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The Environment as Public Good:

Insights in Environmental Behaviour and Support for Environmental Policies and the influence of Time Preferences

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Date: June 17, 2016

Preface

Before we could start writing our bachelor thesis, we were very excited to choose a topic of our interest. We were even more thrilled once we heard a new topic was available, namely within environmental sociology under the supervision of Jeroen Weesie. We both were enthusiastic to conduct research in a topic we were not very familiar in, and therefore really challenge ourselves. Moreover, the influence of time preferences on environmental issues was something we did not yet heard off, but we were very eager to see what this concept could explain.

This way we would like to give a special thanks to our supervisor, Jeroen Weesie, for the challenging feedback and the interesting ideas. Due to his keen supervision, we were able to enhance our academic competences and we are very grateful for this learning opportunity. Furthermore, we would really like to thank Koen Damhuis, Rik Damhuis, Lizzy Doorewaard, and Kasper Otten for critically reading our drafts. We are very thankful for all the input. Even though we did not always chose the easiest way and had some struggles, we are very proud to present our thesis.

The environment as public good:
Insights in Environmental Behaviour and Support for Environmental Policies moderated by Time Preferences

Abstract. The aim of this research was to get insight in the problem of collective action in regard to environmental issues. The free-rider problem occurs, where not everyone contributes to a cleaner environment. The contribution to the environment is measured by environmental behaviour and support for environmental policies. The latter indicates willingness to contribute. Although there have been multiple studies in the environmental sociology, this study combines the collective action problem with time preferences. Based on earlier research, collective benefits should have a positive effect on environmental behaviour as well as support for environmental policies. Moreover, theories suggest that there is an effect of selective incentives on behaving environmentally friendly. Also, a positive moderating effect of time preferences is predicted. Data was obtained from the 'Swiss Environmental Survey 2007'. Results of OLS multiple regression show evidence that supports the effect of collective benefits on environmental behaviour and support for environmental policies. Selective incentives show to be partially explained by the results. There was no evidence found that supports the moderating effect of time preferences on environmental behaviour and on support for environmental policies.

KEYWORDS*: collective action, collective benefits, time preferences, selective incentives, environmental behaviour, support for environmental policies*

1. Introduction

Various climate analytics underscore the importance of changing environmental behaviour in order to control and manage global environmental problems (Stylianou, Rincon, Walton, n.d.). They state that if countries continue their current behaviour, the average global warming in the year 2100 will be increased with 4.5˚C, while an augmentation of 2˚C already leads to a substantial and dangerous climate impact. With regard to these alarming prospects, several summits have been held to make worldwide agreements among countries by pledges made on all conferences of parties (COP). The latest assembly took place in December 2015 (COP21) (Davenport, 2015). However, during this summit it became clear many countries did not met their promised goals and there still has to be done a lot to combat the environmental problems. While environmental issues are worldwide problems, causes can be found, at least to some extent, in people's daily behaviour (Ostrom, 2014, Nordlund & Garvill, 2002; Steg & Vlek, 2009). Therefore, in order to solve global environmental problem, changes in micro-level behaviour is necessary.

Several scholars conducted research on this matter, however, the main focus has been on rather psychological factors (e.g. attitudes, environmental knowledge), the problem of collective action and the environment, or the environment and time preferences (Ostrom, 2014; Kollmuss & Agyeman, 2002; Enzler, 2015; Hardisty & Weber, 2009, Nordlund & Garvill, 2002). What mainly distinguishes this study from previous research, is the fact that we combine the problem of collective action and time preferences. Time preferences are important, since changes in micro-level behaviour yield issues in immediate and long-term consequences (Nordlund & Garvill, 2002; Hardisty & Weber, 2009). Individual benefits from, for example, not-recycling, traveling by car, and not preserving energy are immediate, whereas negative environmental impacts of such actions are often uncertain, long-term consequences (Nordlund & Garvill, 2002). Moreover, the problem of collective action is relevant to consider, since on the micro-level temptations not to contribute to a cleaner environment may occur (Olson, 1977). This indicates that people will free-ride on the contribution of others, since they will benefit from the consequences of their behaviour.

Olson (1977) introduced selective incentives as a possible solution to the problem of collective action. Moreover, Hobbes (1651) argues the importance of state-regulation (policies) to affect micro-level behaviour. He namely state that people are willing to give up their possibility to free-ride, if others would do as well. This study focusses on the willingness to give up free-riding behaviour by looking at support for environmental policies.

In line with the above the following question will serve as the main focus of this study: *What influences environmental behaviour and support for environmental policies?* Since we are additionally interested in the influence of time preferences, we also look at the following question: *To what extent are environmental behaviour and support for environmental policies affected by time preferences?*

In order to answer the above questions, this study is subdivided in five chapters. This study will start with elaborating on different theories and the mechanisms leading to several hypotheses. Consequently, the collected data shall be explained, as well as the operationalisation and methods for analyses. The following chapter elaborates the results. Finally, the last chapter will discuss the results and critical notes to this study and recommendations for further research will be given.

2. Theoretical Framework

In this chapter various important factors influencing environmental behaviour and support for environmental policies will be discussed, in order to find theoretical answers to our main and sub-question. First, we will define the central concepts used in this study. Secondly, our theoretical expectations and hypotheses will be discussed. Finally, we will elaborate on the influence of time preferences.

2.1. Collective benefits and environmental behaviour

The starting point of this study is Mancur Olson's book 'The Logic of Collective Action' (1977). He looks at both, group and individual attempts in achieving public goods. Moreover, he argues that in order to achieve public goods, collective benefits are of great importance. Collective benefits are explained by Olson (1977) as the gains every individual enjoys when the public good is provided. Public goods are seen as non-excludable (no-one in the group can be excluded from using the good) and non-rivalrous goods (the use of the good by one individual does not limit or reduce the availability or opportunity to use it for other group members). Furthermore, Kaul, Grunberg & Stern (1999) argue that public goods have benefits that cannot easily be limited to one single person. Looking at the definition of public goods, among other scholars, we consider the environment to be a public good (Kaul, Grunberg & Stern, 1999; Andreoni, 1988; Uitto, 2016). There namely is no excludability (e.g. environmental issues concern everyone on the planet, whereby no one can be excluded), and no rivalry (e.g. the use of a clean air by someone does not limit or reduce the availability of clean air for others). Accordingly, in this study the collective benefit refers to the benefit someone receives from a cleaner environment (e.g. general health benefits, better condition of surrounding nature and animal life, maintaining biodiversity better air quality).

Moreover, in order to study influences on environmental behaviour, a clear concept is needed. Many scholars see environmental behaviour as one's actions influencing, changing and impacting on the availability of natural resources, and altering the dynamics and structures of our ecosystem (e.g. use of toxic substances, emissions of greenhouse gases, energy consumption) (Steg & Vlek, 2009; Kollmuss & Agyeman, 2002). This is a rather broad concept of environmental behaviour and could be measured in various ways. Stern, Dietz, Ruttan, Socolow and Sweeney (1997) underscore the importance of choosing appropriate and adequate constructs to measure environmental behaviour. They argue there are many studies that provide little insight in environmental behaviour, since these variables

are relatively uninteresting to use. Therefore, we decided to focus on constructs of environmental behaviour that have been studied often and proved to be good indicators (Dürr, 1994; Steg & Vlek, 2009; Jensen 2002; Barr, 2003). For this reason this study will focuses on two types of environmental behaviour, namely: preserving energy (energy consumption within the household, e.g. usage of light, usage of different wattage bulbs) and recycling behaviour (the process of separating used materials in the household, e.g. recycling paper and organic waste and reusing and repairing materials in the household) (Ruiz, 1993; Nordlund & Garvill, 2002).

Looking at the mechanism of the above outlined collective benefits, Olson (1977) argues this may lead to group-orientated behaviour or, in other words, to collective action. The theoretical mechanism Olson (1977) relies on is the group theory. This group theory, of which Arthur Bentley (1949) was the founder, is based on the idea that a group of actors who share a common interest are more likely to behave in a way that has a positive effect on their common interest[1]. Furthermore, the group theory is based on the idea that individuals are rational actors that can make deliberate decisions. The group theory follows the assumption that people motivate their actions by their wants and goals and thus tries to maximize their own benefits or utility. Using this line of reasoning, Olson arrives at the (simple) equation:

$$\mathbf{A}i = \mathbf{V}i - \mathbf{C}$$

In this equation A*i* stands for the advantage any individual receives from the achieved public good considering they contributed, V*i* represents the value to the individual of the public good and C are the costs of contributing. When A*i* >0 for *some* individuals (*i*) in the group, these individuals will contribute and the group will presumably succeed, and thus provide the public good. However, when A*i*<0 for *some* individuals in the group, the group is not likely to achieve the public good, since the individual costs of contributing are too high. For example, recycling costs time and effort (C), however, person A has strong values regarding the environment (V*i*), whereby A receives an advantage when the public good is achieved. However, if the costs were to be higher than A's values (A*i*<0), person A will not contribute, according to Olson's theory (1977). In other words, individuals will not contribute if their

[1] Note that Olson's idea of the logic of collective action is not followed by all scholars. Ostrom (2014), for example finds it inadequate, since she argues Olson's idea is based on rather specific conditions such as little mutual trust, little possibility to communicate with other group members or the lack of binding agreements, which she finds rather simplistic.

individual benefit is worth less than the costs of their contribution, even if the group shares a common interest. Furthermore, since no-one can be excluded from using or consuming the public good, group members may profit even if they defect. This is also known as the so-called free-rider problem (Stigler, 1974; Battaglini, Nunnari & Palfrey, 2014; Nordhaus, 2015). Therefore, Olson (1977) emphasizes that even if individuals in the group are rational, this could lead to irrational collective outcomes.

