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Pro-Environmental Consumer Behaviour: Cross Country Differences

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Foreword

I would like to take this opportunity to thank my husband, Andreas Strøm, and my family for support and encouragement as I worked on this thesis and throughout my studies. I would also like to thank my supervisor, Ingeborg Foldøy Solli, in particular for her help, patience and friendly guidance in this process.

Abstract

This paper investigates country variations in environmentally friendly consumer behaviour across Europe. The purpose is to detect if countries have different inclinations to respond to the urgency of environmental protection. Such variation could be informative on developing national and international climate policies and energy regulations. To investigate this, a regression analysis was performed using data from the European Social Survey (ESS) round 8th in 2016 (2nd edition). As the dependent variable, "willingness to pay for the most energy efficient household appliance" was used. Countries were used as key variables and several other control variables, both at individual- and country-level, were used. Results showed that there is significant difference between countries. Some countries were affected by the addition of control variables and changed throughout the analysis. Others remained fairly consistent throughout. Country level variables, GDP per capita and electricity prices, were expected to account for some variation. Results proved no such trend, however.

Content

1. Introduction

Greta Thunberg, a Swedish climate activist, has at age 16 been able to capture global attention as she addresses the urgency of action for environmental protection. “Our house is on fire!”, she exclaimed to the UN, demanding a more proactive attitude from politicians. Her passion has inspired the Friday school strike across several countries, showing an impressive engagement amongst youths towards our environment. The passionate engagement of some stand in stark contrast to the indifference of others, yet our environment is our common home and its state affects us all. This begs the question of how and why there may be such a great difference between us in terms of willingness to engage in our common good? In this study, we will attempt to address this question by investigating differences across countries in Europe. We will also attempt to determine some possible explanations for any detected variance. Several studies point out that there exists a gap between what we acknowledge as important to do and what we are actually willing to forego in order to do it. In other words, we may be aware of the importance of consumer behaviour on the environment, but that does not necessarily mean we are willing to pay the price for abatement. Previous research proves that our willingness to pay extra for environmentally friendly goods and services, can be determined by certain variables at individual- and country level. In this study we will look into the willingness of paying for energy efficiency in household appliances and we will look into the effect of accounting for some such variables.

Energy efficiency is often brought forth as an attractive partial solution in the ongoing debate on energy abatement. Dramatic energy cutbacks would cause a lot of trouble for any nation, including economic loss and stagnate growth, making it politically and practically unrealistic. Still, the European Union (EU) has endeavoured to decrease levels with 20% compared with projected levels for 2020. On their website, the EU state in a post on energy consumption that the goal is to encourage energy efficiency so that consumers can reduce energy bills, protect our environment and also reduce reliance on external suppliers of oil and gas. One of their efforts in this regard, include the EU labelling system. This system is intended to provide the consumer with a standardised scale of energy efficiency that a large range of household appliances are graded according to. In this way they can make an informed purchase decision. According to their website, the EU’s energy label (Directive 2010/30/EU) the scale ranges from A to G, with ‘A’ as the most energy efficient products and ‘G’ the least efficient. Seven colour codes are also used, where dark green represent the most efficient and red the least. This system provides a common ground for European consumers.

Cutting our energy waste can be done in a number of ways and at various costs. Several factors impact our willingness to do so. But as we all have different sets of priorities, preferences and view climate change differently, we are also differently inclined to respond to the urgency for change in our consumption of energy. How informed we are of environmental change largely depends on the media coverage and political climate of where we are living. This in turn should intuitively make us more or less inclined to act on this urgency and make environmentally friendly choices as consumers. Dramatic changes in our climate will affect us all and the responsibility to do something about this is unquestionably on all. Still our willingness to sacrifice and pay for reducing energy consumption, vary significantly.

