the hypothesized direction. However, this difference is not large enough to be significant as indicated by the chi-square value.¹⁰

Table (VII): Voting intentions separated per level of the experimental factors

		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Measure 1 (Waste separation)	10 min. (N=106)	7.5%	22.6%	45.3%	24.5%
	40 min. (N=105)	12.4%	21.0%	43.8%	22.9%
<i>Chi-Square = 1.40, d.f. = 3, p-value = .707</i>					
Measure 2 (Sustainable energy)	5 year (N=109)	11.0%	26.6%	40.4%	22.0%
	20 year (N=102)	9.8%	27.5%	41.2%	21.6%
<i>Chi-Square = .10, d.f. = 3, p-value = .992</i>					
Measure 3 (Energy tax)	Regressive (N=108)	28.7%	50.0%	16.7%	4.6%
	Progressive (N=103)	29.1%	42.7%	24.3%	3.9%
<i>Chi-Square = 2.17, d.f. = 3, p-value = .538</i>					

¹⁰ A parallel analysis using recoded dichotomous items instead of the ordinal items for measure support is presented in appendix C part 3. Using those dichotomous items does not change any of the results.

Table (VIII): Manipulation check questions

		<i>Small effort</i>	<i>Small nor large effort</i>	<i>Large effort</i>
Measure 1 (Waste separation)	10 min. (N=106)	63.2%	22.6%	12.3%
	40 min. (N=105)	29.5%	34.3%	33.3%
<i>Chi-Square = 25.69, d.f. = 2, p-value = .000</i>				
		Short period	Neither short nor long	Long period
Measure 2 (Sustainable energy)	5 year (N=109)	34.9%	40.4%	21.1%
	20 year (N=102)	19.6%	38.2%	41.2%
<i>Chi-Square = 11.39, d.f. = 2, p-value = .003</i>				

There can be different reasons for the findings of non-significance. The most likely reason is that actually there are no relationships between the experimental factors and voting intentions. However, the findings of non-significance can also be a result of biases in the survey design. As a result of unintended effects of the wording of the questions the respondents might not have picked up the manipulations. In order to test whether the respondents actually picked up the manipulations while interpreting the questions, the final part of the questionnaire contains two control questions. The respondents were asked to indicate how they perceived the required effort of 10(40) minutes and how they perceived the 5(20) year benefit period while answering the earlier referendum questions. Table VIII reports that the number of students who perceived an effort of 40 minutes per week to be a large effort (33.3%) is much higher than the number of students who perceived that 10 minutes is a large effort (12.3%). This difference is significant as indicated by the chi-square analysis (p -value = .000). The respondents pick up the manipulation. The same holds for the second manipulation. The number of students who indicate that they perceived the 20 year period as a long period (41.2%) almost doubles the number of students who indicate that they perceived the 5 year period as a long period. This difference is also significant (p -value = .003). Those control questions indicate that the manipulations made a significant difference in how the respondents perceived the referendum questions. The observed findings of non-significance cannot be attributed to survey errors alone.

As explained in the ‘methods’ section, a potential threat for the validity of the aforementioned findings is the fact that the effect of one factor may not be independent from the effects of other factors to which the respondents were exposed earlier in the survey. There are two possibilities of controlling for this potential bias. The next section looks at possible interaction effects between the experimental factors. But besides looking at interaction effects another way of checking whether the effects of the experimental factors are independent from each other is by looking at group differences based on the different versions of the

survey; with every version representing another sequence of the manipulated factors. As voting intentions within every level of an experimental factor are composed by merging the scores of respondents that filled in four different versions of the survey, the scores in those version-based subgroups should not significantly differ from each other in order to rule out sequence effects. When question order influences the voting intentions the respondents from the four version-based subgroups cannot validly be taken together into larger groups representing one level of the experimental factor. Table IX reports an ANOVA analysis in which an average support for the measures is compared per version of the survey for every level of a factor. The analysis indicates that for neither of the measures there is any significant variation within the version-based subgroups that make up the levels of the experimental factors. The sequence of the different levels of the experimental factors in the questionnaire does not influence the voting intentions of the respondents.

Table (IX): ANOVA of version based group differences

	<i>F</i>	<i>P-value</i>
<u>Measure 1</u>		
Waste separation costs 10 minutes	.38	.765
Waste separation costs 40 minutes	.61	.610
<u>Measure 2</u>		
Term 5 year	.22	.880
Term 20 year	.94	.425
<u>Measure 3</u>		
Regressive	.62	.602
Progressive	1.03	.384
<u>Measure 4</u>		
(All versions; no manipulation)	.96	.463

6.2 Analysis of Covariance

As the previous section showed that direct effects between the experimental factors and the relevant measures cannot be observed, two other questions remain. 1) Are direct effects of the experimental factors on voting intentions marginal as a result of interactions with third variables? 2) If the experimental factors - related to the policies themselves - do not play any role in explaining any of the variance in voting intentions, which other type of variables do? In order to answer these questions the independent/control variables will be introduced in the analyses. Those variables will first be used as control variables in order to check whether the effects of the experimental factors on voting intentions are the same for all values of a control variable. For example, the effect of the required efforts on support for compulsory waste separation should be the same for men and woman.

If this is not the case, there is an interaction effect (e.g. Norušis 2008: 337). The independent effects of the variables on support for the different measures are also examined to study the unique effect of those variables. All independent/control variables are recoded to a range from 0 to 1 in order to make interpretation in multivariate analysis more straightforward.

Before looking at the effects of the independents on voting intentions, table X presents simple bivariate correlation coefficients among the independent variables. Although 31 of the 45 coefficients are statistically significant, most relationships are intermediate or weak. The strongest relations exist between the general attitude towards the importance of environmental problems and the relational items in which the importance of environmental problems is compared to the importance of economic or safety problems. Those variables are related but not so highly that multicollinearity is likely to be a problem in multivariate analyses.¹¹

Using analysis of covariance (ANCOVA), tables XI to XIV present the main and interaction effects of the experimental factors on the dependent variables, controlling for the effects of the control variables which covary with the dependent. The unique effects of the independent/control variables on the dependents are also included in the model. Performing these analyses, unequal distributions of some of the control variables among the experimental groups can be controlled for. ANCOVA analyzes what happens if all cases scored equally on the covariates, so that the effect of the factors over and beyond the covariates can be isolated. As ANCOVA can simultaneously deal with fixed factors and covariates and contains both factor and covariate main effects as well as factor-by factor and factor-by-covariate interactions, this type of analysis fits best the experimental nature of the data (Statnotes; Univariate GLM 2010).^{12 13}

¹¹ The typical criterion in a correlation matrix to reveal bivariate multicollinearity is a bivariate correlation coefficient $>.90$ (Statnotes 2010).

¹² ANCOVA is implemented in the Univariate General Linear Model procedure of SPSS that can both handle regression as well as ANOVA procedures. Being a member of the ANOVA family, ANCOVA is based on the differences of group means (F-test) statistic, testing if the means of the groups formed by values of the independent variables (or combinations of variables) are different enough not to have occurred by chance. ANCOVA is primarily used with an interval-dependent variable. However, its logic can be accepted in some cases with an interval type ordinal dependent variable with a substantial number of categories; this is more or less the case with the four-point scale of voting intentions. The current ANCOVA models are obtained by introducing the dummy independent variables as fixed factors while the other independent variables are introduced as covariates. All four models show an overall model significance as showed in the 'corrected model rows' in the tables.

¹³ One could argue that instead of ANCOVA a regression procedure should be used to get round the problem of using an ordinal variable as the dependent variable in ANCOVA. However, running Ordinal regression is difficult to interpret and creates its own problems, especially with a relatively low number of respondents. Running Binary Logistic regression using the recoded dichotomous

Table (X): Correlation matrix of Independent Variables

	<i>Gender</i>	<i>School Profile</i>	<i>Personal risk perceptions</i>	<i>Social risk perception</i>	<i>Knowledge: Real causes</i>	<i>Knowledge: Bogus causes</i>	<i>General env. beliefs</i>	<i>EnvEco</i>	<i>EnvSecurity</i>	<i>Gov. Regulation</i>
Gender	1									
Profile	-.06	1								
Personal Risk	.21**	.05	1							
Societal Risk	.17*	.04	.60**	1						
Real causes	-.01	.17*	.17*	.33**	1					
Bogus causes	-.30**	.07	-.24**	-.32**	-.20**	1				
Gen.Env. beliefs	.20**	-.07	.33**	.42**	.19**	-.16**	1			
Env-Eco	.14*	.00	.33**	.34**	.14*	-.14**	.78**	1		
Env-Sec	.05	.01	.24**	.32**	.23**	-.06	.71**	.70**	1	
Government Regulations	.08	.06	.30**	.28**	.13	-.02	.32**	.22**	.17*	1

* Significant at .05; ** Significant at .01. Pearson Correlation (two-tailed tests).

Table XI reports the ANCOVA for the compulsory waste separation measure. The adjusted R² shows that the introduced variables together account for almost 12% of the variance in support of compulsory waste separation. Looking at the F-test for the variable ‘manipulation 1’¹⁴ the ANCOVA model confirms the earlier finding of non-significance. There are no significant differences in means between the group exposed to the 10-minute effort and the group exposed to the 40-minute effort. Any evidence for an interaction effect between one of the covariates and ‘manipulation 1’ is also not found. Looking at the main effects; ‘gender’, ‘knowledge of the real causes of global warming’, and the ‘general opinion on government regulation’, turn out to have a significant effect on support for waste separation on the .05 level. Partial eta-squared¹⁵ values show ‘gender’ has the strongest effect on support for the measure. Women are more likely to support the

opponent/support items as the dependent variables is more straightforward. Those alternative models using Binary Logit are presented in appendix F. However, ANCOVA is preferred in the main analysis because its build in ability to deal with all different type of effects and because of its easier interpretation in terms of explained variances instead of odds.

¹⁴ ‘Manipulation 1’ = Experimental factor 1 (10 minutes effort – 40 minutes effort).

¹⁵ Effect size coefficients are standardized measures of the strength of a relationship. Partial eta-squared indicates the percent of total variance in the dependent variable accounted for by the variance between (categories) groups formed by the independent variables. The coefficient is partial because they reflect effects after controlling for other variables in the model (Statnotes; Univariate GLM 2010).

Table (XI): ANCOVA on Measure 1 (Waste separation)

	<i>Type III Sum of Squares</i>	<i>Df.</i>	<i>F</i>	<i>p-value</i>	<i>Partial Eta squared</i>
Corrected Model	34.95	21	2.30	.002	.206
Intercept	12.61	1	17.39	.000	.086
Manipulation 1	.74	1	1.02	.314	.005
Demographics:					
Gender	4.92	1	6.79	.010	.035
School Profile	1.05	1	1.44	.231	.008
Specific environmental perceptions:					
Personal risk perceptions	.03	1	.04	.838	.000
Societal risk perceptions	.03	1	.04	.850	.000
Knowledge: Identifying real causes	3.56	1	4.92	.028	.026
Knowledge: Identifying bogus causes	.26	1	.36	.550	.002
General environmental beliefs:					
General importance of environmental policies	.56	1	.77	.381	.004
Environment vs. Economy	.50	1	.68	.409	.004
Environment vs. Security	2.31	1	3.18	.076	.017
Government regulation	3.37	1	4.65	.032	.024
Interaction effects:					
M1 * Gender	.01	1	.02	.888	.000
M1 * School Profile	.46	1	.63	.427	.003
M1 * Personal risk perceptions	.44	1	.61	.437	.003
M1 * Societal risk perceptions	1.08	1	1.49	.223	.008
M1 * Knowledge: real causes	.11	1	.15	.701	.001
M1 * Knowledge: bogus causes	.00	1	.01	.942	.000
M1 * Gen. importance of environment	.57	1	.78	.378	.004
M1 * Environment vs. Economy	1.32	1	1.82	.179	.010
M1 * Environment vs. Security	.09	1	.12	.732	.001
M1 * Government regulation	.04	1	.05	.819	.000
Error	134.81	186			
Total	1832.00	208			
Corrected Total	169.77	207			

Adjusted R² = .116 (M1 = manipulation 1)

measure than men.¹⁶ This finding can probably be explained by the practical nature of waste separation. Some scholars argued that women are more likely to prefer personal solutions to public problems while men look for political solutions (O'Connor et al. 1999: 468). Higher knowledge of the correct causes of global warming makes support for the measure also more likely as well as a supportive attitude towards government regulations in society.