Acknowledging the mechanisms described above, we follow the assumption that individuals will contribute to a cleaner environment if their collective benefits are higher than their individual costs. We assume if the benefits individuals gain from a cleaner environment will rise, behaving environmentally friendly becomes more profitable for the individual. This leads to our first hypothesis:

H1*: The more a person benefits from a cleaner environment, the more he will behave environmentally friendly.*

2.2. Impact of selective incentives on environmental behaviour.

The group theory and its mechanism of group-oriented behaviour, as previously elaborated on, differs when taking group sizes into account (Olson, 1977; Hardin, 1982). Both Olson and Hardin state that small groups are more likely to bring forth group-oriented behaviour and achieve group goals. They argue it is clearer within small groups if individuals contribute to the public good or not. Groups that are too large for individual actions to be noticeable for group members, are referred to as latent groups (Olson, 1977). In these groups, individuals will not know if one member makes no contribution. As mentioned earlier, environmental impacts concern the entire world, whereby it is necessary for this study to consider latent groups instead of small groups[2]. Olson (1977) and Hardin (1982) argue that within these latent groups, free-riding behaviour occurs, the problem of collective action.

In order to overcome this problem of collective action, Olson and Hardin underscore the importance of individual encouragements, which they call selective. They state that selective incentives are able to turn a situation where cooperation is irrational into a situation where collective action is rational for individuals. Olson (1977) defines selective incentives as individual stimuluses and inducements, or punishment and costs which lead people to act

[2] Note that Hardin (1982) underscores that we may not overlook the fact that there are smaller subgroups within this latent group (e.g. countries, districts, cantons, cities, villages, groups of friends or neighbourhoods). Within these subgroups individual actions could be visible. Nonetheless no-one can be excluded from the original main and latent group, the world.

in a certain way. Since no-one can be excluded from obtaining the benefits from the public good and individuals have little incentive to contribute voluntarily, people need to be motivated by personal inducements. He emphasizes that only separate and selective incentives will stimulate rational individuals to act in a group-oriented way. These incentives need to be 'selective' so that individuals who do not contribute to the attainment of the group's interest will be treated or encouraged differently from those who do. For example, person A may be especially encouraged by financial gains, while person B might not care for money and is motivated by his internal feeling of wanting to do the right thing.

Furthermore, these incentives can be divided in three different dimensions of selective incentives, namely; selective economic incentives, selective social incentives and selective psychological incentives. First, selective economic incentives may be defined as extra payment when participating and monetary sanctions when objecting (e.g. funding for solar panels or extra payment for collecting non-separated garbage) (Olson, 1977). Besides direct or tangible financial impacts this study acknowledges time as selective economic incentive as well since time has to be invested or may be gained by contributing (e.g. recycling takes time or using public transportation may save time in traffic). The second dimension, selective social incentives, are described to be positive or negative changes in relationship to or with other people (e.g. respect from your friends and family for driving a hybrid car or disapproval and criticism from your neighbours when polluting the communal park). Finally, selective psychological incentives are defined as the internal feeling of doing the right thing (e.g. voluntarily cleaning litter on beaches giving the individual the feeling of doing it right or driving an old polluting car with a guilt feeling). Olson argues selective incentives increase the individual benefits so it exceeds the costs ($V_i > C$). In this way, members of a latent group will contribute to a cleaner environment, whereby selective incentives could suit as a possible solution to the problem of collective action.

Presumably, these positive and negative selective incentives encourage individuals to preserve energy and recycle. For example, individuals may experience negative selective social incentives, such as anger and disapproval from friends and family when littering the park. Contrariwise, individuals can experience positive selective economic incentives such as financial benefits when preserving energy. We therefore argue if these selective incentives (positive or negative) are strong enough, someone will behave in a pro-environmental way. These assumptions lead to the following hypotheses:

H2: *Experiencing selective economic incentives positively affects environmental behaviour.*

H3: *Experiencing selective social incentives positively affects environmental behaviour.*

H4: *Experiencing selective psychological incentives positively affects environmental behaviour.*

2.3. Support for environmental policies.

Besides the selective incentives theorized by Olson (1977), this study distinguishes one other possible solution to overcome the collective action problem, namely the implementation of policies. Brennan (2009) emphasizes the importance of policies and states that selective incentives are not strong enough to encourage individuals, in which people will always have the temptation to defect. He beliefs that, in order to overcome this problem interference of national or supranational governments is necessary.

Hobbes (1651) was one of the first scholars to point out the importance of governments in regard to free-riding behaviour. He believes that in a world without regulation of the state, each person would have the right to do everything. He refers to this condition as *the state of nature* which would lead to a war of all against all (Hobbes, 1651). However, he states that collective contracts (i.e. policies), which force all individuals to contribute, would solve this. Moreover, Brennan (2009) and Samuelson (1954) elaborate on the benefits that all individuals receive by the creation of these explicit collective contracts. They state that these policies or collective contracts more or less force people to contribute, which makes this stronger than selective incentives. Additionally, Dawes, McTavish and Shaklee (1976) argue that before the enforcement of policies free-rider behaviour was almost always beneficial, since individuals could not contribute, but still benefit. However, defecting when environmental policies are enforced, is strongly connected to sanctions and costs. Therefore, when social contracts are established (i.e. policies are implemented), individual costs will shift from defecting to contributing.

However, before environmental policies are to be successfully implemented, governments need support for these policies from society (Downs, 1957). Poortinga, Steg & Vlek (2004, p.76) define policy support as "*the tacit endorsement of, or willingness to accept measures and regulations*". They argue that policy support contributes to the successful

implementation of environmental policies, since citizens only support policies and vote for parties they believe are beneficial to them and the public good. Moreover, Hobbes (1651) and Brennan (2009) state that people are willing to give up the capacity to defect if others do as well, since people have self-preservation. Moreover, they state when people receive benefits from the public good, a cleaner environment, people are willing to give up the right to free-ride, if others do as well. In other words, if people benefit more from a cleaner environment, they are more likely give support to environmental policies that enforces them, but also others to contribute. In line with the above, the following hypothesis is considered:

> H5: *The more an individual benefits from a cleaner environment, the more he will support environmental policies.*

2.4 Time preferences, environmental behaviour and support for environmental policies

In addition to solve the problem of collective action and ensure everyone's contribution to a cleaner environment, this study underscores the importance of time preferences. Time preferences are important to consider, since changes in micro-level behaviour yield issues in immediate and long-term consequences (Nordlund & Garvill, 2002; Hardisty & Weber, 2009). When individuals contribute to a cleaner environment, these benefits are not necessarily directly visible to them, since most of these benefits lie in the future, whereas the costs may be visible now (e.g. investing time, effort, and sometimes money) (Nordlund & Garvill, 2002). For example, the environmental benefits of driving electric cars may not be visible to the drivers in the present, but the lower emissions of greenhouse gases will contribute to a cleaner environment in the future. Hardhaus (2015) states that this 'invisibility' has impact on free-rider behaviour. However, we may not ignore altruism. People are not solely concerned for themselves and think about their impact for future generations (Steg and Vlek, 2009; Kollmuss & Agyeman, 2002). Many academic researchers investigated this trade-off in relation to intertemporal decision-making (Frederick, Loewenstein & O'Donoghue, 2002; Zauberman, Kyu Kim, Malkoc & Bettman, 2009; Hardisty & Weber, 2009; Heilmann, 2008). To study the effect of time on micro-level behaviour we need to define this concept. Some scholars use the term *time preferences* (Hardisty & Weber, 2009), while others prefer the term *time discounting* (Heilmann, 2008). These concepts are highly intertwined. This study will adopt the term *time preferences*, since this study focuses on environmental outcomes and therefore on the extent to which people prefer future outcomes more than immediate outcomes or the other way around.

Enzler (2015) also emphasizes the importance of including time when studying environmental behaviour. She introduces immediate as well as future orientation as predictors of environmental behaviour and focuses on macro-outcomes. She found that both immediate and future outcomes are predictors of pro-environmental behaviour. Besides Enzler, there are more scholars who emphasize the relevance of future orientation as a predictor of behaviour (Lasane & O'Donnell, 2005; Zimbardo & Boyd, 1999). They argue that these individuals generally set long-term goals, and therefore consider long-term consequences of their behaviour. Considering the effect of collective benefits on environmental behaviour, we assume that people who benefit more from a cleaner environment, will behave more environmentally friendly. Moreover, we believe that if people who benefit more from a cleaner environment and are future-oriented, will behave even more environmentally friendly.