In this paper we will first address relevant theories for this topic. This includes microeconomic theory, behavioural economics and welfare economics. According to classic microeconomic theory, higher income (GDP per capita) and lower usage cost (electricity price), will lead to higher consumption of energy. In other words, such variables would be indicators of low interest in reducing energy waste and for environmental protection. Energy efficiency may, however, also be linked to a desire for future usage cost savings. In terms of climate change efforts, welfare economics addresses how a so-called “freerider”-problem may explain why some are much less inclined to reduce energy consumption for the common good. Following this, we will investigate existing research and literature. Previous research includes studies on energy consumption, purchase barriers, and policies and labelling. Energy consumption has changed a lot in recent years. Studies review purchase as well as usage patterns in consumers. A review of the methodology follows next. Here we go through how the statistical models in STATA were developed. The main type of model used in this study, is regression analysis. The model tested for the differences amongst European countries in their willingness to purchase the most energy efficient home appliance. The models also used several control variables at both individual and country level. In this study we were mostly interested in detecting the effect of GDP per capita and electricity prices on possible country variation. Some graphical elements are also included. Data was retrieved through the European Social Survey (2016) and through the EU statistics website. Results show that there does exist compelling evidence for country variation and that several variables contribute to the explanation for this. Still, the anticipated effect of GDP per capita and electricity prices, were not proven in this model. In the analysis we discuss this further and argue that this could be due to the model only being based on a single year and no historical data beyond that. Using historical data, we would possibly be able to detect a trend for GDP per capita and electricity prices affecting willingness to pay for energy efficiency. Lastly, we provide a short conclusion. Please find relevant tables attached at the end.

2. Theory

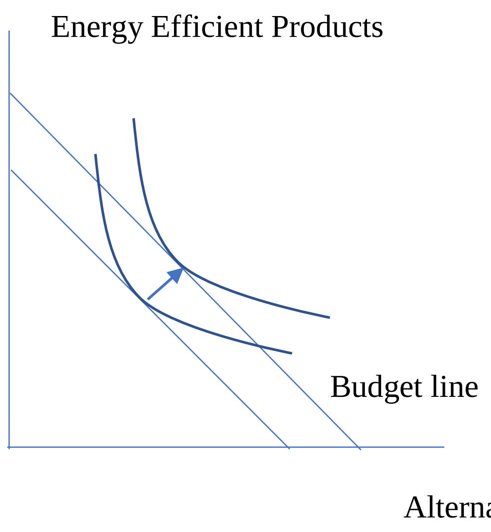
This chapter will begin with a review of consumer theory. Next, behavioural economics is explored in order to shed light on how real consumers may not necessarily appear to adhere to classic utility-maximising assumptions in their choices. This could be due to a number of reasons. Because of this, consumers are not necessarily predictable in their behaviour and reasons behind their choices may be ambiguous. Lastly, we will examine welfare economics. Welfare economics help explain mechanisms at individual and at aggregate level. The aim of this chapter is to garner an understanding of how we may interpret and understand the mechanisms behind variation between consumers of different countries in terms of willingness to pay for energy efficiency.

2.1 Consumer Theory

Consumer theory establishes the mechanisms behind consumer behaviour when faced with choice. When making a decision, a consumer will base his or her actions on a set of preferences. These preferences are based on perceived utility associated with the alternatives available to him or her and are individual to the consumer (Pindyck & Rubinfeld, 2013). In other words, when investigating choices of consumers, their preferences are at the core. For a consumer indifferent to energy efficiency, an appliance that is energy efficient is a perfect substitute to one that is not. The consumer is indifferent to one or the other based on that factor alone and their choice will rather be due to other attributes, such as price and perceived quality. However, a consumer who values environmental efforts or thinks that efficiency will likely result in reduced electric costs, may be willing to pay more for an energy efficient appliance. If a consumer is willing to pay extra for such an appliance, we can conclude that they perceive the appliance to provide some higher utility and reveal their potential preferences. In this paper we assume that such preferences are most likely to be related to environmental awareness, but keep in mind it may also include potential future cost savings.