¹⁶ Interpretation of the direction of the effects is on the basis of bivariate tables presented in appendix E.

Table (XII): ANCOVA on Measure 2 (Sustainable energy)

	<i>Type III Sum of Squares</i>	<i>Df.</i>	<i>F</i>	<i>p- value</i>	<i>Partial Eta squared</i>
Corrected Model	49.43	23	3.15	.000	.283
Intercept	7.10	1	10.40	.001	.054
Manipulation 1	1.82	1	2.67	.104	.014
Manipulation 2	.144	1	.21	.647	.001
Demographics:					
Gender	.90	1	1.33	.251	.007
School Profile	1.93	1	2.82	.095	.015
Specific environmental perceptions:					
Personal risk perceptions	.08	1	.12	.729	.001
Societal risk perceptions	.00	1	.00	.966	.000
Knowledge: Identifying real causes	8.19	1	12.01	.001	.061
Knowledge: Identifying bogus causes	.72	1	1.05	.306	.006
General environmental beliefs:					
General importance of environmental policies	.11	1	.16	.693	.001
Environment vs. Economy	1.86	1	2.73	.100	.015
Environment vs. Security	.62	1	.91	.341	.005
Government regulation	.21	1	.31	.579	.002
Interaction effects:					
M1 * M2	.95	1	1.40	.239	.008
M2 * Gender	1.26	1	1.84	.176	.010
M2 * School profile	.14	1	.20	.655	.001
M2 * Personal risk perceptions	1.36	1	1.99	.159	.011
M2 * Societal risk perceptions	.01	1	.02	.895	.000
M2 * Knowledge: real causes	1.31	1	1.92	.168	.010
M2 * Knowledge: bogus causes	.17	1	.25	.619	.001
M2 * Gen. importance of environment	.11	1	.16	.691	.001
M2 * Environment vs. Economy	2.842E-5	1	.00	.995	.000
M2 * Environment vs. Security	.13	1	.19	.661	.001
M2 * Government regulation	.17	1	.26	.614	.001
Error	125.50	184			
Total	1726.00	208			
Corrected Total	174.923	207			

Adjusted R² = .193 (M1 = manipulation 1) (M2 = manipulation 2)

The next table (XII) shows the ANCOVA for the transition towards sustainable energy measure. Together the introduced variables explain 19% of the variance. This is substantially higher than in the previous model. ‘Manipulation 2’, containing the different levels of a 5 year period and a 20 year period before one

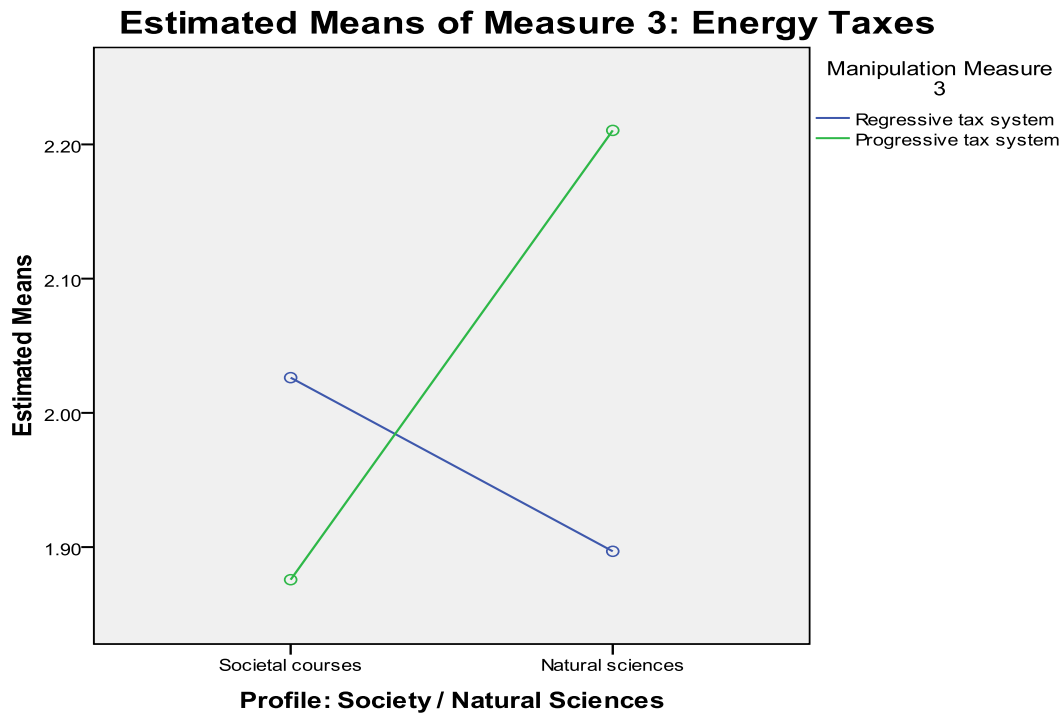
starts to benefit from the transition towards sustainable energy, has no effect on the dependent variable. Any interaction effect of a combination of one of the covariates and manipulation 1 is also not observed. The interaction term 'manipulation 1' by 'manipulation 2' is added to the model in order to check for unwanted effects as a result of the sequence of the manipulations in the questionnaire. No interaction is found. The only significant main effect that can be found is the effect of 'knowledge of the real causes of global warming'. This effect is considerably strong with a partial eta-squared value of .061 indicating that 6% of the variance in support for the measure can be attributed to this variable alone. However, as the issue of a transition towards sustainable energy in order to reduce CO₂ emissions is highly related to the global warming problem it is not surprising that people with higher knowledge of the causes of this problem are more likely to support solutions that reduce the effects of those causes.

Table XIII shows more complex results using the energy tax measure as the dependent variable. Together the variables in the model explain 14% of the total variance. Again, there is no significant effect of the experimental factor (regressive-progressive) on support for the measure as can be read from the F-test for 'manipulation 3'. However, this model contains three significant interaction effects. The first significant interaction is the second-order interaction between the three manipulations (M1*M2*M3). Interpreting this interaction is very difficult as all three first-order interaction terms of the three manipulated factors are not significant. It seems to be the case that one specific sequence of the levels of the three factors in a specific version of the questionnaire leads to an average group score on support for the energy tax measure that significantly deviates from the average scores of the other version-based groups. An interpretation of the profile plots seems to indicate that within the group of people that were exposed to the 10 minutes effort in the first manipulation there is a reversed direction of the relation between the second and the third manipulation compared to the group of respondents that were exposed to the 40 minutes effort. However, it is very doubtful whether any substantial meaning should be given to this second-order interaction as the first-order interactions between the manipulations are not significant and as there is no theoretical basis for this second-order interaction. The second interaction effect that turns out to be significant is the interaction between 'school profile' of the students and the third manipulation. The profile plot in figure 2 shows that average support for the regressive tax system is a little bit higher than average support for the progressive tax system among the group of respondents that follow the societal profile. Where support for the regressive tax system decreases among the respondents that follow the natural sciences profile support for the progressive tax system strongly increases in this group compared to students following the societal profile. Youth educated in the natural sciences are more supportive of the progressive system, which is surprising as a tax-system is more a society-based measure instead of a technological solution to the problem. The last significant interaction effect exists for the combination of the third manipulation and the covariate that indicates the 'relative importance of

Table (XIII): ANCOVA on Measure 3 (Energy tax)

	<i>Type III Sum of Squares</i>	<i>Df.</i>	<i>F</i>	<i>P-value</i>	<i>Partial Eta squared</i>
Corrected Model	34.68	27	2.22	.001	.250
Intercept	1.85	1	3.19	.076	.017
Manipulation 1	.29	1	.49	.484	.003
Manipulation 2	.23	1	.40	.526	.002
Manipulation 3	.04	1	.07	.790	.000
Demographics:					
Gender	.49	1	.84	.361	.005
School Profile	.48	1	.82	.367	.005
Specific environmental perceptions:					
Personal risk perceptions	.38	1	.65	.420	.004
Societal risk perceptions	1.23	1	2.13	.147	.012
Knowledge: Identifying real causes	1.10	1	1.90	.169	.010
Knowledge: Identifying bogus causes	.01	1	.02	.897	.000
General environmental beliefs:					
General importance of environmental policies	.02	1	.04	.851	.000
Environment vs. Economy	2.02	1	3.49	.064	.019
Environment vs. Security	.27	1	.46	.498	.003
Government regulation	1.61	1	2.77	.098	.015
Interaction effects:					
M1 * M2	.00	1	.00	.960	.000
M1 * M3	.52	1	.89	.346	.005
M2 * M3	.05	1	.08	.778	.000
M1 * M2 * M3	2.80	1	4.84	.029	.026
M3 * Gender	.08	1	.13	.717	.001
M3 * School Profile	2.42	1	4.18	.042	.023
M3 * Personal risk perceptions	.60	1	1.04	.309	.006
M3 * Societal risk perceptions	.37	1	.64	.423	.004
M3 * Knowledge: real causes	.07	1	.12	.726	.001
M3 * Knowledge: bogus causes	.09	1	.15	.695	.001
M3 * Gen. importance of environment	.11	1	.18	.671	.001
M3 * Environment vs. Economy	3.18	1	5.48	.020	.030
M3 * Environment vs. Security	2.87	1	4.96	.027	.027
M3 * Government regulation	.10	1	.17	.684	.001
Error	104.31	180			
Total	975.00	208			
Corrected Total	138.99	207			

Adjusted R² = .137 (M1 = manipulation 1) (M2 = manipulation 2) (M3 = manipulation 3)

Figure 1: Profile plot of interaction between school profile and manipulation 3

environmental problems compared to economic problems'.¹⁷ Support for the progressive tax system is around 9% higher than support for the regressive tax system in the group with people thinking economical problems are more important than environmental problems while this difference is only around 4% for the group of people who think the environment is more important while overall support for each of those two tax systems is higher among the last group of people. Respondents who think the environment is more important than the economy are more likely to support whatever tax system proposed compared to the respondents who think the economy is more important than the environment. The last group is more selective in the type of tax system that they will support. Any significant main effects are not found in this model.

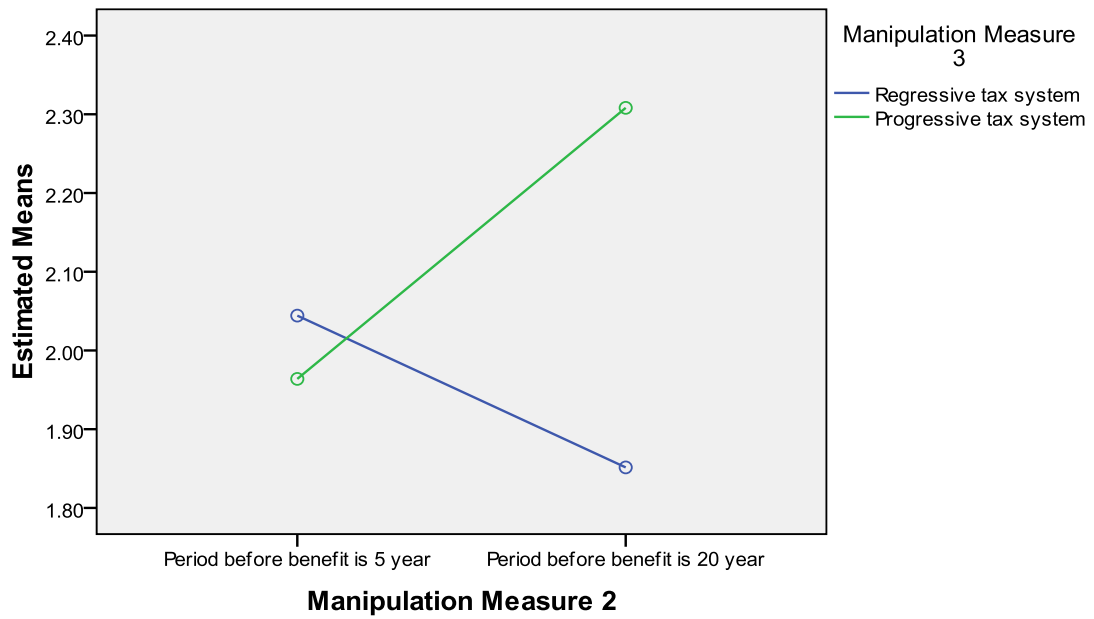
The energy quota measure is the dependent variable in the last ANCOVA model. The explained variance of the model is 11%. The interaction terms of the covariates with the manipulations are dropped from this model as this measure did not contain an experimental factor. The manipulations were introduced in this last model to control for sequence effects. The F-tests show that 'manipulation 1' and the interaction 'manipulation 1 * manipulation 2' have significant effects on support for the energy quota. However, as only 16% of the respondents in the whole sample report to (probably) support this measure it is very likely that this finding is based on an unequal distribution of the small number of supporters over

¹⁷ As profile plots cannot be obtained when one of the variables is a covariate, interpretation of the interaction is on the base of table 7 in appendix E.