However, there are also researchers who focus on short-term minded individuals (Heal, 2007; Graham, 2007). They state that individuals prefer benefits now rather than receiving benefits in the future, and present costs are valued higher than the costs in the future (Guth, 2009). This concept is also supported by Hardisty and Weber (2009). Additionally, they state that individuals downgrade the value of large outcomes less than small ones. Moreover, Hardisty and Weber (2009) distinguished between different goals or benefits, namely: environmental and financial goals, and the different effects of time preferences on these matters. They found that information on how much someone downgrades the value of monetary gains allows one to predict how much they downgrades the value of environmental gains. Hardisty and Weber (2009) argue that monetary gains is a predictor for environmental gains, since impatience and concern for future uncertainty are major drivers of time preferences in general. They therefore emphasize that outcomes of financial time preferences should be applicable in regard to the environment and environmental policies.

The impact of time preferences is also suitable for support for environmental policies, since environmental policy outcomes are considered to be long-term (Hanley & Spash, 2009). Once a policy is implemented, people first have to follow this environmental policy, but the outcomes of this imposed behaviour is only visible in the further future (Lasane & O'Donnell, 2005). This may lead to costs in the present and benefits in the future. We earlier assumed that the more a person benefits from a cleaner environment, the more he or she will support environmental policies. Additionally, this mechanism is considered to be stronger if people are future-oriented.

Altogether we assume that future-oriented individuals are more likely to value future environmental benefits more than short-term minded individuals. This implies that the effect of individual benefits from a cleaner environment on behaving environmentally friendly will be stronger for individuals who value future outcomes more. We assume that this idea also holds for support for environmental policies. This leads to the following hypotheses:

H6: *The effect that the more an individual benefits from a cleaner environment the more he behaves environmentally friendly will be stronger for individuals who value future outcomes more.*

H7: *The effect that the more an individual benefits from a cleaner environment the environmental policies he supports will be stronger for individuals who value future outcomes more.*

In order to provide a good overview of our hypotheses, figures 1 and 2 present a schematic visual summary of the expected relations.

Figure 1. Effects of collective benefits, moderated by time preferences, and selective incentives on preserving energy and recycling behaviour.

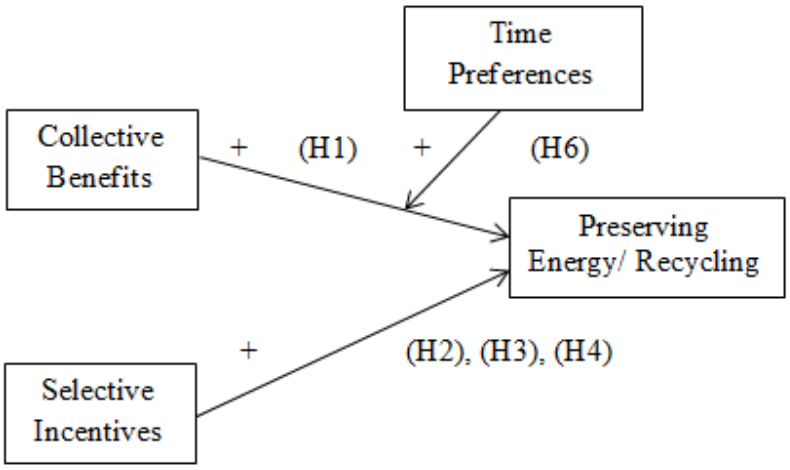
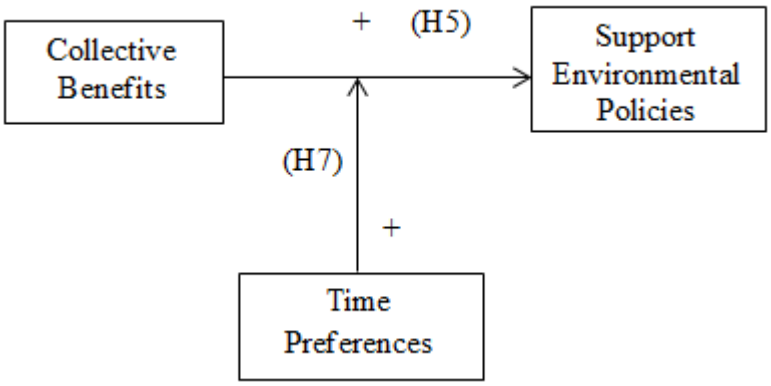


Figure 2. Effects of collective benefits, moderated by time preferences on support for environmental policies.



3. Data and Methods

This section provides information about the data collection, operationalisation, and methods used for analyses. As shown in figures 1 and 2, there are expected relations between collective benefits on both environmental behaviour (i.e. preserving energy and recycling) and support for environmental policies. Selective incentives have solely a predictive effect on environmental behaviour. Environmental behaviour and support for environmental policies can be seen as our dependent variables, whereas collective benefits and selective incentives are our independent variables. As argued in the theoretical section, time preferences is expected to have a moderating effect on the effect of collective benefits on environmental behaviour and support for environmental policies.

3.1. Data collection

We will use data of the 'Swiss Environmental Survey 2007' conducted between November 2006 and March 2007 (n=3,369). This dataset was introduced to respondents as a research into living conditions in Switzerland and not as an environmental study. In this way the researchers avoided an unequal distribution of persons with a stronger interest in environmental issues and persons with little interest in such issues[3]. Also, questions on people's opinion about the environment, environmental behaviour, and other environment-

[3] The outcomes will be better generalizable to the general population, which leads to less validity problems.

related questions were included. Unfortunately, the follow-up survey (conducted in 2010-2011) was not yet available[4].

The data collection for the 'Swiss Environmental Survey 2007' study was conducted by the LINK Institute in Switzerland through random phone interviews. The sample was obtained by a two-stage sample design. In the first step, households were selected randomly from regional strata (stratified by the Swiss cantons) and notified by mail. In the second step, one respondent was selected randomly from all household members older than the age of 18 and able to respond in German, Italian or French. At the end of the phone interviews, respondents were asked if they were willing to fill in a paper survey. The questions of the paper survey provide more insight on people's living situation, people's mobility, and opinions regarding various themes. Among the respondents, approximately 44% is male and 56% female.

3.2. Dependent variables

3.2.1. Preserving Energy

Preserving energy is our first measure for environmental behaviour. The dataset provides multiple questions on this matter. However, since these questions address and measure different kinds of energy saving behaviour, we decided to include them separately in our analyses. The first variable that will be included in our analyses is 'turning off the TV', where 1 means 'only with remote control', 2 is 'with remote control, but I have an eco-saver', and 3 'completely turn off the TV'. The second variable we will use is 'turning off the lights' with response categories varying from 1 'no, never' to 4 'yes, always'. Lastly, the variable 'usage of energy-saving lights (CFL's)' will be used and has 3 response categories where 1 is 'no, none', 2 'yes, some', and 3 'yes, predominantly'.

3.2.2. Recycling behaviour

The second dependent variable on environmental behaviour is recycling behaviour. The dataset provides a set of 7 items which measure recycling behaviour in 7 domains, namely glass, paper, batteries, aluminium, tins, provisions, and plastic bottles. All seven variables have the same response categories, varying from 0 'no', 1 'yes', and 2 'the household does not consume this product'. Computing a scale with factor analysis is not applicable on such

[4] Note: The other dataset is the follow-up survey "Swiss Environmental Survey 2007" conducted in 2010-2011 (n= 1.945). 2.517 original respondents of the 2006-2007 wave were contacted again, since some addresses could not be recovered and some respondents indicated that they did not wanted to be contacted again in the future.

items where 2 means that the household does not consume the product. We do believe, however, that it is important to include all these items to get an indication on the amount of goods a household recycles. Therefore, we computed a variable that indicates the percentage of the products a respondent recycles among the respondents that do or do not recycle the product. In this way, if someone answered on one item 'the household does not consume this product', he will still be included when he answered on the other products that the household does or does not recycle it.

3.2.3. Support for environmental policies

Our third dependent variable is 'support for environmental policies'. The dataset provides a set of 8 possible environmental policies on which respondents indicate to what extent they support these policies, namely: 'soot filter requirement for new diesel cars', 'road fees when entering city centre', compulsory taxes on petrol and diesel cars for reducing greenhouse gases', 'no expansion of existing nuclear plants and no start-ups of new one's', 'limiting maximum speed on highways to 100 km/h', 'temporary reduction of speed limit to 80 km/h on the highways to reduce fine dust in the winter', 'temporary reduction of speed limit to 80 km/h on highways to reduce ozone pollution in the summer', and 'increasing parking fees in cities'. All items have Likert-scale response categories varying from 1 'totally disagree' to 5 'totally agree'. Edquist, Hommen & Tsipouri (2000) emphasize the differences in direct and indirect policies, where direct policies have immediate impact on your daily life and indirect policies are not immediately noticeable for individuals. The dataset provides one item that measures indirect environmental policies (no expansion of existing nuclear plants and no start-ups of new one's'), and seven policies that could be directly noticeable for persons. Since there is solely one item that measures indirect policies, we decided to only look at direct environmental policies. We want to compute a scale for these items that indicates the degree of support for environmental policies of the individual. However, six out of these seven items concern car drivers in general and one item solely concerns future diesel car drivers. We therefore believe that the outcome of this item can differ from the others, since people who will not be affected by this policy may easily support this policy. A factor analysis, principal axis factoring[5] confirmed this expectation and showed two components with an eigenvalue higher than 1 (see appendix 1). The factor matrix showed low factor loadings on the item 'soot filter requirement for new diesel cars'. The second factor analysis

[5] Principal axis factoring is chosen, since we follow a conceptual approach instead of, for example, solely data reduction (Principal component).

without this item showed one explaining factor with an eigenvalue higher than 1, explaining almost 60% of the variance (see appendix 2). The reliability analysis showed a Cronbach's alpha of .860 (see appendix 3), which indicates a good internal consistency (Bland & Altman, 1997). To make up our scale, we take the mean of all the variables left in the reliability analysis.