Consumers may experience shifts in their preferences based on changes in their income or other factors. Higher income pushes the budget line outwards and allows for the consumer to reach higher levels of utility. In terms of the two motivations for being willing to pay extra for energy efficient appliances, consumers may be divisive in their responses to changes in income. For a consumer who primarily values future cost savings, a higher income may result in them being willing to pay more for a better quality and more energy efficient appliance or they will just use more energy as they can now afford it. Because of this the result of change in income in such consumers, in terms of energy usage, is unclear. For a consumer who is willing to pay for energy efficiency due to environmental concerns, a change in income will most likely mean an opportunity to go to extra lengths in order to reduce energy usage. They will likely be willing to pay more for an energy efficient appliance.

Figure 1: Extended Budget and Preferences for Consumption of Energy Efficient Appliances



How the individual will adapt to a new budget, is determined by his or her preferences for environmental protection. At country level, the consequence of being richer can also be ambiguous in this regard: Classic consumer theory suggest higher income brings the opportunity to consume more, but in this particular context the more resourceful countries may be pressurized through international politics and feel of duty to take more responsibility upon themselves, for example by implementing policies and regulations for energy consumption, and thereby incentivizing their inhabitants to limit energy usage and encourage efficiency. Another factor that may contribute to consumers' preferences for energy efficiency, is the price for energy itself: in this case; electricity prices. As with higher income, consumer theory generally suggests that lower prices allow for increased consumption. According to this line of reason, we may assume that high income (GDP per capita) and low electricity prices, indicates that a consumer from a specific country would be less inclined to pay extra for an energy efficient appliance, unless there are other incentives in place to regulate energy consumption.

2.2 Behavioural Economics

Consumer behaviour can be analysed and predicted based on various theories and methods. Consumer theory is, however, a modelized world and one that is based on ideal prerequisites. In real life there are elements of uncertainty and seemingly irrationality in the behaviour of the consumer. The consumer does not know exactly what the future holds upon making a purchasing decision, and responses to such uncertainty is individual to the consumer (Pindyck & Rubinfeld, 2013). Behaviour is related to the consumer’s preference for risk. Most consumers are typically risk-averse, but they can also be risk-neutral or risk-loving. The consumer will judge risk based on their subjective probability of an outcome. This subjective probability will be informed by information available to the consumer. Based on probability, the consumer can make some assumptions about expected value and variability of possible events. Expected value can for instance be a calculation of how much the consumer will save on future electric bills, if investing in an expensive, yet effective energy efficient appliance. Variability is the extent of difference between various outcomes. For example, may future policies make it inevitable for consumers to choose energy efficient products because electricity prices will be extremely high or climate change will rapidly escalate and leave no room for energy waste. Or, on the other hand, the future may hold a solution to our energy needs and we no longer need to restrict use of energy, making an investment in an energy efficient appliance, a useless investment (assuming it costs more). For the consumer there is a risk associated with both purchasing and not being willing to purchase the most energy efficient home appliance. Common perceptions about the urgency of environmental protection and general attitudes regarding energy usage, form societal norms, which again is likely to inform consumers purchase decisions and may help explain country variation not accounted for by other factors. In order for the consumer to make the best decision based on their preferences and make an assumption on expected value, value lies in information (Pindyck & Rubinfeld, 2013). The situation for a consumer about to make a decision regarding energy efficiency, will depend on information readily available. Information regarding energy use and environmental concerns will typically depend largely on politics and media coverage of such topics. Specifics regarding energy efficient products, will also depend on local stores, their staff and general labelling. All of these factors will determine the extent of information available to the consumer and, except for labelling, will vary across countries. Differences between countries when it comes to consumers’ willingness to purchase the most energy efficient appliance, can amongst other factors, indicate a variation in information readily available to the consumer.