Figure 2: Profile plots of second order interaction: M1*M2*M3

Estimated Means of Measure 3: Energy tax

Manipulation Measure 1 = Waste separation costs 10 minutes



Estimated Means of Measure 3: Energy tax

Manipulation Measure 1 = Waste separation costs 40 minutes

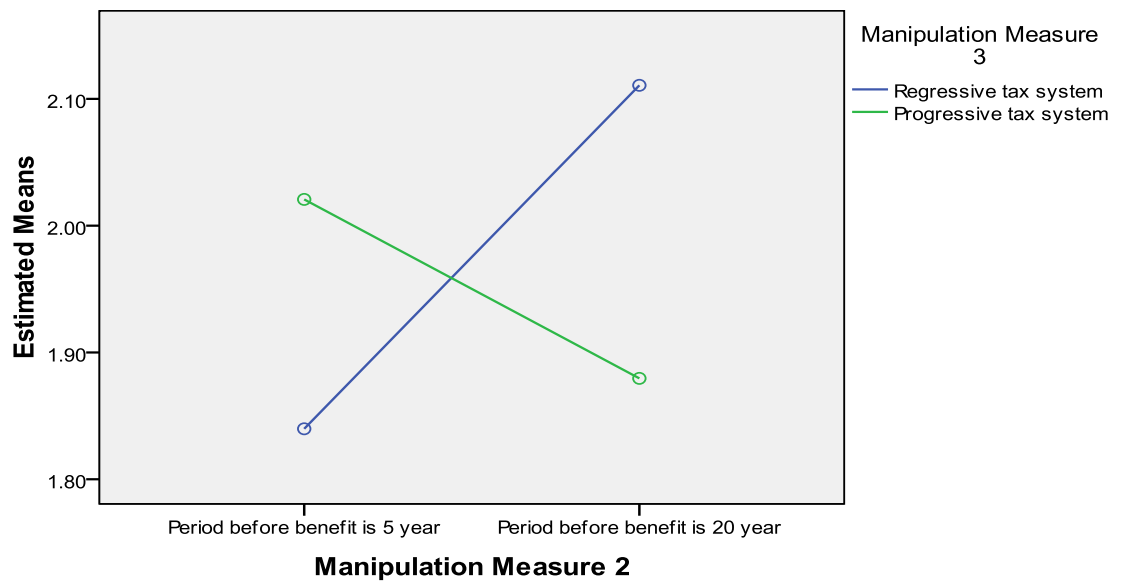


Table (XIV): ANCOVA on Measure 4 (Energy quota)

	<i>Type III Sum of Squares</i>	<i>df</i>	<i>F</i>	<i>P-value</i>	<i>Partial Eta squared</i>
Corrected Model	26.64	17	2.55	.001	.187
Intercept	4.04	1	6.58	.011	.034
Manipulation 1	2.52	1	4.12	.044	.021
Manipulation 2	.51	1	.83	.364	.004
Manipulation 3	.05	1	.08	.778	.000
Demographics:					
Gender	.43	1	.70	.403	.004
School Profile	.25	1	.41	.524	.002
Specific environmental perceptions:					
Personal risk perceptions	5.19	1	8.46	.004	.043
Societal risk perceptions	.20	1	.32	.570	.002
Knowledge: Identifying real causes	.23	1	.37	.544	.002
Knowledge: Identifying bogus causes	.66	1	1.07	.302	.006
General environmental beliefs:					
General importance of environmental policies	2.72	1	4.43	.037	.023
Environment vs. Economy	3.73	1	6.08	.015	.031
Environment vs. Security	1.28	1	2.08	.151	.011
Government regulation	.51	1	.83	.363	.004
Interaction effects:					
M1 * M2	2.92	1	4.75	.030	.025
M1 * M3	.16	1	.27	.606	.001
M2 * M3	1.39	1	2.26	.134	.012
M1 * M2 * M3	.03	1	.05	.816	.000
Error	116.00	189			
Total	711.00	207			
Corrected Total	142.65	206			

Adjusted R² = .114 (M1 = manipulation 1) (M2 = manipulation 2) (M3 = manipulation 3)

the different test groups. ‘Personal risk perceptions’, ‘general importance of environmental problems’, and the ‘relative environment vs. economy’ measure turn out to have significant main effects on the measure. ‘Personal risk perceptions’ has the strongest effect (partial eta-squared = .043) on support for the measure. Students thinking that environmental problems contain a lot of risks for their personal well being are most likely to support the most restricting of the four policies; an energy quota. However, looking at the skewed variance in the dependent variable this finding should also be taken with some caution.

6.3 Multivariate analyses on an overall scale of voting intentions

In the last part of the result section an analysis of the unique effects of the independent variables on an overall scale of environmental voting intentions using OLS regression is presented. This analysis resembles the 1999 analysis on the determinants of environmental voting intentions by O'Connor *et al.* The main purpose of doing this is to compare the current findings with existing findings in order to consolidate the validity of the analyses. The environmental voting intentions scale variable is an interval variable ranging from 4 to 16 composed by combining the four items that measure the voting intentions towards the proposed referendum items. The four voting intentions items form a single factor with an eigenvalue of 1.63 and a Cronbach's alpha of .5¹⁸. The manipulated factors are not included in the equations because they are theoretically supposed to influence only one of the four items. As all previous analyses showed the experimental factors have no impact on support for the measures it can be expected that omitting them from the equations will not change any results.

The first equation in table XV shows a model with only the two socio-demographic variables. However, this model explains only 2% of the total variance and the overall equation is not significant (p-value = .067). The second model adds the two 'risk perception' variables to the equation. Adding those variables increases the explained variance in voting intentions to 12%. 'Social risk perceptions' obtains statistical significance in this model with students perceiving environmental problems as very risky for society being 3.23 points higher on the overall support scale than students on the 'no societal risk' end of the social risk perception scale. The third equation adds the two knowledge questions to the equation, which increases the explained variance to 17%. After the introduction of those variables the 'societal risk perception' measure is no longer significant. 'Knowledge of the real causes of global warming' is the only significant predictor of overall voting intentions in this model. The fourth model in table XV adds three variables representing some 'general environmental beliefs' to the model while the 'specific environmental perceptions' - risk perceptions and knowledge - are dropped from this equation. The explained variance of this model is 23%, which indicates that the general environmental beliefs are stronger predictors of environmental voting intentions than the specific environmental perceptions. In this model the two variables that indicate the relative importance of the environment compared to the economy or security turn out to be significant. Relative importance of environmental problems compared to economic problems

¹⁸ A Cronbach's alpha of .5 is on the low side. However, as the four items measure support for environmental measures that differ in topic and required effort, they are not intended to exactly measure the same concept. Nevertheless, from a theoretical point of view all items measure a degree of support for an environmental measure that can be combined into an underlying dimension of general support for environmental measures with the respondents that even support the least supported measure (energy quota) being most likely the ones that score highest on this scale. On the basis of more respondents, identical scale constructions using comparable items showed higher reliability scores in previous research (e.g. O'Connor *et al.* 1999; 2002).

Table (XV): OLS regression (Scale variable of the four proposed policies)

	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>
Demographics:					
Gender	.70*	.36	.37	.46	.33
	(.30)	(.30)	(.30)	(.28)	(.28)
Profile	-.08	-.18	-.34	-.10	-.39
	(.30)	(.29)	(.29)	(.27)	(.27)
Specific environmental perceptions:					
Personal risk perceptions		1.68	1.75		.62
		(.97)	(.94)		(89)
Societal risk perceptions		3.23**	2.02		.72
		(1.089)	(1.13)		(1.07)
Knowledge: identifying real causes			1.85**		1.53**
			(.55)		(.52)
Knowledge: identifying bogus causes			-.27		-.54
			(.55)		(.51)
General environmental beliefs:					
Importance of environmental policies				.52	-1.06
				(1.04)	(1.05)
Environment vs. Economy				3.33*	3.80**
				(1.45)	(1.40)
Environment vs. Security				2.86*	2.87*
				(1.28)	(1.24)
Control: government regulation					1.64**
					(.61)
Constant	8.92**	5.83**	5.57**	5.60**	4.09**
	(.26)	(.67)	(.79)	(.50)	(.80)
Adjusted R ²	.016	.124	.166	.225	.302
N	208	207	207	208	206

Cell entries are unstandardized regression coefficients, with standard errors in parentheses.

* Significant at .05; ** Significant at .01 (Models I and VI are not significant. ANOVA (p-value = .067) model I, ANOVA (p-value = .729) model IV).

is the strongest predictor of voting intentions in this model. The last model in table XV is the fully developed model in which both the specific environmental perceptions as well as the general environmental beliefs are introduced in the equation. Also the control variable for the general opinion on government regulation is added. The full model explains 30% of the variance. Within the block of specific environmental perceptions the 'knowledge of real causes' variable turns out to be significant. The two 'relative importance of environmental problems' variables are significant in the general environmental beliefs block. The variable

that controls for the general opinion on government regulations is also a significant predictor of voting intentions. Looking at the regression coefficients, it can be concluded that relative importance of environmental problems compared to economic problems is the strongest predictor of overall support for environmental measures.¹⁹

7. Conclusions and discussion

This study explored under which conditions citizens will support government policies that imply constraints on the citizens' domain of freedom in order to solve environmental collective action problems. The main task of the analysis was to identify characteristics of the policies themselves that can explain popular support for the policies. However, the primary conclusion of this study is that the three characteristics studied – the required efforts, expected period before one benefits from the policy, and fairness of the policy – are no significant predictors of voting intentions in environmental referenda. Differences in the levels of those factors do not lead to different levels of support. As no direct evidence is found for the expected causal relations, the four hypotheses have to be rejected. This finding supports the earlier observation by Thalmann (2004: 179) and Halbheer *et al.* (2006: 443) that differences made between environmental proposals do not immediately lead to substantial differences in support for the proposals. The finding that the difference between regressive and progressive effects of an environmental tax does not significantly change support for an environmental tax can be added to Thalmann's finding that few voters paid attention to fine differences in tax rate and revenue recycling. Nevertheless, looking at the aggregate support levels for the four proposed policies, the analysis seems to confirm that proposals that restrict consumer sovereignty have a low chance of being accepted. The quota on energy use is by far the least supported measure. Physical or financial contributions to environmental goods are more popular than restrictions.

Multivariate analyses showed that environmental cognitions are better predictors of support for the measures. Predicting overall support for environmental measures using OLS regression showed that some variables classified as 'general environmental beliefs' explain most of the variance in voting intentions. Especially the variables that indicate a trade-off between commitment to environmental problems and economical or security problems are strong predictors of support for environmental policies in general. This finding is conform earlier findings stating that for someone to approve green taxes in a referendum this person must be concerned about the environment and willing to give its protection priority over other goals such as wealth (Thalmann 2004: 210). Knowledge of the real causes of global warming is the other significant predictor of support for environmental policies. The importance of this variable corresponds

¹⁹ Multicollinearity is not suspected as tolerance was never lower than .20. Residual plots do not indicate major deviations from the linearity assumption.

with earlier observations by O'Connor *et al.* (1999). Despite not being directly comparable, the explained variance of 30% of the fully developed model does not deviate to much with the 33% of explained variance that O'Connor *et al.* (1999: 469) reported. As both models include more or less a comparable set of variables and report more or less the same conclusions this consensus improves the validity of the current study by grounding the results into previous findings.

Looking at the predictors of support for the four measures separately, the most important conclusion should be that every measure has its own unique determinants. Support for compulsory waste separation is best explained by 'gender' and 'knowledge of the real causes of global warming'. Support for a transition towards sustainable energy can be best explained by 'knowledge of the real causes of global warming' only. Support for an energy-tax can be best explained by the interaction effects of the experimental factor with the covariates 'school profile' and 'environment vs. economy'. Finally, support for an energy quota can best be explained by 'personal risk perceptions' and the trade-of between commitment with the environment and commitment with the economy. This all indicates that explaining under which conditions citizens will support certain policies is a very complex enterprise. As van Liere and Dunlap (1980: 181) already indicated many years ago, researchers should reconsider the practice of lumping diverse issues together into general measures of environmental concern.