3.3. Independent variables

3.3.1 Collective Benefits

As argued in the theoretical framework, we aim to measure individual net benefits from the public good, a cleaner environment, when it is provided. However, this dataset does not provide such information. Therefore, items are included that measure individual values regarding the public good[6]. The items focus on whether the respondent believes something has to change in order to establish a cleaner environment. We include the items that concern the environment in general. The items concern opinions about 'if we continue like this, we are heading to an environmental disaster', 'there are limits of growth, where our industrialized world is already exceeded or will be soon', politicians do too little in protecting the environment', 'in favour of the environment, we should all be prepared to our limit our current life standard', and 'environmental protection measures should be also enforced even if jobs will be lost'. All items have Likert-scale response categories varying from 1 'totally disagree' to 5 'totally agree'. A factor analysis, principal axis factoring showed one factor with an eigenvalue higher than 1, explaining 44.4% of the total variance (see appendix 4). A reliability analysis showed a Cronbach's alpha of .683 (see appendix 5), which implies an acceptable amount of internal consistency (Bland & Altman, 1997). Eventually, a scale was created by taking the mean of the items left in the reliability analysis.

3.3.2. Moderating effect of Time Preferences

We expect a moderating effect of time preferences on the effect of collective benefits on environmental behaviour and support for environmental policies. The information the dataset provides is a variation of the same question on whether the respondent prefers 1000 francs immediately or more than 1000 francs in a year[7]. The amount of money that could be gained

[6] Referring to the equation in the theoretical framework, we ideally would like to measure the *Ai*, however, since the dataset solely provides values on the public good of a cleaner environment, we measure the *Vi*. The idea remains the same: when *Vi* is high enough, *Ai* will be high too, whereby individuals will contribute.

[7] As previously discussed, Hardisty and Weber (2009), stated that outcomes on monetary time preferences allow to predict environmental time preferences.

in a year varies from 1000 to 10 francs. We believe that people who consider (only) ten francs as sufficient compensation for waiting a year are likely to value long-term outcomes more than people who would require a compensation of, for example, 500 francs. In order to see how many respondents stop at each point, a ratio variable of time preferences was created that varies from 0 ‘take 1000 francs now’ to 10 ‘take 10 francs in a year’, where the amount of money one can receive in a year declines with each step.

3.3.3. Selective Incentives

According to Olson (1977) selective incentives accounts for a possible solution to the collective action problem. In the theoretical framework, a distinction is made between economic, social, and psychological incentives.

3.3.3.1. Selective economic incentives

Selective economic incentives were defined as extra payment when contributing to the public good and monetary sanctions when abstaining from making a contribution (Olson, 1977). Besides direct or tangible financial impacts, time is also considered as economic incentive (Lindbeck, Nyberg and Weibull, 1999). Ideally, we would like to express all contributions and sanctions in monetary terms. However, such items are not provided in the dataset. We will therefore use monthly nett income of the individual, since individual, monthly income differs among people which implies it is selective. We believe that persons with a higher income are more capable of investing in environmental behaviour (e.g. being capable of buying energy saving lights). Furthermore, we will include the variable ‘time’, since behaving environmentally friendly is generally time consuming (Nordlund & Garvill, 2002). Two items are used to measure this construct of time. First the number of children of the respondent will be included, where the response categories vary from 1 ’10 children’ to 10 ‘no children’. Moreover, we include whether respondents are employed or not, where 0 means ‘do have a job’ and 1 ‘do not have a job’. These items indicate the disposable time of respondents.

3.3.3.2. Selective social incentives

In section 2.2, we defined selective social incentives as positive or negative changes in relations with other people. Ideally, we would measure how often and what kind of positive or negative pressure third parties exercise on people regarding environmental behaviour. This dataset does not provide such items. Accordingly, we will use as a proxy, namely: the extent of contact with neighbours, family, and friends. The dataset provides two variables that

indicates this, namely ‘how often do you see your neighbours’, varying from 1 ’no contact’ to 5 ‘a lot of contact’, and ‘how often do you see your friends/family’, varying from 1 ‘never’ to 7 ‘everyday’.

3.3.3.3. Selective psychological incentives

Finally, selective psychological incentives are defined as the internal feeling of doing the ‘right’ thing. Ideally, this study would include variables that measure this feeling when contributing to a cleaner environment. The dataset, however, does not provide such variables. Instead, it does contain items that indicate the internal feeling of someone in regard to the environment, with the idea that someone who feels strongly about environmental issues, are more receptive toward the feeling of doing the ‘right’ thing. The items that are included are: ‘getting angry when I see or hear about environmental problems’, and ‘I believe that environmental problems are strongly exaggerated’. Both items have Likert-scale response categories varying from 1 ’totally disagree’ to 5 ’totally agree’.

3.7. Control Variables

The following control variables will be included in the analyses: gender, age, education, and environmental knowledge.

Firstly, we believe support for environmental policies and environmental behaviour could differ among males and females, among different ages, and among different educational levels. The study of Straughan and Roberts (1999) showed a significant connection between gender, as well as age and level of education on ecological conscious consumer behaviour (ECCB). We assume that not only ECCB could be influenced by these variables, but also other types of environmental behaviour, such as recycling and preserving energy. Regarding education, this study includes the item that is already categorised according to the International Standard Classification of Occupations (ISCO). The response categories are 1 ‘primary education’, 2 ‘secondary education’, 3 ’higher education, no university’, and 4 ‘university or postdoc’.

Furthermore, regarding environmental knowledge, Green-Demers, Pelletier, and Ménard (1997) state that this construct alone does not suffice as an explanation for environmental behaviours. However, the extent of one’s knowledge of environmental issues and what does or does not contribute to a cleaner environment might affect an individual’s decision regarding environmental behaviour or support for environmental policies. After all,

if a person for example does not know what the impact of recycling is on the environment, it is more likely he will not recycle.

Table 1. Descriptive statistics of all included variables.

Variable	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Dependent				
Use of energy saving lights	1.93	0.74	1.00	3.00
Turning off the TV	2.35	0.93	1.00	3.00
Turning off the lights	3.13	0.88	1.00	4.00
Recycling behaviour	89.45	14.97	0.00	100.00
Support environmental policies	2.95	1.04	1.00	5.00
Independent				
Collective benefits	3.76	0.71	1.40	5.00
Time preferences	1.96	3.11	0.00	10.00
Selective Incentives				
- Economic				
Income	4.05	2.31	0.00	20.00
Number of children	8.56	1.34	4.00	10.00
Not Employed	0.35	0.48	0.00	1.00
- Social				
Contact with neighbours	3.28	0.94	1.00	5.00
Contact with friends and family	4.89	1.23	1.00	7.00
- Psychological				
Getting angry	3.60	1.15	1.00	5.00
Environmental problems are not exaggerated	3.27	1.29	1.00	5.00
Control				
Gender	0.63	0.48	0.00	1.00
Age	50.99	17.11	18.00	94.00
Education	2.56	0.81	1.00	4.00
Environmental knowledge	2.17	1.15	0.00	5.00
Valid N	1108			

3.9. Analytical strategy

This study will conduct ordinary least squares (OLS) multiple regression analyses in order to measure the effect of our independent variables on environmental behaviour (preserving energy and recycling behaviour) and support for environmental policies[8].

[8] We considered measuring the items on 'preserving energy' with logistic regression analysis, since the dependent variables are discrete. However, after careful consideration we decided to conduct the OLS regression analysis, since the outcomes will not differ greatly and we do not possess the statistical knowledge to correctly conduct this analysis. The analysis we now conduct is sometimes described as the 'linear probability model' (Horrace & Oaxaca, 2005). Standard errors will be slightly biased, hence we interpret the results cautiously.

The first three analyses measure the effect of independent variables on preserving energy (usage of energy saving lights, turning off the TV, and turning off the lights). Each multiple regression analysis consists of two models, where the first model includes the main effects of collective benefits and time preferences, selective incentives, and the control variables. In the second model, the interaction effect of collective benefits and time preferences will be included. The fourth multiple regression analysis on recycling behaviour holds the same methodological design as preserving energy.

The last multiple regression analysis regarding support for environmental policies also consists of two models. Here, the first model includes the main effects of collective benefits and time preferences, and the control variables. The second model will also include the interaction effect of collective benefits and time preferences. In all analyses we will check for possible multicollinearity problems with VIF measures[9]. The tables in appendix 6 show that the variables meet the criteria and no problems of multicollinearity occur.