2.3 Welfare Economics and the "Freerider"-Problem

The "freerider"-problem in welfare economics, accounts for when the consumer acknowledges that the sum of everyone's energy usage affects our climate, but that the individual's energy usage is so miniscule it makes no real difference. Because of this, there is no incentive to limit his or her own use, as long as everyone else does it. If there is no economic gain for the consumer to limit energy use, a consumer may behave in such a manner unless there are corrective measures such as well implemented energy policies in place. In this section we will examine the welfare economics of environmental change and theoretic explanation behind the "freerider"-problem. We will first investigate the mechanisms from the consumer's perspective and then at aggregate level. In this section we assume the consumer believes that excessive energy usage negatively affects our environment and causes climate change.

Emission of climate gases implies negative external costs (negative externality). Climate stability is a public good and it is of everyone's interest to maintain for future generations. Based on basic consumer theory, we may assume that for a consumer, i, his or her utility U^i is a product of a number of goods (X_n^i) and some vector for environmental quality (q). q is non-rival, exogenous and cannot be chosen.

$$U^i = U^i\,(X_1^i, X_2^i, \ldots., X_n^i, q)$$

$$\frac{\partial \mathrm{Ui}}{\partial \mathrm{q}} > 0$$

This indicates a positive relationship between the level of utility and the index for environmental quality.

$q = q\ (E)$

E = Total emissions of pollutants e.g. climate gases

$E = \sum_{\forall} ei$ (sum of all individuals, i, in economy) (emissions at household level)

There is a negative relationship between environmental quality and household emissions. In other words, the less emissions, the better the quality of environment:

$$\frac{\partial \mathrm{q}}{\partial \mathrm{E}} < 0$$

It is the sum of all pollutants that create the negative effect at such a level where it actually makes an impact on the environment. However, at individual level, the effect of pollution on the environment is inconsequential.

$$\frac{\partial \mathrm{q}}{\partial \mathrm{ei}} \approx 0$$

Because emissions at individual level are so small, it cannot impact environmental quality at aggregate level. It is only the sum of all that creates the real effect. This leads to a possible "freerider"-problem. For the singular consumer, it does not matter if he or she makes sacrifices for the environment, as long as everybody else is doing it. The problem can be described like this:

$$\uparrow x^{i}\text{'s} \rightarrow \uparrow e^{i} \rightarrow \uparrow E \rightarrow \downarrow q$$

Environmental impact at individual level (e^i) rises with a higher number of individuals, leading to more total environmental effect collectively from all consumers and consequentially to worse environmental quality. Therefore we may describe total effect (E) as exogenous if we assume $\uparrow e^i \rightarrow \downarrow q$ and q is endogenous. At country level, this mechanism may explain why some countries seem disinterested in engaging in global environmental efforts and reduce energy consumption (G. Kipperberg, personal communication, August 30 2017).

Consumer theory, behavioural economics and welfare economics are theories that help explain some of the mechanisms of how differences amongst consumers may arise in terms of their pro-environmental purchase behaviour.

3. Literature

In this chapter existing research and literature will be reviewed with the ambition to gain insight and provide scientific context for this topic. Hopefully we will be able to identify how this study may contribute to the growing research on energy usage and climate change. First, studies on consumer behaviour and choice in terms of household energy efficiency will be reviewed. Thereafter there will be a short examination of literature relating to factors known to affect environmental friendliness in consumers. These are factors that will be used as control variables in the econometric model later on. The following section will be a review of research that may shed light on how differences materialize between countries and/or geographical areas. Studies reviewed examine questions about how and why consumers of different nationalities vary in their preference for energy efficiency. In this section areas such as energy labelling, environmental policies and electricity prices will be explored.