Differentiating between issues and measures reveals new opportunities of better understanding the determinants of support for different environmental policies. One of the current shortcomings in the body of literature that studies the determinants of citizen support for environmental policies is that most scholars adopt their own theoretical framework and do not integrate their contribution into the existing discussion. The author of this current study noticed that most scholars working in this field did not refer to some highly related studies, which seems to slow down the development of the literature. Integrating insights provided by the whole body of existing literature into the research design is one of the main contributions of this study. Referring back to the normative discussion in the first part of this study it is difficult to provide clear policy recommendations based on the current findings. As changing the type of policies that will be proposed in referenda is an easier task than changing voter characteristics, it is unfortunate that conditions immediately related to the policies themselves do not have stronger effects on citizen support for the policies. Changing citizen's perceptions about specific and general environmental issues seems to be the best strategy in order to increase support for environmental policies. The analysis showed that responsible decision-making requires at least some minimal knowledge of cause and effect. Making people aware of the causes of environmental problems seems to be the first strategy that governments should apply.

The last note should be on the methodology applied in this study. The study adopted an experimental research design not used before in this field of study and tested some factors not tested before. The validity of the results are therefore not

necessarily a given. Biases as a result of the research design cannot be ruled out totally. However, where possible, checks and balances against such biases were executed and those control analyses did not give indications that unintended side effects or misunderstanding of the question influenced the results. New research, building further upon the methodology applied in this study should be able to give further indications on the reliability of this study. A final issue is the question whether the results of this study can be generalized. As only high-school students participated in the survey the results may be different when respondents from the whole Dutch society would participate in the survey. This possibility cannot be ruled out with the current data and it is recommendable that future research includes a broader sample of the whole population. However, comparing the findings of this study with previous findings showed that the current findings do not deviate very much from earlier findings. It therefore seems to be likely that studying the determinants of support for environmental measures among high-school students does not lead to totally different findings as would have been the case when studying the general population.

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Appendix A: Complete questionnaire in Dutch

Enquête: De publieke opinie ten aanzien van Milieu en Milieubeleid

Universiteit Leiden

In deze enquête onderzoeken wij hoe je aankijkt tegen een aantal milieuvraagstukken waar je als jongere in de toekomst mee te maken kunt krijgen. Ook vragen wij jouw mening over bepaalde maatregelen die de regering zou kunnen nemen om het milieu te beschermen. Volg bij het invullen van de vragen de gegeven volgorde en overleg niet met andere personen.

1) Hoe belangrijk vind jij het dat de regering iets doet aan één van de volgende problemen? (*één antwoordvakje per rij aanvinken*)

	Helemaal niet belangrijk	Niet erg belangrijk	Neutraal	Redelijk belangrijk	Ze er belangrijk
a) Economische problemen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Problemen met de veiligheid op straat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Milieuproblemen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2A) Hoe waarschijnlijk is het volgens jou dat één van de volgende milieuproblemen ooit gedurende je leven een bedreiging gaat vormen voor je **persoonlijke** welzijn? (*één antwoordvakje per rij aanvinken*)

	Ze er onwaarschijnlijk	Onwaarschijnlijk	Neutraal	Waarschijnlijk	Ze er waarschijnlijk
a) Luchtvervuiling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Het opwarmen van de aarde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Drinkwater tekorten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Het opraken van fossiele brandstoffen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Het uitsterven van diersoorten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2B) Hoe waarschijnlijk is het volgens jou dat één van de volgende zaken op de lange termijn een bedreiging gaat vormen voor de internationale **samenleving** als geheel?
(*één antwoordvakje per rij aanvinken*)

	Zeer onwaarschijnlijk	Onwaarschijnlijk	Neutraal	Waarschijnlijk	Zeer waarschijnlijk
a) Luchtvervuiling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Het opwarmen van de aarde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Drinkwater tekorten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Het opraken van fossiele brandstoffen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Het uitsterven van diersoorten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3) Zou je van elk van de volgende factoren willen aangeven of jij inschat dat het een oorzaak is van het opwarmen van de aarde? (*één antwoordvakje per rij aanvinken*)

	Wel oorzaak	Geen oorzaak	Weet niet
a) Het gebruik van auto's	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Het genereren van nucleaire energie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Het uitdunnen van de ozonlaag in de hogere atmosfeer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Het kappen van het tropisch regenwoud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Het gebruik van kolen en olie voor het opwekken van elektriciteit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Het gebruik van spuitbussen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Het gebruik van verwarming en airconditioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Het gebruik van chemicaliën om insecten te bestrijden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Wij presenteren je nu vier maatregelen die de regering kan nemen om milieuproblemen aan te pakken. Deze maatregelen vereisen echter wel dat je een bepaalde extra inspanning moet doen of dat bepaalde producten duurder worden. Voor elk van deze vier mogelijke maatregelen vragen wij om aan te geven wat je denkt dat je zou stemmen wanneer deze maatregel door de regering aan je voorgelegd zou worden in een referendum.

Maatregel 1) De regering stelt in een referendum voor het scheiden van alle verschillende soorten huishoudelijk afval verplicht te stellen. Deze maatregel vereist een extra fysieke inspanning omdat je al je afval moet scheiden en naar een verzamelpunt moet brengen. Zou je een voorstander van deze maatregel zijn wanneer dit je per week gemiddeld manipulatie 1 (A: 10 minuten) (B: 40 minuten) extra werk kost in het wegbrengen en sorteren van je afval? (*één antwoordvakje aanvinken*)

A) Zeker tegenstander	B) Waarschijnlijk tegenstander	C) Waarschijnlijk voorstander	D) Zeker voorstander
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Maatregel 2) De regering stelt in een referendum voor om grootschalig te gaan investeren in duurzame energiebronnen om de CO₂ uitstoot te beperken. Deze maatregel vereist echter wel dat iedere burger voor het ontwikkelen en het gebruik van energie uit duurzame energiebronnen met onmiddellijke ingang per maand €15 extra gaat betalen. Omdat het omschakelen naar een duurzame energievoorziening tijd in beslag zal nemen zal het een aantal jaar duren voordat de maatregel daadwerkelijk zorgt voor milieuwinst. Ben je een voorstander van deze maatregel wanneer het investeren in duurzame energiebronnen binnen een termijn van manipulatie 2 (A: 5 jaar) (B: 20 jaar) zal leiden tot een aanzienlijk lagere CO₂ uitstoot in Nederland? (*één antwoordvakje aanvinken*)

A) Zeker tegenstander	B) Waarschijnlijk tegenstander	C) Waarschijnlijk voorstander	D) Zeker voorstander
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Maatregel 3) De regering stelt in een referendum voor om een extra belasting op het energieverbruik van huishoudens in te voeren om burgers aan te moedigen minder energie te verbruiken. manipulatie 3 (A: Zou je een voorstander zijn van een totale extra belastingsdruk van 15% op het energieverbruik van huishoudens doormiddel van een belasting waarbij je per m³ energie een vaste prijs van 15% extra gaat betalen?) (B: Zou je een voorstander zijn van een totale extra belastingsdruk van 15% op het energieverbruik van huishoudens doormiddel van een belasting waarbij het percentage belasting dat u per m³ betaalt oploopt naarmate je meer energie gebruikt? Net als bij de inkomsten belasting betaal je dan over een eerste bepaalde hoeveelheid m³ energie een laag belasting tarief dat onder de 15% extra ligt terwijl voor elke extra

bepaalde hoeveelheid m³ energie dat je verbruikt het belastingstarief oploopt naar een percentage boven de 15%.) (één antwoordvakje aanvinken)

A) Zeker tegenstander	B) Waarschijnlijk tegenstander	C) Waarschijnlijk voorstander	D) Zeker voorstander
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Maatregel 4) De regering stelt in een referendum voor om een quotum op het energiegebruik van huishoudens in te voeren. Via deze maatregel kan het energieverbruik met dezelfde hoeveelheid worden teruggedrongen als mogelijk is met het invoeren van belastingen. Een quotum op het energieverbruik houdt in dat er voor elk huishouden per persoon een maximum hoeveelheid energie per maand beschikbaar komt. Met deze beschikbare hoeveelheid energie zal een huishouden het dan een hele maand moeten doen. Het is niet mogelijk om doormiddel van een betaling extra energie te kopen. Zou je een voorstander van een dergelijk quotum op het energieverbruik zijn? (één antwoordvakje aanvinken)

A) Zeker tegenstander	B) Waarschijnlijk tegenstander	C) Waarschijnlijk voorstander	D) Zeker voorstander
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tot slot willen we je nog een paar korte vragen stellen.

4) Hoe sta je in het algemeen tegenover overheidsreguleringen in de samenleving? (één antwoordvakje aanvinken)

- A) De overheid zou veel minder moeten reguleren
- B) De overheid zou iets minder moeten reguleren
- C) Neutraal
- D) De overheid zou iets meer moeten reguleren
- E) De overheid zou veel meer moeten reguleren

5) Wat is je geslacht?

- A) Man
- B) Vrouw

6) Heb je momenteel, of had je in het recente verleden, een bijbaan?

- A) Ik heb momenteel een bijbaan
- B) Ik had in het recente verleden een bijbaan
- C) Ik heb nooit een bijbaan gehad

7) Welk profiel volg je?

- A) Cultuur en maatschappij
- B) Economie en maatschappij
- C) Natuur en gezondheid
- D) Natuur en techniek

8) In een eerdere vraag werd gevraagd of je een voorstander zou zijn van het verplicht scheiden van afval wanneer dit 10 (40) minuten extra per week zou kosten. Toen je de vraag beantwoorde wat was je idee bij deze 10 minuten?

- A) Mijn idee was dat deze 10 (40) minuten een kleine inspanning is.
- B) Mijn idee was dat deze 10 (40) minuten geen kleine en geen grote inspanning is.
- C) Mijn idee was dat deze 10 (40) minuten een grote inspanning is.

9) In een eerdere vraag werd gevraagd of je een voorstander zou zijn van het omschakelen naar een duurzame energievoorziening wanneer het 5 (20) jaar zou duren voordat de positieve effecten van deze inspanning zich gaan uitbetalen. Toen je de vraag beantwoorde wat was je idee bij deze termijn van 5 (20) jaar?

- A) Mijn idee was dat deze 5 (20) jaar een korte periode is.
- B) Mijn idee was dat deze 5 (20) jaar geen korte en geen lange periode is.
- C) Mijn idee was dat deze 5 (20) jaar een lange periode is.

Bedankt voor het invullen van het onderzoek.

Appendix B: Complete questionnaire English translation

Survey: Public opinion of the Environment and Environmental Policies

University of Leiden

In this survey we hope to enquire after your opinion on some environmental dilemmas which you, as a youth, will presumably face in the future. We would also like your opinion on certain policies that the government could implement in order to protect the environment. Please complete the following survey in the declared order without consulting others.

1) According to you, how important is it that the government takes action regarding one of the following problems? (*mark one answer per row*)

	Really unimportant	Not really important	Neutral	Reasonably important	Very important
a) Economic problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Problems with public safety on the street	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Environmental problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2A) How likely are you, sometime during your lifetime, to experience a threat to your **personal** well-being as a result of one of the following? (*mark one answer per row*)

	Very unlikely	Unlikely	Neutral	Likely	Very likely
a) Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Global Warming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Shortage of drinking-water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Depletion of fossil fuels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Extinction of animal species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The conditions underlying citizen support for the implementation of environmental policies

2B) How likely is it according to you that one of the following will contain a threat for the well-being of the international **society** as a whole? (*mark one answer per row*)

	Very unlikely	Unlikely	Neutral	Likely	Very likely
a) Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Global Warming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Shortage of drinking-water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Depletion of fossil fuels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Extinction of animal species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3) Please indicate whether you think each of the following is a cause of **global warming**? (*mark one answer per row*)

	Cause	No cause	Don't know
a) People driving their cars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Nuclear power generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Depletion of ozone in the upper atmosphere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Destruction of tropical forests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Use of coal and oil for electricity generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Use of aerosol spray cans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) People heating and cooling their homes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Use of chemicals to destroy insect pests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

We now present you four measures that can be implemented by the government in order to tackle environmental problems. However, those policies require a degree of personal sacrifice in the form of an extra physical effort or higher costs for certain private goods. For each of these four policies, please indicate how you think you will vote should these measures be proposed to you by the government in a referendum.