4. Results

4.1. Preserving Energy

Our first analysis assesses the effect of independent variables on preserving energy, consisting of two models. We use multiple items to measure preserving energy: 'using energy saving lights', 'turning off the TV', and 'turning off the lights'. The results of these analyses are presented in table 2.

The first model for the variable 'use of energy saving lights' that includes the main effects of collective benefits and time preferences, selective incentives, and the control variables is significant (R^2=.021, F(13, 1427)= 3.415, p<.001). Within this model, the effect of collective benefits (b=0.053, t=1.729, p=.084/2) is significant. We thus found evidence that the more someone values a cleaner environment has a positive effect on the use of energy saving lights. No evidence is found that supports the effect of selective economic incentives. From the selective social incentives, only contact with your neighbours (b=0.056, t=2.720, p=.007/2) has a significant effect. This implies that more contact with neighbours shows to have a positive influence on the use of energy saving lights. The selective psychological

[9] As a rule of thumb, VIF's greater than 10 indicate that variables could be considered as a linear combination of other independent variables (Myers, 1990).

incentive, measured by the feeling that environmental problems are not exaggerated is significant as well (b=0.032, t=1.976, p=.048/2), which indicates that the more you feel that environmental problems are not exaggerated, this has a positive influence on the use of energy saving lights. Moreover, the control variable age shows a significant effect. The second model, with the addition of the interaction effect of collective benefits and time preference, is not significant (ΔR^2=.002, ΔF(1, 1426)=2.690, p 2s=.101).

The first model for the variable 'turning off the TV' again includes all variables, except the interaction effect. This model showed to be significant (R^2=.031, F(13, 1126)= 3.812, p<.001). Within this model, the effect of collective benefits (b=0.154, t=3.565, p<.001/2) is significant. We thus found evidence that more someone values a cleaner environment has a positive effect on turning off the TV. Regarding selective economic incentives, nothing seemed to be significant. Within the selective social incentives, contact with your neighbours (b=0.081, t=2.801, p=.005/2) and contact with your friends and family (b=0.035, t=1.570, p=.117/2) show to be significant. This implies that more contact with both, neighbours, and family and friends has a positive impact on turning off the TV. With regard to the selective psychological incentives, the item of the feeling that environmental problems are not exaggerated proves to be significant (b=0.032, t=1.378, p=.169/2). This means that the stronger the internal feeling that environmental problems are not exaggerated at all has a positive effect on turning off the TV. Furthermore, the control variable age has a significant effect. The second model, with the addition of the interaction effect of collective benefits and time preference, is not significant (ΔR^2=.000, ΔF(1, 1125)=0.026, p=.872).

Finally, the model regarding variable 'turning off the lights' that includes all variables, except for the interaction effect showed that this model holds significant factors (R^2=.013, F(13, 1210)= 2.207, p<.008). However, solely the control variables gender and age have a significant effect and none of our independent variables. The second model, with the addition of the interaction effect of collective benefits and time preferences, is not significant (ΔR^2=.000 ΔF(1, 1209)=0.204, p=.652).

Table 2. Results OLS multiple regression analysis of the effects on preserving energy.

	Use of energy saving lights				Turning off the TV				Turning off the lights			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	B	SE(B)	B	SE(B)	B	SE(B)	B	SE(B)	B	SE(B)	B	SE(B)
Collective benefits	0.053**	0.030	0.047*	0.031	0.154***	0.043	0.153***	0.043	0.011	0.039	0.009	0.040
Time preferences	0.008	0.006	0.009*	0.006	-0.001	0.009	-0.001	0.009	0.007	0.008	0.007	0.008
Income	-0.022	0.010	-0.023	0.010	-0.018	0.014	-0.018	0.014	-0.022	0.013	-0.022	0.013
Number of children	-0.038	0.016	-0.037	0.016	0.028	0.023	0.028	0.023	-0.009	0.020	-0.009	0.020
Not employed	-0.127	0.058	-0.126	0.058	-0.045	0.079	-0.045	0.079	-0.048	0.072	-0.048	0.072
Contact with neighbours	0.056**	0.021	0.057**	0.021	0.081**	0.029	0.081**	0.029	0.015	0.027	0.015	0.027
Contact with friends and family	-0.005	0.016	-0.005	0.016	0.035*	0.023	0.035*	0.023	0.010	0.021	0.010	0.021
Getting angry	0.016	0.018	0.017	0.018	-0.019	0.026	-0.019	0.026	-0.041	0.023	-0.041	0.023
Environmental problems not exaggerated	0.032**	0.016	0.034**	0.016	0.032*	0.023	0.032*	0.023	0.018	0.021	0.018	0.021
Gender	0.007	0.043	0.004	0.043	-0.018	0.061	-0.018	0.061	-0.118**	0.056	-0.119**	0.056
Age	0.003*	0.002	0.003*	0.002	0.008**	0.002	0.008**	0.002	0.007**	0.002	0.007**	0.002
Education	0.038	0.026	0.039	0.026	0.012	0.036	0.012	0.037	-0.002	0.033	-0.002	0.033
Environmental knowledge	0.004	0.018	0.004	0.018	0.039	0.025	0.039*	0.025	-0.018	0.023	-0.018	0.023
Collective benefits x Time preferences			-0.015	0.009			-0.002	0.012			-0.005	0.011
Constant	1.472		1.477		1.639		1.639		3.028		3.029	
R^2	0.021		0.022		0.031		0.030		0.013		0.012	
N	1440		1440		1139		1139		1223		1223	

** p=.10, ** p=.05, *** p<.001*

4.2. Recycling behaviour

This analysis measures the effects of the independent variables on recycling behaviour. The results are presented in table 3. The first model on the effect of all independent variables and control variables, except the interaction effect, is significant (R^2=.079, F(13, 1447)=10.634, p<.001). Within this model, the effect of collective benefits is significant (b=1.211, t=2.004 p=.045/2). This implies that the more someone values a cleaner environment, the more household products are recycled. Regarding selective economic incentives, nothing seemed to be significant. From the selective social incentives, only contact with your neighbours (b=2.772, t=6.769, p<.001/2) has a significant effect. This shows that the more someone has contact with his neighbours, the more household products are recycled. The selective psychological incentive about getting angry when seeing or hearing about environmental problems (b=0.734, t=2.066, p=.039/2) holds a significant effect. This implies that the more someone is getting angry when seeing or hearing about environmental problems, the more household products are recycled. Moreover, the control variables age and environmental knowledge have a significant effect. The second model, which adds the interaction-effect of collective benefits and time preferences is not a significant predictor of recycling behaviour (ΔR^2=.001, ΔF(1, 1446)=1.227, p 2s=.268).

4.3 Support for environmental policies

This third multiple regression analysis regarding support for environmental policies, also consists of two models. The results of these analyses are presented in table 3. The first model, that includes the main effects of collective benefits and time preferences, and the control variables is significant (R^2=.243, F(6, 2442)=131.690, p<.001). Within this first model, the effect of collective benefits proves to be a significant factor (b=0.570, t=22.314, p<.001/2). This implies that the more someone values a cleaner environment, the environmental policies someone supports. Moreover, all control variables have a significant effect on support for environmental policies. Model two, which adds the interaction effect of collective benefits and time preferences is not significant (ΔR^2=.000, ΔF(1, 2441)=0.873, p=.350).

Table 3. Results OLS multiple regression analysis of the effects on recycling behaviour and support for environmental policies.

	Recycling				Support for environmental policies			
	Model 1		Model 2		Model 1		Model 2	
	B	SE(B)	B	SE(B)	B	SE(B)	B	SE(B)
Collective benefits	1.211**	0.604	1.133**	0.608	0.570***	0.026	0.569***	0.026
Time preferences	0.004	0.128	0.021	0.129	-0.007	0.006	-0.007	0.006
Income	-0.474	0.197	-0.487	0.198				
Number of children	-1.221	0.317	-1.212	0.317				
Not employed	-0.466	1.143	-0.450	1.143				
Contact with neighbours	2.772***	0.410	2.779***	0.410				
Contact with friends and family	-0.605	0.316	-0.602	0.316				
Getting angry	0.734**	0.355	0.739**	0.355				
Environmental problems not exaggerated	-0.496	0.326	-0.474	0.326				
Gender	-0.060	0.857	-0.100	0.858	0.309***	0.038	0.308***	0.039
Age	0.086**	0.033	0.086**	0.033	0.010***	0.001	0.010***	0.001
Education	0.067	0.509	0.074	0.509	0.143***	0.023	0.143***	0.023
Environmental knowledge	0.901**	0.351	0.905**	0.351	0.099***	0.017	0.099***	0.017
Collective benefits x Time preferences			-0.199	0.180			0.007	0.008
Constant	72.463		72.551		1.639		1.640	
R^2	0.079		0.079		0.243		0.243	
N	1460		1460		2448		2448	

** p=.10, ** p=.05, *** p<.001*

4.4. Additional analyses

We conducted some additional analyses with extra variables that we find interesting to consider. To explain 'use of energy saving lights', and 'recycling', we fitted models with nett, monthly household income rather than individual income, since recycling behaviour as well as the use of energy saving lights are likely household decisions. For example, the respondent may not want to recycle, but his partner would. The multiple OLS regression analyses show that nett monthly household income does not have a significant effect on the use of energy saving lights. For recycling behaviour, however, we do see that nett, monthly household income has a significant effect on the amount of products a household recycles. It shows the higher the monthly household income, the more products are recycled. Also, we look at the effect of having a child younger than the age of 12 on the four items of environmental behaviour, since young children are likely to be time consuming. The multiple OLS regression analyses show solely a significant effect of this dummy-variable on turning of the lights. This effect is positive, which implies that persons with children younger than the age of 12 turn off the lights more often.