Measure 1) In a referendum the government proposes to make separation of household waste compulsory. This measure requires an extra physical effort because you have to separate all your waste and you have to bring it to a collection point. Would you support this policy if it would cost you on average manipulation 1 (A: 10 minutes) (B: 40 minutes) a week extra work in separating and disposing of your waste? (*mark one answer*)

A) Definite opponent	B) Probably opponent	C) Probably supporter	D) Definite Supporter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Measure 2) In a referendum the government proposes to start a large scale investment in sustainable energy sources to reduce the emission of CO₂. However, this measure requires every citizen from today onwards to make an extra monthly payment of €15 for the development and usage of sustainable energy. It should be noted that the transition to sustainable energy will cost some time resulting in a time loss of a couple of years before any benefits can be seen. Would you support this measure when investing in sustainable energy sources will lead to a substantial lower level of CO₂ emissions in the Netherlands within a period of manipulation 2 (A: 5 years) (B: 20 years)? (*mark one answer*)

A) Definite opponent	B) Probably opponent	C) Probably supporter	D) Definite Supporter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Measure 3) In a referendum the government proposes to implement extra taxes on the energy usage per household in order to give citizens an incentive to reduce energy use. manipulation 3 (A: Would you support a total extra tax burden of 15% on the energy usage of households by means of a tax through which you have to pay for every m³ energy a fixed price of 15% extra?) (B: Would you support a total extra tax burden of 15% on the energy usage of households by means of a tax system which increases the tax percentage per m³ energy as you use more energy? Similarly to income tax, you will pay a low tax percentage of less than 15% over a first fixed quantity of energy, with any additional fixed quantity of energy use incurring an incrementing tax rate percentage above 15%). (*mark one answer*)

A) Definite opponent	B) Probably opponent	C) Probably supporter	D) Definite Supporter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Measure 4) In a referendum the government proposes to implement a quota on the energy usage per household. By means of this measure the energy usage per household can be forcibly reduced with the same magnitude as would be possible with the implementation of taxes on energy usage. A quota on energy usage entails that for every household a maximum quantity of energy will be available per person per month. A household will have to do with the available quantity of energy for the whole month. It is not possible to obtain extra energy by means of paying for extra energy. Would you support such a quota on energy usage? (*mark one answer*)

A) Definite opponent	B) Probably opponent	C) Probably supporter	D) Definite Supporter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To conclude, a couple of short questions.

4) What is your general opinion of government regulations in society? (*mark one answer*)

- A) The government should regulate less
- B) The government should regulate a little less
- C) Neutral
- D) The government should regulate a little more
- E) The government should regulate more

5) What is your gender?

- A) Male
- B) Female

6) Do you have, or did you recently have, a secondary job?

- A) I have a secondary job at the moment
- B) I recently had a secondary job
- C) I never had a secondary job

7) Which High school profile are you taking?

- A) Culture and Society
- B) Economy and Society
- C) Nature and Health
- D) Nature and Technique

8) In a previous question we asked you whether you would support the compulsory separation of Household waste when this would cost you an additional 10 (40) minutes a week. When you answered this question how did you see those 10 (40) minutes?

- D) I saw those 10 (40) minutes as a small effort.
- E) I saw those 10 (40) minutes as neither a small nor a large effort.
- F) I saw those 10 (40) minutes as a large effort.

9) In a previous question we asked you whether you would support a transition towards a sustainable energy supply when it will take 5 (20) years before the positive effects of this effort will start to become visible. When you answered this question, what was your perception about this period of 5 (20) years?

- A) It was my perception that 5 (20) years is a short period.
- B) It was my perception that 5 (20) years is neither a short nor a long period.
- C) It was my perception that 5 (20) years is a long period.

Thank you for participating in this survey.

Appendix C: Descriptive statistics and bivariate relations of factors

Part 1: General facts

Table 1 (I): Factorial crossing of the factors over the different versions of the survey

<i>Version</i>	<i>Physical Effort</i>	<i>Pay-off period</i>	<i>Tax-system</i>
A	10 minutes	5 year	Regressive
B	10 minutes	5 year	Progressive
C	10 minutes	20 year	Regressive
D	10 minutes	20 year	Progressive
E	40 minutes	5 year	Regressive
F	40 minutes	5 year	Progressive
G	40 minutes	20 year	Regressive
H	40 minutes	20 year	Progressive

Table 2: Number of respondents per version of survey

<i>Version</i>	<i>Respondents</i>
A	28
B	27
C	26
D	25
E	28
F	26
G	26
H	25

Part 2: Interpretation of the referendum items (ordinal)

Table 3 (II): Voting intentions

	<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Measure 1) In a referendum the government proposes to make separation of household waste compulsory. This measure requires an extra physical effort because you have to separate all your waste and you have to bring it to a collection point. Would you support this policy if it would cost you on average 10 (40 minutes) a week extra work in separating and disposing of your waste?	10.0 %	21.8 %	44.5 %	23.7 %
Measure 2) In a referendum the government proposes to start a large scale investment in sustainable energy sources to reduce the emission of CO ₂ . However, this measure requires every citizen <u>from today onwards</u> to make an extra monthly payment of €15 for the development and usage of sustainable energy. It should be noted that the transition to sustainable energy will cost some time resulting in a time loss of a couple of years before any benefits can be seen. Would you support this measure when investing in sustainable energy sources will lead to a substantial lower level of CO ₂ emissions in the Netherlands within a period of 5 (20 years)?	10.4 %	27.0 %	40.8 %	21.8 %
Measure 3) In a referendum the government proposes to implement extra taxes on the energy usage per household in order to give citizens an incentive to reduce energy use. Would you support a total extra tax burden of 15% on the energy usage of households by means of a tax through which you have to pay for every m ³ energy a fixed price of 15% extra? (Would you support a total extra tax burden of 15% on the energy usage of households by means of a tax system which increases the tax percentage per m ³ energy as you use more energy? Similarly to income tax, you will pay a low tax percentage of less than 15% over a first fixed quantity of energy, with any additional fixed quantity of energy use incurring an incrementing tax rate percentage above 15%).	28.9 %	46.4 %	20.4 %	4.3 %
Measure 4) In a referendum the government proposes to implement a quota on the energy usage per household. By means of this measure the energy usage per household can be forcibly reduced with the same magnitude as would be possible with the implementation of taxes on energy usage. A quota on energy usage entails that for every household a maximum quantity of energy will be available per person per month. A household will have to do with the available quantity of energy for the whole month. It is not possible to obtain extra energy by means of paying for extra energy. Would you support such a quota on energy usage?	53.8 %	30.5 %	11.9 %	3.8 %

Numbers vary from 210 to 211 depending on missing data

Table 4 (VII): Voting intentions separated per level of the experimental factors

		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Measure 1 (Waste separation)	10 min. (N=106)	7.5%	22.6%	45.3%	24.5%
	40 min. (N=105)	12.4%	21.0%	43.8%	22.9%
<i>Chi-Square = 1.40, d.f. = 3, p-value = .707</i>					
Measure 2 (Sustainable energy)	5 year (N=109)	11.0%	26.6%	40.4%	22.0%
	20 year (N=102)	9.8%	27.5%	41.2%	21.6%
<i>Chi-Square = .10, d.f. = 3, p-value = .992</i>					
Measure 3 (Energy tax)	Regressive (N=108)	28.7%	50.0%	16.7%	4.6%
	Progressive (N=103)	29.1%	42.7%	24.3%	3.9%
<i>Chi-Square = 2.17, d.f. = 3, p-value = .538</i>					

Table 5 (VIII): Manipulation check questions

		<i>Small effort</i>	<i>Small nor large effort</i>	<i>Large effort</i>
Measure 1 (Waste separation)	10 min. (N=106)	63.2%	22.6%	12.3%
	40 min. (N=105)	29.5%	34.3%	33.3%
<i>Chi-Square = 25.69, d.f. = 2, p-value = .000</i>				
Measure 2 (Sustainable energy)	5 year (N=109)	34.9%	Neither short nor long 40.4%	21.1%
	20 year (N=102)	19.6%	38.2%	41.2%
<i>Chi-Square = 11.39, d.f. = 2, p-value = .003</i>				

Table 6 (IX): ANOVA of version based group differences

	<i>F</i>	<i>P-value</i>
<u>Measure 1</u>		
Waste separation costs 10 minutes	.38	.765
Waste separation costs 40 minutes	.61	.610
<u>Measure 2</u>		
Term 5 year	.22	.880
Term 20 year	.94	.425
<u>Measure 3</u>		
Regressive	.62	.602
Progressive	1.03	.384
<u>Measure 4</u>		
(All versions; no manipulation)	.96	.463

Part 3: Interpretation of referendum items (dichotomies)

Table 7: voting intentions

	<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Measure 1 (Waste separation)	31.8 %	68.2 %
Measure 2 (Sustainable energy)	37.4 %	62.6 %
Measure 3 (Energy tax)	75.3 %	24.7 %
Measure 4 (Energy quota)	84.3 %	15.7 %

Numbers vary from 210 to 211 depending on missing data

Table 8: Total number of issues (probably) supported by the respondents (on basis of dichotomous items)

<i>Number of referendum items supported by the respondent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
0	10.5 %	10.5 %
1	30.5 %	41.0 %
2	38.6 %	79.5 %
3	18.1 %	97.6 %
4	2.4 %	100.0 %

N = 210

Table 9: Voting intentions separated per level of the experimental factors

		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Measure 1 (Waste separation)	10 min. (N=106)	30.2%	69.8%
	40 min. (N=105)	33.4%	66.6%
<i>Chi-Square = .24, d.f. = 2, p-value = .624</i>			
Measure 2 (Sustainable energy)	5 year (N=109)	37.6%	62.4%
	20 year (N=102)	37.3%	62.7%
<i>Chi-Square = .00, d.f. = 2, p-value = .957</i>			
Measure 3 (Energy tax)	Regressive (N=108)	78.7%	21.3%
	Progressive (N=103)	71.8%	28.2%
<i>Chi-Square = 1.34, d.f. = 2, p-value = .248</i>			

Table 10: ANOVA of version based group differences

	<i>F</i>	<i>P-value</i>
<u>Measure 1</u>		
Waste separation costs 10 minutes	.18	.907
Waste separation costs 40 minutes	1.15	.333
<u>Measure 2</u>		
Term 5 year	.06	.983
Term 20 year	.58	.633
<u>Measure 3</u>		
Regressive	.72	.542
Progressive	.68	.565
<u>Measure 4</u>		
(All versions; no manipulation)	1.34	.232

Part 4: General descriptive statistics of some independent control variables

Table 11 (III): Mean scores on Personal and Societal risk perceptions (5 point scale)

	<i>Personal risk</i>	<i>Societal risk</i>
Air pollution	3.43	3.93
Global Warming	3.15	3.85
Shortage of drinking-water	2.46	3.93
Depletion of fossil fuels	3.54	4.34
Extinction of animal species	3.39	3.67

Table 12 (IV): Knowledge of the Real causes of global warming

	<i>Good answer</i>	<i>Wrong answer/Don't know</i>
People driving their cars	90.0%	10.0%
Destruction of tropical forests	69.2%	30.8%
Use of coal and oil for electricity generation	71.1%	28.9%
People heating and cooling their homes	43.6%	56.4%

Table 13 (V): Knowledge of Bogus causes of global warming

	<i>Good answer</i>	<i>Wrong answer/Don't know</i>
Nuclear power generation	38.9%	61.1%
Depletion of ozone in the upper atmosphere	14.7%	85.3%
Use of aerosol spray cans	35.5%	64.5%
Use of chemicals to destroy insect pests	40.8%	59.2%

Table 14 (VI): Importance of different problems

	<i>Really unimportant</i>	<i>Not really important</i>	<i>Neutral</i>	<i>Reasonably important</i>	<i>Very important</i>
Economic problems	.9%	1.4%	4.3%	45.0%	48.3%
Problems with public safety on the street	.5%	2.4%	16.6%	41.7%	38.9%
Environmental problems	2.4%	10.0%	19.4%	44.5%	23.7%

Part 5: Correlation Matrix of Independent variables

Table 15 (X): Correlation matrix of Independent Variables

	<i>Gender</i>	<i>School Profile</i>	<i>Personal risk perceptions</i>	<i>Social risk perception</i>	<i>Knowledge: Real causes</i>	<i>Knowledge: Bogus causes</i>	<i>General env. beliefs</i>	<i>EnvEco</i>	<i>EnvSecurity</i>	<i>Gov. Regulation</i>
Gender	1									
Profile	-.06	1								
Personal Risk	.21**	.05	1							
Societal Risk	.17*	.04	.60**	1						
Real causes	-.01	.17*	.17*	.33**	1					
Bogus causes	-.30**	.07	-.24**	-.32**	-.20**	1				
Gen.Env. beliefs	.20**	-.07	.33**	.42**	.19**	-.16**	1			
Env-Eco	.14*	.00	.33**	.34**	.14*	-.14**	.78**	1		
Env-Sec	.05	.01	.24**	.32**	.23**	-.06	.71**	.70**	1	
Government Regulations	.08	.06	.30**	.28**	.13	-.02	.32**	.22**	.17*	1

* Significant at .05; ** Significant at .01. Pearson Correlation (two-tailed tests).

Appendix D: General linear models; ANCOVA

Table 1 (XI): ANCOVA on Measure 1 (Waste separation)

	<i>Type III Sum of Squares</i>	<i>Df.</i>	<i>F</i>	<i>p-value</i>	<i>Partial Eta squared</i>
Corrected Model	34.95	21	2.30	.002	.206
Intercept	12.61	1	17.39	.000	.086
Manipulation 1	.74	1	1.02	.314	.005
Demographics:					
Gender	4.92	1	6.79	.010	.035
School Profile	1.05	1	1.44	.231	.008
Specific environmental perceptions:					
Personal risk perceptions	.03	1	.04	.838	.000
Societal risk perceptions	.03	1	.04	.850	.000
Knowledge: Identifying real causes	3.56	1	4.92	.028	.026
Knowledge: Identifying bogus causes	.26	1	.36	.550	.002
General environmental beliefs:					
General importance of environmental policies	.56	1	.77	.381	.004
Environment vs. Economy	.50	1	.68	.409	.004
Environment vs. Security	2.31	1	3.18	.076	.017
Government regulation	3.37	1	4.65	.032	.024
Interaction effects:					
M1 * Gender	.01	1	.02	.888	.000
M1 * School Profile	.46	1	.63	.427	.003
M1 * Personal risk perceptions	.44	1	.61	.437	.003
M1 * Societal risk perceptions	1.08	1	1.49	.223	.008
M1 * Knowledge: real causes	.11	1	.15	.701	.001
M1 * Knowledge: bogus causes	.00	1	.01	.942	.000
M1 * Gen. importance of environment	.57	1	.78	.378	.004
M1 * Environment vs. Economy	1.32	1	1.82	.179	.010
M1 * Environment vs. Security	.09	1	.12	.732	.001
M1 * Government regulation	.04	1	.05	.819	.000
Error	134.81	186			
Total	1832.00	208			
Corrected Total	169.77	207			

Adjusted R² = .116 (M1 = manipulation 1)

Table 2 (XII): ANCOVA on Measure 2 (Sustainable energy)

	Type III Sum of Squares	Df.	F	p- value	Partial Eta squared
Corrected Model	49.43	23	3.15	.000	.283
Intercept	7.10	1	10.40	.001	.054
Manipulation 1	1.82	1	2.67	.104	.014
Manipulation 2	.144	1	.21	.647	.001
Demographics:					
Gender	.90	1	1.33	.251	.007
School Profile	1.93	1	2.82	.095	.015
Specific environmental perceptions:					
Personal risk perceptions	.08	1	.12	.729	.001
Societal risk perceptions	.00	1	.00	.966	.000
Knowledge: Identifying real causes	8.19	1	12.01	.001	.061
Knowledge: Identifying bogus causes	.72	1	1.05	.306	.006
General environmental beliefs:					
General importance of environmental policies	.11	1	.16	.693	.001
Environment vs. Economy	1.86	1	2.73	.100	.015
Environment vs. Security	.62	1	.91	.341	.005
Government regulation	.21	1	.31	.579	.002
Interaction effects:					
M1 * M2	.95	1	1.40	.239	.008
M2 * Gender	1.26	1	1.84	.176	.010
M2 * School profile	.14	1	.20	.655	.001
M2 * Personal risk perceptions	1.36	1	1.99	.159	.011
M2 * Societal risk perceptions	.01	1	.02	.895	.000
M2 * Knowledge: real causes	1.31	1	1.92	.168	.010
M2 * Knowledge: bogus causes	.17	1	.25	.619	.001
M2 * Gen. importance of environment	.11	1	.16	.691	.001
M2 * Environment vs. Economy	2.842E-5	1	.00	.995	.000
M2 * Environment vs. Security	.13	1	.19	.661	.001
M2 * Government regulation	.17	1	.26	.614	.001
Error	125.50	184			
Total	1726.00	208			
Corrected Total	174.923	207			

Adjusted R² = .193 (M1 = manipulation 1) (M2 = manipulation 2)

Table 3 (XIII): ANCOVA on Measure 3 (Energy tax)

	<i>Type III Sum of Squares</i>	<i>Df.</i>	<i>F</i>	<i>P-value</i>	<i>Partial Eta squared</i>
Corrected Model	34.68	27	2.22	.001	.250
Intercept	1.85	1	3.19	.076	.017
Manipulation 1	.29	1	.49	.484	.003
Manipulation 2	.23	1	.40	.526	.002
Manipulation 3	.04	1	.07	.790	.000
Demographics:					
Gender	.49	1	.84	.361	.005
School Profile	.48	1	.82	.367	.005
Specific environmental perceptions:					
Personal risk perceptions	.38	1	.65	.420	.004
Societal risk perceptions	1.23	1	2.13	.147	.012
Knowledge: Identifying real causes	1.10	1	1.90	.169	.010
Knowledge: Identifying bogus causes	.01	1	.02	.897	.000
General environmental beliefs:					
General importance of environmental policies	.02	1	.04	.851	.000
Environment vs. Economy	2.02	1	3.49	.064	.019
Environment vs. Security	.27	1	.46	.498	.003
Government regulation	1.61	1	2.77	.098	.015
Interaction effects:					
M1 * M2	.00	1	.00	.960	.000
M1 * M3	.52	1	.89	.346	.005
M2 * M3	.05	1	.08	.778	.000
M1 * M2 * M3	2.80	1	4.84	.029	.026
M3 * Gender	.08	1	.13	.717	.001
M3 * School Profile	2.42	1	4.18	.042	.023
M3 * Personal risk perceptions	.60	1	1.04	.309	.006
M3 * Societal risk perceptions	.37	1	.64	.423	.004
M3 * Knowledge: real causes	.07	1	.12	.726	.001
M3 * Knowledge: bogus causes	.09	1	.15	.695	.001
M3 * Gen. importance of environment	.11	1	.18	.671	.001
M3 * Environment vs. Economy	3.18	1	5.48	.020	.030
M3 * Environment vs. Security	2.87	1	4.96	.027	.027
M3 * Government regulation	.10	1	.17	.684	.001
Error	104.31	180			
Total	975.00	208			
Corrected Total	138.99	207			

Adjusted R² = .137 (M1 = manipulation 1) (M2 = manipulation 2) (M3 = manipulation 3)

Figure 1: Profile plot of interaction between school profile and manipulation 3

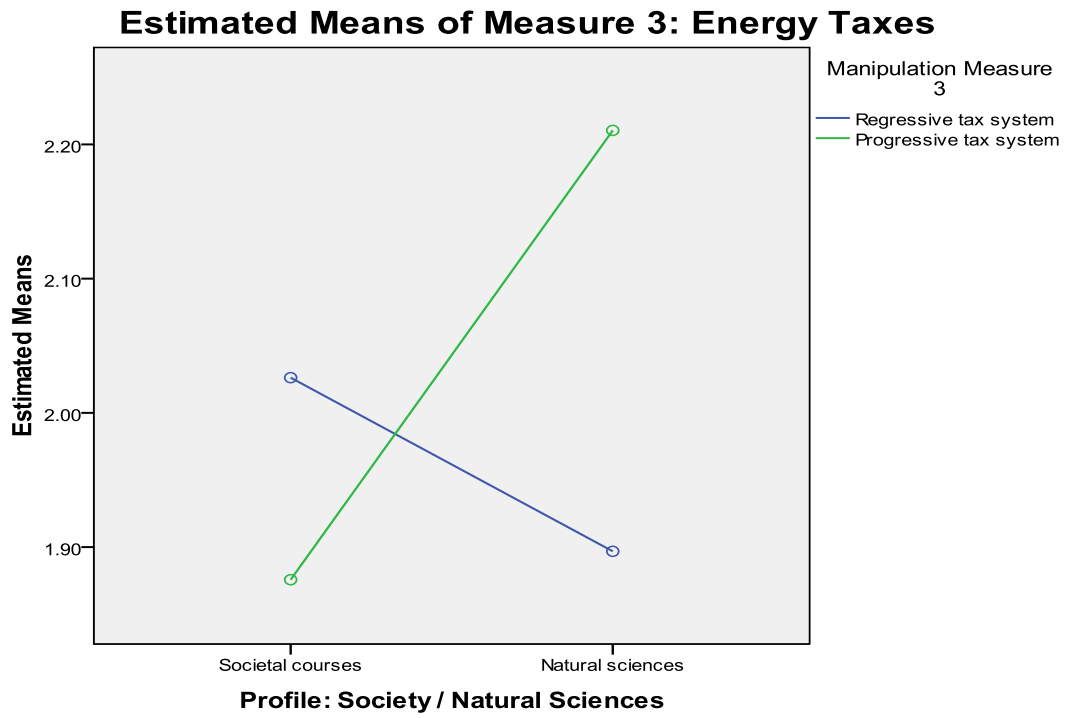
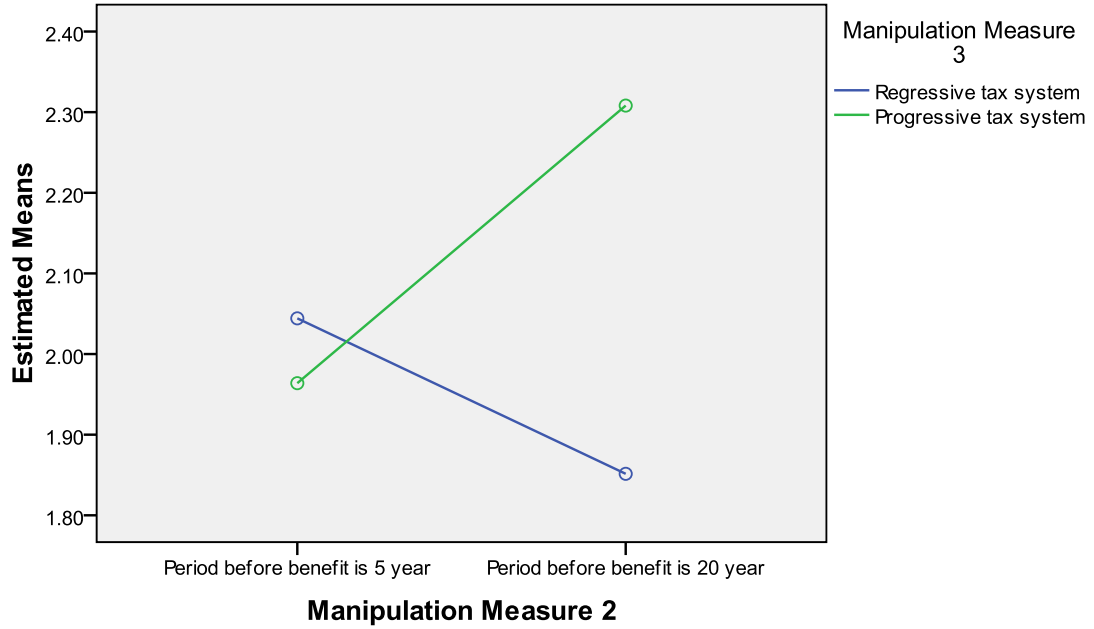