For our dependent variable 'support for environmental policies', we were curious if the extent of trust in political parties would have an effect. Trust in political parties could influence possible support for environmental policies, since the respondent may lack trust that some policies will be implemented. It seems that trust in political parties does have a significant effect on support for environmental policies, where more trust leads to more environmental policies that are supported. We also expected that the effect of collective benefits on support for environmental policies would be stronger for persons who have more trust in political parties. However, the regression analysis did not show a significant effect on this moderation effect.

Lastly, we would like to control for education of the partner[10]. This factor could influence environmental behaviour of the respondent by sharing knowledge about the environment or doing it for them. The multiple regression analyses showed only a significant effect on support for environmental policies, where a higher education of the partner leads to more environmental policies that are supported.

[10] The response categories of this item differs from the educational level of the respondent himself, since this item does not concern the international classification, but the Swiss classification. The international classification for educational level of the partner was not provided by the dataset.

5. Conclusion and Discussion

5.1 Conclusion

The main aim of this study was to get insights in micro-level environmental behaviour and support for environmental policies by answering our research question: What influences environmental behaviour and support for environmental policies? We assumed collective benefits would affect both, environmental behaviour and support for environmental policies. Moreover, we expected based on Olson's theory of collective action (1977) that selective incentives would also positively influence environmental behaviour. Additionally, we looked to what extent environmental behaviour and support for environmental policies are affected by time preferences. We examined these predictions with the use of data from the 'Swiss Environmental Survey 2007'.

To begin with, our results showed some support for our hypotheses. First of all, we found evidence of our expectation, that collective benefits of a cleaner environment increase both environmental behaviour (H1) and support for environmental policies (H5). Collective benefits influence three of the four indicators of environmental behaviour; using energy saving lights, turning off the TV and recycling behaviour, but not for turning of the lights. A possible explanation may be that benefits from turning off lights are perceived as very small. Nonetheless, we may state that collective benefits influence environmental behaviour, which is in line with Olson's group theory and equation (1977). He states that when an individual gains enough benefits from the public good, he or she will contribute ($A_i > 0$). The results imply that when people receive enough benefits from a cleaner environment, they are willing to contribute by using energy saving lights, turning off the TV and recycling. Moreover, collective benefits also proved to have a convincing effect on support for environmental policies. This is in line with Hobbes (1651) and Brennan (2009), who state that people are willing to give up their chance to free ride when they benefit from the thereby established situation. Therefore, the findings indicate that people are willing to give up their change to defect on contributing to a cleaner environment, if they will receive benefits from a cleaner environment. Besides these results, we conducted additional analyses. Among other things, these analyses showed that trust in political parties and the level of education of the partner, both positively affected support for environmental policies. We could argue that people who do not trust political parties, are not willing to give up their chance to free ride since they do not belief political parties and others will hold their end of the social contract. With regard to

the level of education of the partner, we could argue this m increase environmental knowledge and disposable income in the household.

Secondly, we found marginal support of the influence of selective incentives on environmental behaviour. To begin with, we expected selective economic incentives to positively influence on environmental behaviour (H2). We did not find any support for this hypothesis. Individual net income does not positively influence environmental behaviour. Peculiar is that, the additional analysis showed household net income appears to positively influence recycling behaviour. This could be explained by the fact that recycling is a household task instead of an individual task. With regard to the disposable time, the number of children and the effect of not being employed, did not influence environmental behaviour positively. We could argue that having more disposable time (less children and no job), does not lead to more environmental behaviour. With regard to selective social incentives, we found partial evidence of our expectation that social selective incentives would positively influence environmental behaviour (H3). How often you see your neighbours positively influences three of the four indicators of environmental behaviour; using energy saving lights, turning off the TV and recycling behaviour, but not for turning of the lights. Regarding recycling behaviour, this may be explained by the visibility. Since recycling bins are often placed in neighbourhoods, it may be possible that neighbours notice when someone recycles. The frequency you see your friends and family solely influences turning off the TV. Lastly, we found marginal evidence of our hypothesis expecting selective psychological incentives to have a positive effect on environmental behaviour (H4). Getting angry about environmental problems when seeing or hearing about them positively influences recycling behaviour. The extent of which you feel environmental problems are not exaggerated positively influences using energy saving lights and turning off the TV. A possible explanation for these two outcomes may be that recycling behaviour, using energy saving lights and turning off the TV seem to have a larger impact on the environment. All together the results of selective incentives are somewhat contradictory to Olson's theory (1997). He stated that selective incentives are necessary to solve the problem of collective action, by motivating individuals to contribute. However, since we only found partial support for selective social incentives, marginal support for selective psychological incentives and no support at all for selective economic incentives, we could argue they are not always strong enough, to motivate people to contribute.

Lastly, we argued that time preferences moderate the impact of collective benefits on environmental behaviour and on support for environmental policies (H6 & H7). Both of these

hypotheses are not supported. An explanation for this might be found in the methodology. We measured collective benefits as values towards the environment, which probably already includes a time component. Therefore the measurement of collective benefits may imbricate with the measurement of time preferences. Due to this operationalization error we are not able to make any concrete statements in respect to time preferences.

5.2 Discussion

In this section, we will elaborate on possible explanations for the lack of support for some of our hypothesis, discuss possible limitations of this study, how this may affect our results or interpretations and what we recommend for further research.

In the first place, our dataset proved to be somewhat limited. Our results showed that collective benefits influence environmental behaviour and support for environmental policies. However, as earlier explained, the dataset did not contain a perfect measure of net individual benefits from the environment (A*i*), and therefore used individual values regarding a cleaner environment (V*i*). This measurement of collective benefits makes our results rather an indication of how this mechanism may work, then as concrete evidence of its effect. Consequently, our results stating that collective benefits influence environmental behaviour and support for environmental policies need to be attenuated. With regard to the measurement of support for environmental policies, we had rather good items, however, ideally we would also include policy statements on different environmental dimensions instead of focussing on cars and its emissions (e.g. recycling policies, preserving nature policies).

Secondly, our measurement of selective incentives was slightly different then Olson theorized (1977, p.23). Therefore, we had to use proxies that were slightly problematic. Initially, it was surprising selective economic incentives did not have any influence on environment behaviour. Accordingly, an explanation for this may be the operationalization of these items. Ideally we would have measured selective economic incentives by monetary contributions and sanctions, and a direct indicator of disposable time (e.g. weekly work hours). For social selective incentives we had to use a proxy as well. Ideally we would have measured how often and what kind of positive or negative pressure third parties exercise on people regarding environmental behaviour. The variables used for psychological selective incentives where again not perfectly comprehensive, since we lacked a variable containing the inner feeling of doing the right thing when behaving environmentally friendly. This may be a more accurate measure or an important additional variable since it really measures the

definition of a psychological incentive given by Olson (1977, p.23). To completely understand and get insight in the mechanism of selective incentives we recommend further research, to measure these in the way Olson theorized them.

Furthermore, an overall interesting finding was that none of the items (i.e. collective benefits, selective incentives, time preferences) seem to have a positive effect on turning off the lights. This is rather peculiar since we did not expect this finding. Perhaps a possible explanation could be that people do not associate this action with the environment or are not aware of its adverse effects. However, to really state something on this finding, additional research should focus on this type of environmental behaviour.

Finally, studying environmental behaviour could, naturally, be measured in various ways. The items we included in this study are therefore not exhaustive or generalizable to all kinds of environmental behaviour. We, for example, did not make a real distinction between individual or household environmental behaviour. Further research may want to focus on this distinction and provide insights on the level environmental behaviour choices are made. Moreover, examining and studying the moderation of time preferences on environment behaviour or support for environmental policies in a way they do not imbricate or overlap each other, would be favourable. This would provide valuable insights on the possible behavioural differences between future-oriented people and short-term minded people. Furthermore, regarding collective benefits, more extensive research may focus on different kinds of benefits people gain, and which they value most (e.g. general health benefits, better condition of surrounding nature and animal life, maintaining biodiversity better air quality etc). This may provide information for governments on how to encourage people to contribute to a cleaner environment. Altogether, additional research on this subject is necessary for further insights in the problem of collective action in context of a cleaner environment and the influence of time preferences on this matter.

After all, we answered our main research question: *What influences environmental behaviour and support for environmental policies?* We found that collective benefits influence environmental behaviour and support for environmental policies. Moreover, selective incentives marginally influence environmental behaviour. Therefore, we could state, if people receive selective social and psychological incentives they are, to some extent, encouraged to behave green. However, above all and most importantly, if people gain from the benefits of a cleaner environment, they are willing to contribute to achieve this, by behaving green and supporting environmental policies.

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Appendix 1

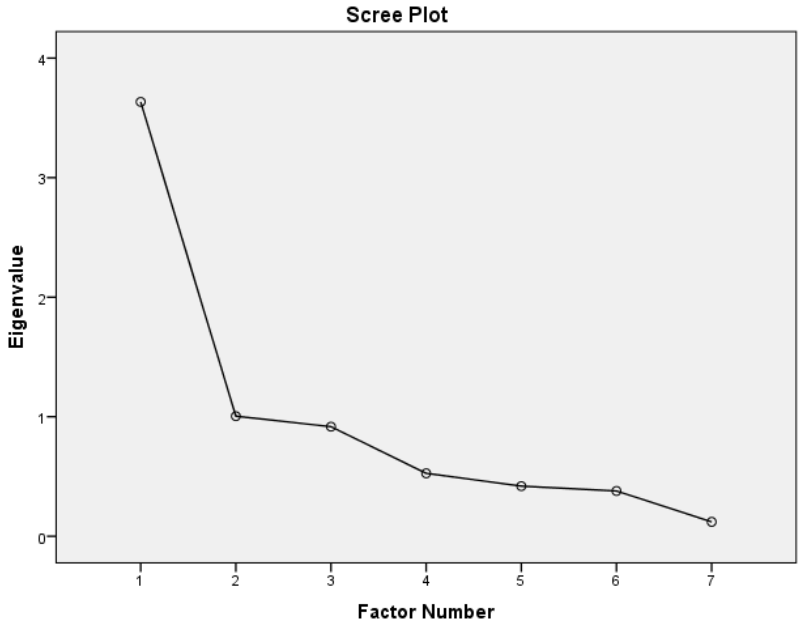
First factor analysis, principal axis factoring, for support for environmental policies.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3,634	51,914	51,914	3,305	47,217	47,217	2,931
2	1,004	14,349	66,264	,673	9,610	56,827	2,617
3	,917	13,094	79,358				
4	,526	7,520	86,878				
5	,419	5,993	92,871				
6	,379	5,412	98,283				
7	,120	1,717	100,000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.



Factor Matrix[a]

	Factor	
	1	2
supol1 Partikelfilter-Pflicht	,240	,065
supol2 Road Pricing in Stadtzentren	,658	,473
supol3 Treibstoffabgabe	,628	,265
supol5 Tempo 100 auf Autobahnen	,716	-,084
supol6 Tempo 80 auf Autobahnen zur Senkung der Feinstaubbelastung (temporär, Winter)	,861	-,368
supol7 Tempo 80 auf Autobahnen zur Senkung der Ozonbelastung (temporär, Sommer)	,864	-,368
supol8 Parkgebühr-Erhöhung in Städten	,649	,310

Extraction Method: Principal Axis Factoring.

a. 2 factors extracted. 14 iterations required.

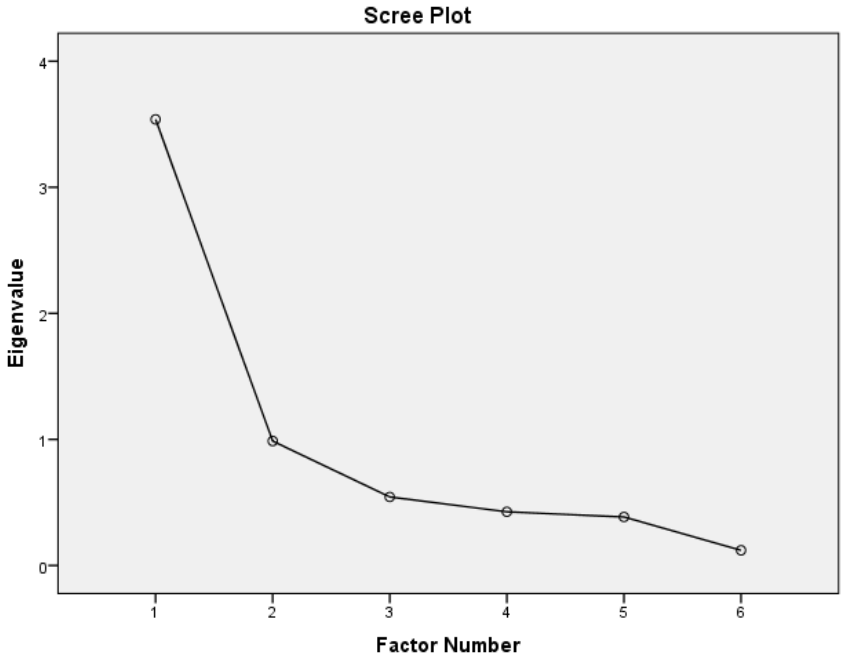
Appendix 2

Second factor analysis, principal axis factoring, for support for environmental policies.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,538	58,974	58,974	3,083	51,375	51,375
2	,987	16,451	75,425			
3	,543	9,057	84,482			
4	,426	7,097	91,579			
5	,385	6,412	97,991			
6	,121	2,009	100,000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
supol2 Road Pricing in Stadtzentren	,609
supol3 Treibstoffabgabe	,614
supol5 Tempo 100 auf Autobahnen	,740
supol6 Tempo 80 auf Autobahnen zur Senkung der Feinstaubbelastung (temporär, Winter)	,832
supol7 Tempo 80 auf Autobahnen zur Senkung der Ozonbelastung (temporär, Sommer)	,832
supol8 Parkgebühr-Erhöhung in Städten	,635

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 6 iterations required.

Appendix 3

Reliability Analysis for support for environmental policies.

Case Processing Summary

		N	%
Cases	Valid	2525	74,9
	Excluded[a]	844	25,1
	Total	3369	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,860	6

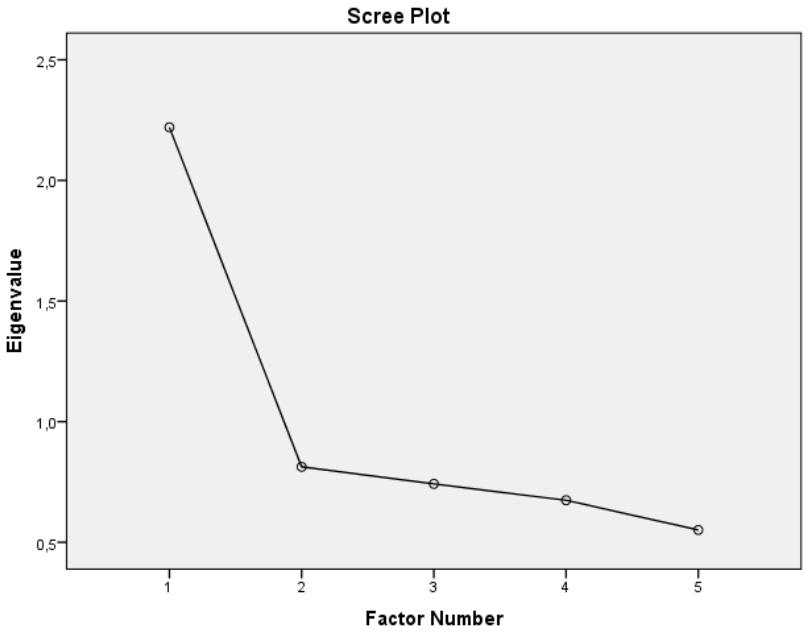
Appendix 4

Factor analysis, principal axis factoring, for collective benefits.

Total Variance Explained

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	2,220	44,403	44,403
2	,813	16,253	60,656
3	,742	14,841	75,496
4	,674	13,485	88,981
5	,551	11,019	100,000

Extraction Method: Principal Axis Factoring.



Appendix 5

Reliability analysis for collective benefits.

Case Processing Summary

		N	%
Cases	Valid	3171	94,1
	Excluded[a]	198	5,9
	Total	3369	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,683	5

Appendix 6

VIF measures for multicollinearity.

Table 1. VIF measures on use of energy saving lights.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,781	,230		7,735	,000		
	scalecollben_cen	,053	,030	,051	1,729	,084	,790	1,265
	timepref_cen	,008	,006	,034	1,270	,204	,951	1,052
	income2	-,022	,010	-,067	-2,204	,028	,738	1,355
	number of children	-,038	,016	-,069	-2,357	,019	,789	1,268
	employment status	-,127	,058	-,081	-2,200	,028	,504	1,984
	Kontakt zu Nachbarn	,056	,021	,072	2,720	,007	,979	1,022
	Verabredungen mit Freunden, Verwandten, Bekannten	-,005	,016	-,008	-,316	,752	,937	1,067
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	,016	,018	,025	,894	,371	,854	1,170
	tube7_good	,032	,016	,056	1,976	,048	,840	1,191
	Geschlecht	,007	,043	,004	,157	,875	,855	1,169
	Alter	,003	,002	,068	1,736	,083	,441	2,267
	ISCO skill level	,038	,026	,042	1,475	,140	,827	1,209
	knowledge	,004	,018	,006	,207	,836	,891	1,123
2	(Constant)	1,770	,230		7,684	,000		
	scalecollben_cen	,047	,031	,045	1,524	,128	,779	1,283
	timepref_cen	,009	,006	,039	1,463	,144	,936	1,068
	income2	-,023	,010	-,070	-2,296	,022	,736	1,359
	number of children	-,037	,016	-,068	-2,318	,021	,788	1,269
	employment status	-,126	,058	-,080	-2,187	,029	,504	1,984
	Kontakt zu Nachbarn	,057	,021	,072	2,746	,006	,978	1,022
	Verabredungen mit Freunden, Verwandten, Bekannten	-,005	,016	-,008	-,297	,766	,937	1,067
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	,017	,018	,026	,920	,358	,854	1,171
	tube7_good	,034	,016	,059	2,075	,038	,836	1,196
	Geschlecht	,004	,043	,002	,087	,931	,854	1,171
	Alter	,003	,002	,068	1,743	,082	,441	2,267
	ISCO skill level	,039	,026	,043	1,502	,133	,827	1,209
	knowledge	,004	,018	,006	,222	,824	,890	1,123
	collben_timepref	-,015	,009	-,043	-1,640	,101	,966	1,035

a. Dependent Variable: How many energy saving lights do you have?