Figure 2: Profile plots of second order interaction: M1*M2*M3

Estimated Means of Measure 3: Energy tax

Manipulation Measure 1 = Waste separation costs 10 minutes



Estimated Means of Measure 3: Energy tax

Manipulation Measure 1 = Waste separation costs 40 minutes

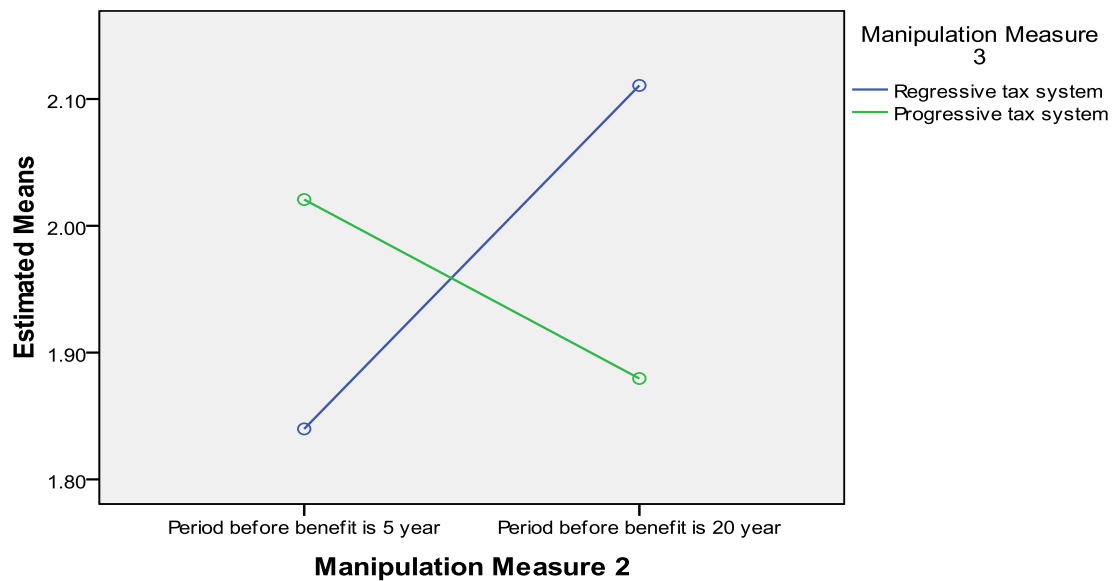


Table 4 (XIV): ANCOVA on Measure 4 (Energy quota)

	<i>Type III Sum of Squares</i>	<i>df</i>	<i>F</i>	<i>P-value</i>	<i>Partial Eta squared</i>
Corrected Model	26.64	17	2.55	.001	.187
Intercept	4.04	1	6.58	.011	.034
Manipulation 1	2.52	1	4.12	.044	.021
Manipulation 2	.51	1	.83	.364	.004
Manipulation 3	.05	1	.08	.778	.000
Demographics:					
Gender	.43	1	.70	.403	.004
School Profile	.25	1	.41	.524	.002
Specific environmental perceptions:					
Personal risk perceptions	5.19	1	8.46	.004	.043
Societal risk perceptions	.20	1	.32	.570	.002
Knowledge: Identifying real causes	.23	1	.37	.544	.002
Knowledge: Identifying bogus causes	.66	1	1.07	.302	.006
General environmental beliefs:					
General importance of environmental policies	2.72	1	4.43	.037	.023
Environment vs. Economy	3.73	1	6.08	.015	.031
Environment vs. Security	1.28	1	2.08	.151	.011
Government regulation	.51	1	.83	.363	.004
Interaction effects:					
M1 * M2	2.92	1	4.75	.030	.025
M1 * M3	.16	1	.27	.606	.001
M2 * M3	1.39	1	2.26	.134	.012
M1 * M2 * M3	.03	1	.05	.816	.000
Error	116.00	189			
Total	711.00	207			
Corrected Total	142.65	206			

Adjusted R² = .114 (M1 = manipulation 1) (M2 = manipulation 2) (M3 = manipulation 3)

Appendix E: OLS regression

Table 1 (XV): OLS regression (Scale variable of the four proposed policies)

	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>	<i>VII</i>
Demographics:							
Gender	.70*	.36	.37	.46	.33	.42	
	(.30)	(.30)	(.30)	(.28)	(.28)	(.28)	
Profile	-.08	-.18	-.34	-.10	-.39	-.42	
	(.30)	(.29)	(.29)	(.27)	(.27)	(.27)	
Specific environmental perceptions:							
Personal risk perceptions		1.68	1.75		.62	.97	
		(.97)	(.94)		(.89)	(.90)	
Societal risk perceptions		3.23**	2.02		.72	.38	
		(1.089)	(1.13)		(1.07)	(1.07)	
Knowledge: identifying real causes			1.85**		1.53**	1.45**	
			(.55)		(.52)	(.52)	
Knowledge: identifying bogus causes			-.27		-.54	-.66	
			(.55)		(.51)	(.50)	
General environmental beliefs:							
Importance of environmental policies				.52	-1.06	-1.13	
				(1.04)	(1.05)	(1.04)	
Environment vs. Economy				3.33*	3.80**	4.08**	
				(1.45)	(1.40)	(1.40)	
Environment vs. Security				2.86*	2.87*	2.93*	
				(1.28)	(1.24)	(1.23)	
Control: government regulation					1.64**	1.63**	
					(.61)	(.61)	
Manipulations:							
Manipulation 1 (10-40 minutes)						-.68*	-.27
						(.27)	(.30)
Manipulation 2 (5-20 year)						.07	-.04
						(.26)	(.30)
Manipulation 3 (regressive-progressive)						.17	.22
						(.26)	(.30)
Constant	8.92**	5.83**	5.57**	5.60**	4.09**	4.33**	9.26**
	(.26)	(.67)	(.79)	(.50)	(.80)	(.78)	(.30)
Adjusted R ²	.016	.124	.166	.225	.302	.316	-.008
N	208	207	207	208	206	206	209

Cell entries are unstandardized regression coefficients, with standard errors in parentheses.

* Significant at .05; ** Significant at .01. (Models I and VI are not significant. ANOVA (p-value = .067) model I, ANOVA (p-value = .729) model IV).

Appendix F: Binary logistic regression tables (not used in main analyses)

Table 1: Binary-logit on the four measures (part I)

	<i>Measure 1: (Waste separation)</i>				<i>Measure 2: (Sustainable energy)</i>			
	I	II	III	IV	V	VI	VII	VIII
Demographics:								
Gender	.94**	.92**	1.00**	1.15*	.08	-.12	-.21	0.14
(male-female)	(.32)	(.34)	(.36)	(.52)	(.29)	(.32)	(.34)	(.35)
	2.56	2.50	2.72	3.16	1.08	.89	.81	.87
Profile								
(society-nature)	-.04	-.24	-.29	-.28	-.30	-.57	-.60	-.63
	(.30)	(.32)	(.34)	(.34)	(.29)	(.31)	(.33)	(.34)
	.96	.79	.75	.75	.74	.57	.55	.53
Specific environmental perceptions:								
Personal risk perceptions		.79	.19	.18		1.43	.81	1.23
		(1.06)	(1.11)	(1.11)		(1.00)	(1.06)	(1.09)
		2.20	1.21	1.19		4.16	2.24	3.42
Societal risk perceptions		.64	-.02	-.06		-.01	-.85	-1.12
		(1.23)	(1.34)	(1.34)		(1.18)	(1.30)	(1.33)
		1.90	.99	.94		.99	.43	.33
Knowledge: identifying real causes		1.23*	1.07	1.33		1.93**	1.99**	2.89**
		(.61)	(.63)	(1.01)		(.60)	(.63)	(.93)
		3.42	2.92	3.77		6.86	7.34	17.99
Knowledge: identifying bogus causes		.39	.11	.07		-.30	-.50	-.58
		(.61)	(.64)	(.65)		(.58)	(.61)	(.63)
		1.47	1.12	1.07		.74	.61	.56
General environmental beliefs:								
Importance of environmental policies			-.97	-1.04			.17	.30
			(1.35)	(1.37)			(1.30)	(1.33)
			.38	.35			1.19	1.35
Environment vs. economy			-.19	-.05			3.05	3.38
			(1.79)	(1.86)			(1.78)	(1.82)
			.83	.95			21.09	29.26
Environment vs. security			4.17**	4.27*			.62	.29
			(1.65)	(2.07)			(1.52)	(1.57)
			64.61	71.62			1.86	1.34
Control: government regulation			1.31	1.34			.18	-.03
			(.76)	(1.03)			(.75)	(.76)
			3.69	3.83			1.20	.97
Manipulations:								
Manipulation 1 (10-40 minutes)	-.35	-.40	-.41	.15				
	(.31)	(.33)	(.34)	(1.44)				
	.70	.67	.67	1.17				
Manipulation 2					.02	-.03	.01	1.46

(5-20 year)					(.29)	(.30)	(.31)	(.90)
					1.02	.97	1.01	4.33
Manipulation 3 (regressive- progressive)								
Interactions:								
M1 * M2								-.90 (.47) .41
M1 * Gender					-.27 (.68) .77			
M1 * Knowledge: Real causes					-.44 (1.26) .65			
M1 * Environment vs. security					-.28 (2.21) .76			
M1 * Government regulation					-.05 (1.46) .95			
M2 * Knowledge: Real causes								-1.52 (1.22) .22
Constant	.55 (.29) 3.70	-1.17 (.87) .31	-2.18 (.98) .11	-2.43 (1.15) .09	.61 (.28) 1.83	-1.11 (.84) .33	-2.08 (.96) .13	-2.66 (1.07) .07
Cox and Snell pseudo-R ²	.045	.081	.136	.14	.01	.09	.15	.17
Nagelkerke R ²	.063	.113	.191	.19	.01	.13	.21	.24
Hosmer and Lemeshow test	2.79 (sig = .84)	6.70 (sig = .57)	1.351 (sig = .99)	2.31 (sig = .97)	2.63 (sig = .85)	10.62 (sig = .22)	11.07 (sig = .20)	1.59 (sig = .99)
N	210	209	208	208	210	209	208	208

p<.05, ** p< 0.01 (change in -2 log likelihood) *Note:* the coefficients are the un-standardized parameter estimate values (log odds). Standard errors are reported between parentheses. The third values are the Exp. (B) values are (odds ratios). (M1 = manipulation 1) (M2 = manipulation 2)

Table 1: Binary-logit on the four measures (part II)

	<i>Measure 3: (Energy tax)</i>				<i>Measure 4: (Energy quota)</i>			
	I	II	III	IV	V	VI	VII	VIII
Demographics								
Gender	.06 (.32)	-.09 (.35)	-.17 (.36)	-.24 (.37)	.55 (.39)	.17 (.42)	.31 (.44)	.39 (.46)
Profile	1.06 (.32)	.91 (.34)	.84 (.36)	.79 (.53)	1.73 (.38)	1.19 (.40)	1.37 (.44)	1.47 (.44)
	1.59	1.56	1.73	.87	1.09	.99	.90	.94
Specific environmental perceptions:								
Personal risk perceptions		-.77 (1.10)	-1.55 (1.17)	-1.70 (1.20)		2.83* (1.45)	2.64 (1.60)	3.38* (1.69)
Societal risk perceptions		.46 (1.37)	.21 (1.41)	.18 (1.45)		16.90 (1.73)	14.02 (1.83)	29.45 (1.82)
Knowledge: identifying real causes		.46 (1.16)	.21 (1.03)	.18 (.91)		16.90 (.81)	14.02 (.87)	29.45 (.89)
Knowledge: identifying bogus causes		2.62 (1.37)	1.99 (1.41)	2.14 (1.45)		.87 (2.39)	.22 (1.25)	.15 (1.16)
General environmental beliefs:								
Importance of environmental policies			.93 (1.45)	1.47 (1.57)			-2.48 (1.64)	-2.61 (1.63)
Environment vs. economy			2.54 (1.99)	4.34 (2.88)			.08 (2.21)	.07 (2.25)
Environment vs. security			16.71 (1.70)	.75 (2.40)			11.33 (1.92)	17.54 (1.94)
Control: government regulation			.42 (.84)	10.79 (.88)			47.82 (1.00)	41.55 (1.04)
Manipulations:			3.22	3.49			3.64	3.21
Manipulation 1 (10-40 minutes)								.26 (.46)
Manipulation 2 (5-20 year)								1.29
Manipulation 3 (regressive-progressive)	.36 (.32)	.35 (.34)	.52 (.36)	.90 (1.55)				
Interactions:								
M1 *M2								-1.53* (.67)
								.22

M1 * M2 * M3				-25					
				(.60)					
				.78					
M3 * Profile				1.43*					
				(.73)					
				4.19					
M3 * Environment vs. Economy				5.36					
				(3.44)					
				212.05					
M3 * Environment vs. Security				-7.03*					
				(3.32)					
				.00					
Constant	-1.56	-3.63	-4.94	-5.15	-2.01	-3.80	-5.22	-5.48	
	(.34)	(1.07)	(1.25)	(1.52)	(.37)	(1.31)	(1.48)	(1.55)	
	.21	.03	.01	.01	.13	.02	.01	.00	
Cox and Snell pseudo- R ²	0.02	.07	.12	.15	.01	.05	.09	.12	
Nagelkerke R ²	0.02	.11	.18	.23	.02	.09	.16	.21	
Hosmer and Lemeshow test	6.28	9.38	4.71	11.62	.33	7.75	6.21	4.90	
	(sig. =.39)	(sig. =.38)	(sig. =.79)	(sig. =.17)	(sig. = .85)	(sig.= .46)	(sig.= .62)	(sig.= .77)	
N	210	209	208	208	209	208	207	207	

p<.05, ** p< 0.01 (change in -2 log likelihood) *Note:* the coefficients are the un-standardized parameter estimate values (log odds). Standard errors are reported between parentheses. The third values are the Exp. (B) values are (odds ratios). (M1 = manipulation 1) (M2 = manipulation 2) (M3 = manipulation 3)

Appendix G: Tables with bivariate control analyses for interactions. (only the significant items in the ANCOVA or the binary regression models are included).

Part one: Bivariate control analyses using the ordinal dependent variables

Table 1: The relation between ‘required efforts’ and ‘measure support’ controlled for ‘gender’

<i>Dependent: Measure 1</i>		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Man	10 minutes (N = 62)	11.3%	25.8%	41.9%	21.0%
	40 minutes (N = 44)	20.5%	25.0%	34.1%	20.5%
<i>Chi-Square = 1.85, d.f. = 3, p-value = .604</i>					
Female	10 minutes (N = 43)	.0%	18.6%	51.2%	30.2%
	40 minutes (N = 61)	6.6%	18.0%	50.8%	24.6%
<i>Chi-Square = 3.12, d.f. = 3, p-value = .373</i>					

Table 2: The relation between ‘required efforts’ and ‘measure support’ controlled for ‘knowledge of real causes’

<i>Dependent: Measure 1</i>		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Low knowledge of causes	10 minutes (N = 36)	11.1%	27.8%	44.4%	16.7%
	40 minutes (N = 36)	16.7%	25.0%	50.0%	8.3%
<i>Chi-Square = 1.57, d.f. = 3, p-value = .666</i>					
High knowledge of causes	10 minutes (N = 70)	5.7%	20.0%	45.7%	28.6%
	40 minutes (N = 69)	10.1%	18.8%	40.6%	30.4%
<i>Chi-Square = 1.14, d.f. = 3, p-value = .768</i>					

Table 3: The relation between 'required efforts' and 'measure support' controlled for 'Env-Sec'

<i>Dependent: Measure 1</i>		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Security more important than environment	10 minutes (N = 48)	10.4%	33.3%	41.7%	14.6%
	40 minutes (N = 40)	12.5%	32.5%	32.5%	22.5%
<i>Chi-Square = 1.33, d.f. = 3, p-value = .722</i>					
Environment equal or more important than security	10 minutes (N = 58)	5.2%	13.8%	48.3%	32.8%
	40 minutes (N = 65)	12.3%	13.8%	50.8%	23.1%
<i>Chi-Square = 2.82, d.f. = 3, p-value = .420</i>					

Table 4: The relation between 'required efforts' and 'measure support' controlled for 'government regulation'

<i>Dependent: Measure 1</i>		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Opposes Government regulation	10 minutes (N=30)	16.7%	26.7%	43.3%	13.3%
	40 minutes (N=52)	22.7%	18.2%	27.3%	31.8%
<i>Chi-Square = 3.59, d.f. = 3, p-value = .310</i>					
Neutral Government regulation	10 minutes (N=44)	6.8%	18.2%	50.0%	25.0%
	40 minutes (N=100)	10.7%	25.0%	51.8%	12.5%
<i>Chi-Square = 3.09, d.f. = 3, p-value = .378</i>					
Support government intervention	10 minutes (N=31)	.0%	25.8%	38.7%	35.5%
	40 minutes (N=58)	7.4%	14.8%	40.7%	37.0%
<i>Chi-Square = 3.16, d.f. = 3, p-value = .367</i>					

Table 5: The relation between ‘pay-off term’ and ‘measure support’ controlled for ‘knowledge of real causes’.

<i>Dependent:</i>		<i>Definite</i>	<i>Probably</i>	<i>Probably</i>	<i>Definite</i>
<i>Measure 2</i>		<i>opponent</i>	<i>opponent</i>	<i>supporter</i>	<i>Supporter</i>
Low knowledge of causes	5 year (N=41)	19.5%	39.0%	36.6%	4.9%
	20 year (N=31)	12.9%	38.7%	35.5%	12.9%
<i>Chi-Square = 1.83, d.f. = 3, p-value = .608</i>					
High knowledge of causes	5 year (N=68)	5.9%	19.1%	42.6%	32.4%
	20 year (N=71)	8.5%	22.5%	43.7%	25.4%
<i>Chi-Square = 1.11, d.f. = 3, p-value = .774</i>					

Table 6: The relation between ‘tax system’ and ‘measure support’ controlled for ‘school profile’

<i>Dependent:</i>		<i>Definite</i>	<i>Probably</i>	<i>Probably</i>	<i>Definite</i>
<i>Measure 3</i>		<i>opponent</i>	<i>opponent</i>	<i>supporter</i>	<i>Supporter</i>
Societal Profile	Regressive (N=58)	24.1%	55.2%	15.5%	5.2%
	Progressive (N=54)	35.2%	44.4%	16.7%	3.7%
<i>Chi-Square = 1.96, d.f. = 3, p-value = .581</i>					
Scientific Profile	Regressive (N=50)	34.0%	44.0%	18.0%	4.0%
	Progressive (N=49)	22.4%	40.8%	32.7%	4.1%
<i>Chi-Square = 3.33, d.f. = 3, p-value = .343</i>					

Table 7: The relation between ‘tax system’ and ‘measure support’ controlled for ‘Environment vs. Economy’

<i>Dependent:</i>		<i>Definite</i>	<i>Probably</i>	<i>Probably</i>	<i>Definite</i>
<i>Measure 3</i>		<i>opponent</i>	<i>opponent</i>	<i>supporter</i>	<i>Supporter</i>
Economy more important	Regressive (N=54)	37.0%	51.9%	9.3%	1.9%
	Progressive (N=49)	42.9%	36.7%	18.4%	2.0%
<i>Chi-Square = 3.11, d.f. = 3, p-value = .376</i>					
Environment equal to or more important than the Economy	Regressive (N=54)	20.4%	48.1%	24.1%	7.4%
	Progressive (N=54)	16.7%	48.1%	29.6%	5.6%
<i>Chi-Square = .65, d.f. = 3, p-value = .884</i>					

Table 8: The relation between 'tax system' and 'measure support' controlled for 'Environment vs. security'

<i>Dependent: Measure 3</i>		<i>Definite opponent</i>	<i>Probably opponent</i>	<i>Probably supporter</i>	<i>Definite Supporter</i>
Security more important	Regressive (N=44)	50.0%	43.2%	4.5%	2.3%
	Progressive (N=44)	36.4%	38.6%	20.5%	4.5%
<i>Chi-Square = 5.85, d.f. = 3, p-value = .119</i>					
Environment equally important or more important than security	Regressive (N=64)	14.1%	54.7%	25.0%	6.3%
	Progressive (N=59)	23.7%	45.8%	27.1%	3.4%
<i>Chi-Square = 2.59, d.f. = 3, p-value = .460</i>					

Part two: Bivariate control analyses using the recoded binary dependent variables

Table 9: The relation between 'required efforts' and 'measure support' controlled for 'gender'

<i>M1 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Man	10 minutes (N=62)	37.1%	62.9%
	40 minutes (N=44)	45.5%	54.5%
<i>Chi-Square = .75, d.f. = 1, p-value = .388</i>			
Female	10 minutes (N=43)	18.6%	81.4%
	40 minutes (N=61)	24.6%	75.4%
<i>Chi-Square = .52, d.f. = 1, p-value = .469</i>			

Table 10: The relation between 'required efforts' and 'measure support' controlled for 'knowledge of real causes'

<i>M1 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Low knowledge of causes	10 minutes (N=36)	38.9%	61.1%
	40 minutes (N=36)	41.7%	58.3%
<i>Chi-Square = .06, d.f. = 1, p-value = .810</i>			
High knowledge of causes	10 minutes (N=70)	25.7%	74.3%
	40 minutes (N=69)	29.0%	71.0%
<i>Chi-Square = .19, d.f. = 1, p-value = .665</i>			

Table 11: The relation between ‘required efforts’ and ‘measure support’ controlled for ‘Env-Sec’

<i>M1 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Security more important than environment	10 minutes (N=48)	43.8%	56.3%
	40 minutes (N=40)	45.0%	55.0%
<i>Chi-Square = .01, d.f. = 1, p-value = .906</i>			
Environment equal or more important than security	10 minutes (N=58)	19.0%	81.0%
	40 minutes (N=65)	26.2%	73.8%
<i>Chi-Square = .90, d.f. = 1, p-value = .343</i>			

Table 12: The relation between ‘required efforts’ and ‘measure support’ controlled for ‘government regulation’

<i>M1 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Opposes government intervention (N=52)	10 minutes (N=30)	43.3%	56.7%
	40 minutes (N=22)	40.9%	59.1%
<i>Chi-Square = .03, d.f. = 1, p-value = .86</i>			
Neutral to government intervention (N=100)	10 minutes (N=44)	25.0%	75.0%
	40 minutes (N=56)	35.7%	64.3%
<i>Chi-Square = .132, d.f. = 1, p-value = .25</i>			
Supports Government intervention (N=58)	10 minutes (N=31)	25.8%	74.2%
	40 minutes (N=27)	22.2%	77.8%
<i>Chi-Square = .10, d.f. = 1, p-value = .75</i>			

Table 13: The relation between ‘pay-off term’ and ‘measure support’ controlled for ‘knowledge of real causes’.

<i>M2 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Low knowledge of causes	10 minutes (N=41)	58.5%	41.5%
	40 minutes (N=31)	51.6%	48.4%
<i>Chi-Square = .34, d.f. = 1, p-value = .558</i>			
High knowledge of causes	10 minutes (N=68)	25.0%	75.0%
	40 minutes (N=71)	31.0%	69.0%
<i>Chi-Square = .62, d.f. = 1, p-value = .432</i>			

Table 14: The relation between 'tax system' and 'measure support' controlled for 'school profile'

<i>M3 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Societal Profile	Regressive (N=58)	79.3%	20.7%
	Progressive (N=54)	79.6%	20.4%
<i>Chi-Square = .00, d.f. = 1, p-value = .967</i>			
Scientific Profile	Regressive (N=50)	78.0%	22.0%
	Progressive (N=49)	63.3%	36.7%
<i>Chi-Square = .259, d.f. = 1, p-value = .107</i>			

Table 15: The relation between 'tax system' and 'measure support' controlled for 'Environment vs. Economy'

<i>M3 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Economy more important	Regressive (N=54)	88.9%	11.1%
	Progressive (N=49)	79.6%	20.4%
<i>Chi-Square = 1.69, d.f. = 1, p-value = .193</i>			
Environment equal to or more important than the Economy	Regressive (N=54)	68.5%	31.5%
	Progressive (N=54)	64.8%	35.2%
<i>Chi-Square = .17, d.f. = 1, p-value = .683</i>			

Table 16: The relation between 'tax system' and 'measure support' controlled for 'Environment vs. security'

<i>M3 (binary)</i>		<i>(Probably) opponent</i>	<i>(Probably) supporter</i>
Security more important	Regressive (N = 44)	93.2%	6.8%
	Progressive (N = 44)	75.0%	25.0%
<i>Chi-Square = 5.44, d.f. = 1, p-value = .020*</i>			
Environment equally important or more important than security	Regressive (N = 64)	68.8%	31.3%
	Progressive (N = 59)	69.5%	30.5%
<i>Chi-Square = .01, d.f. = 1, p-value = .929</i>			

Recoding of ordinal independent control variables in appendix G:

'Real causes': 0-2 = Low knowledge
3-4 = High Knowledge

'Env-security': -4 to -1 (41.7%) = Security more important than environment
0 to 3 (58.3%) = Environment equal to or more important than
sec.

'Env-security': -4 to -1 (48.8%) = Security more important than environment
0 to 3 (51.2%) = Environment equal to or more important than
sec.

'Gov regulation': 1 to 2 = less regulation
3 = neutral
4 to 5 = more regulation