Table 2. VIF measures on turning off the TV.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,215	,332		3,658	,000		
	scalecollben_cen	,154	,043	,118	3,565	,000	,774	1,291
	timepref_cen	-,001	,009	-,003	-,092	,927	,948	1,055
	income2	-,018	,014	-,045	-1,321	,187	,717	1,394
	number of children	,028	,023	,041	1,240	,215	,792	1,263
	employment status	-,045	,079	-,023	-,562	,574	,505	1,980
	Kontakt zu Nachbarn	,081	,029	,082	2,801	,005	,984	1,016
	Verabredungen mit Freunden, Verwandten, Bekannten	,035	,023	,047	1,570	,117	,946	1,057
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	-,019	,026	-,024	-,754	,451	,840	1,190
	tube7_good	,032	,023	,044	1,378	,169	,830	1,205
	Geschlecht	-,018	,061	-,009	-,288	,773	,838	1,193
	Alter	,008	,002	,144	3,289	,001	,441	2,267
	ISCO skill level	,012	,036	,010	,328	,743	,839	1,191
	knowledge	,039	,025	,049	1,568	,117	,885	1,130
2	(Constant)	1,212	,333		3,646	,000		
	scalecollben_cen	,153	,043	,118	3,545	,000	,771	1,297
	timepref_cen	-,001	,009	-,002	-,080	,936	,943	1,060
	income2	-,018	,014	-,046	-1,327	,185	,715	1,399
	number of children	,028	,023	,041	1,243	,214	,791	1,264
	employment status	-,045	,079	-,023	-,561	,575	,505	1,980
	Kontakt zu Nachbarn	,081	,029	,082	2,803	,005	,983	1,017
	Verabredungen mit Freunden, Verwandten, Bekannten	,035	,023	,047	1,570	,117	,946	1,057
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	-,019	,026	-,024	-,751	,453	,840	1,191
	tube7_good	,032	,023	,044	1,385	,166	,826	1,211
	Geschlecht	-,018	,061	-,009	-,293	,769	,837	1,194
	Alter	,008	,002	,145	3,290	,001	,441	2,268
	ISCO skill level	,012	,037	,011	,331	,740	,839	1,192
	knowledge	,039	,025	,049	1,568	,117	,885	1,130
	collben_timepref	-,002	,012	-,005	-,161	,872	,984	1,016

a. Dependent Variable: How do you turn off tv?

Table 3. VIF measures on turning off the lights.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3,061	,302		10,144	,000		
	scalecollben_cen	,011	,039	,009	,272	,786	,771	1,297
	timepref_cen	,007	,008	,023	,796	,426	,949	1,054
	income2	-,022	,013	-,058	-1,732	,084	,726	1,378
	number of children	-,009	,020	-,014	-,446	,656	,793	1,261
	employment status	-,048	,072	-,027	-,669	,504	,512	1,952
	Kontakt zu Nachbarn	,015	,027	,016	,562	,574	,981	1,019
	Verabredungen mit Freunden, Verwandten, Bekannten	,010	,021	,014	,488	,625	,941	1,063
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	-,041	,023	-,054	-1,742	,082	,841	1,189
	tube7_good	,018	,021	,026	,846	,398	,823	1,215
	Geschlecht	-,118	,056	-,065	-2,106	,035	,844	1,184
	Alter	,007	,002	,141	3,322	,001	,447	2,239
	ISCO skill level	-,002	,033	-,002	-,057	,955	,832	1,202
	knowledge	-,018	,023	-,024	-,794	,427	,880	1,136
2	(Constant)	3,055	,302		10,111	,000		
	scalecollben_cen	,009	,040	,008	,233	,816	,765	1,306
	timepref_cen	,007	,008	,025	,836	,403	,940	1,064
	income2	-,022	,013	-,059	-1,754	,080	,723	1,382
	number of children	-,009	,020	-,014	-,433	,665	,793	1,262
	employment status	-,048	,072	-,026	-,663	,508	,512	1,952
	Kontakt zu Nachbarn	,015	,027	,016	,572	,567	,981	1,020
	Verabredungen mit Freunden, Verwandten, Bekannten	,010	,021	,014	,491	,623	,941	1,063
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	-,041	,023	-,054	-1,731	,084	,841	1,190
	tube7_good	,018	,021	,027	,872	,383	,820	1,220
	Geschlecht	-,119	,056	-,066	-2,117	,034	,844	1,185
	Alter	,007	,002	,141	3,324	,001	,447	2,239
	ISCO skill level	-,002	,033	-,001	-,046	,964	,832	1,202
	knowledge	-,018	,023	-,024	-,791	,429	,880	1,136
	collben_timepref	-,005	,011	-,013	-,451	,652	,978	1,022

a. Dependent Variable: Ausschalten des Lichts

Table 4. VIF measures on recycling behaviour.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	88,112	4,563		19,311	,000		
	scalecollben_cen	1,211	,604	,057	2,004	,045	,793	1,261
	timepref_cen	,004	,128	,001	,033	,973	,951	1,051
	income2	-,474	,197	-,070	-2,402	,016	,738	1,355
	number of children	-1,221	,317	-,109	-3,854	,000	,784	1,275
	employment status	-,466	1,143	-,014	-,407	,684	,506	1,977
	Kontakt zu Nachbarn	2,772	,410	,172	6,769	,000	,979	1,021
	Verabredungen mit Freunden, Verwandten, Bekannten	-,605	,316	-,050	-1,914	,056	,937	1,068
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	,734	,355	,056	2,066	,039	,857	1,167
	tube7_good	-,496	,326	-,042	-1,523	,128	,840	1,190
	Geschlecht	-,060	,857	-,002	-,070	,944	,857	1,166
	Alter	,086	,033	,099	2,616	,009	,440	2,274
	ISCO skill level	,067	,509	,004	,131	,896	,828	1,207
	knowledge	,901	,351	,068	2,570	,010	,893	1,120
2	(Constant)	87,966	4,564		19,272	,000		
	scalecollben_cen	1,133	,608	,053	1,863	,063	,782	1,278
	timepref_cen	,021	,129	,004	,164	,870	,938	1,066
	income2	-,487	,198	-,072	-2,464	,014	,735	1,360
	number of children	-1,212	,317	-,109	-3,826	,000	,784	1,275
	employment status	-,450	1,143	-,014	-,394	,694	,506	1,977
	Kontakt zu Nachbarn	2,779	,410	,172	6,784	,000	,979	1,022
	Verabredungen mit Freunden, Verwandten, Bekannten	-,602	,316	-,049	-1,903	,057	,937	1,068
	Empörung aufgrund Zeitungsberichten über Umweltprobleme	,739	,355	,056	2,080	,038	,857	1,167
	tube7_good	-,474	,326	-,040	-1,452	,147	,837	1,194
	Geschlecht	-,100	,858	-,003	-,117	,907	,856	1,169
	Alter	,086	,033	,099	2,618	,009	,440	2,274
	ISCO skill level	,074	,509	,004	,146	,884	,828	1,207
	knowledge	,905	,351	,069	2,582	,010	,893	1,120
	collben_timepref	-,199	,180	-,028	-1,108	,268	,968	1,033

a. Dependent Variable: recycle

Table 5. VIF measures on support for environmental policies.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,639	,097		16,842	,000		
	scalecollben_cen	,570	,026	,397	22,314	,000	,978	1,022
	timepref_cen	-,007	,006	-,020	-1,115	,265	,956	1,046
	Geschlecht	,309	,038	,145	8,023	,000	,945	1,058
	Alter	,010	,001	,161	9,062	,000	,980	1,020
	ISCO skill level	,143	,023	,116	6,287	,000	,916	1,092
	knowledge	,099	,017	,111	5,942	,000	,891	1,123
2	(Constant)	1,640	,097		16,849	,000		
	scalecollben_cen	,569	,026	,396	22,239	,000	,976	1,025
	timepref_cen	-,007	,006	-,021	-1,172	,241	,952	1,050
	Geschlecht	,308	,039	,145	7,988	,000	,944	1,060
	Alter	,010	,001	,161	9,075	,000	,980	1,020
	ISCO skill level	,143	,023	,115	6,272	,000	,916	1,092
	knowledge	,099	,017	,111	5,939	,000	,891	1,123
	collben_timepref	,007	,008	,017	,934	,350	,991	1,009

a. Dependent Variable: scale_polpref