3.1 On Energy Consumption

Household energy consumption has steadily risen for several decades. For the US and most of Europe, this entails primarily home heating, water heating, refrigeration and freezing, lighting, cooking and air conditioning (Gardner & Stern, 2002). Following economic growth in Asia, a much larger part of the earth's total population will soon demand the same level of energy consumption. Such levels of energy consumption for all, is simply not sustainable and abatement is inevitable. The need to limit energy usage, entails both energy efficiency improvements and energy curtailment. Abrahamse, Steg, Vlek, and Rothengatter argues that for the sake of energy conservation, energy efficiency is more effective than energy curtailment (2005). As an example, he refers to the potential effect of insulating a house being much greater than by lowering the thermostat. Energy efficiency is, in other words, a very effective technologic improvement that may offer a modern society a realistic approach to limiting our energy usage. As opposed to energy curtailment, energy efficiency may offer a flexible approach that may be more easily tailored to fit with the realistic needs of running a household and a country's need for economic growth. No country would be rational in willing to put a firm limit on energy consumption because it would likely imply a stagnation to economic growth and national prosperity. Modern societies thrive economically with energy usage. General consumption drives economic growth, which leads to more jobs and prosperity in that society. It advances international political and economic status. Today this is closely linked to energy usage. The general consensus among researchers is that an essential feature of policymaking must be to decouple economic growth from energy consumption. Limitations on energy usage, must be incentivised in a sensible manner. Energy efficiency advancement in technology and available appliances, may provide a part of the solution. The effect of this, however, depend on whether or not consumers actually buy and make sensible use of them.

Several researchers call attention to the necessity of recognizing psychosocial variables as essential to truly understanding consumer behaviour (Robinson and Smith, 2002). The purchase of an environmentally friendly good, does not lead to immediate satisfaction for such preferences and they do not provide any individual benefit (Harland, Staats & Wilke, 1999). Rather the benefits of such investments, are uncertain and may be far into the future. Even so, several studies show that consumers are willing to forego instantaneous benefit for the sake of the environment (Onel, 2017). Onel concludes that it is vital for consumers to feel they are capable and responsible in order to act on their motivation for environmental sensitivity. This suggests a complex variation in psychological motivations and help explain why demographic variables does not always give the entire picture of determinants of consumer behaviour. Levine, Koomey, McMahon, Sanstad and Hirst describes the “energy efficiency gap” to help explain the seemingly irrationality in consumer behaviour in terms of energy efficiency technologies (1995). The researchers argue that consumers do not always behave in their most utility maximizing manner and are not always making rational decisions. Another element to consumer behaviour worth mentioning here, is the so-called rebound effect. Abrahamse et.al argue that the real effect of energy efficient appliances must be scrutinized in light of this, as consumers tend use them more. The rebound effect may not be of the utmost importance or even awareness of the consumer who is about to make a purchase decision. It does, however, inform the formation and effect of policies and thereby, indirectly, make an effect on consumer behaviour (Berkhout, Muskens and Veldhuijsen, 2000).

Much research has been conducted in attempt to determine demographic factors that affect likelihood of environmental friendliness in consumers. Commonly referred to in literature are gender, age, education, income and type of living area (Whitehead, 1991; Cameron and Englin, 1997; Blomquist and Whitehead, 1998; Engel and Pötschke, 1998; Witzke and Urfei, 2001; Dupont, 2004; Israel and Levinson, 2004). In terms of gender, existing research alludes to women as being more likely to behave environmentally conscious (Torgler and García-Valiñas, 2006). By referring to previous studies, they do however point out, that results are not always consistent. Age appear in particular to have a complicated effect on environmental behaviour. According to Torgler and García-Valiñas, there are two age-related effects. The *life-cycle effect* is the effect stemming from being at a particular stage in life and the *cohort effect* comes from belonging to a specific generation (2006). A US study finds that there is a significant positive relationship between level of education and environmentally friendly consumer behaviour (Goetz, Debertin and Pagoulatos; 1998). In their state-level empirical analysis in the US, they use instrumental variables estimation to determine that higher education has an independent, positive effect on environmental awareness in consumers. Income is also likely to make a significant impact on consumer behaviour. Higher income is often determined to have a positive and significant impact on environmental consumer behaviour (Whitehead, 1991; Blomquist and Whitehead, 1998; Dupont, 2004). Additionally, the type of living area for the household in question is situated, have been proven influential (Danielson, Hoban, Van Houtven, and Whitehead, 1995; Veisten, Hoen, Navrud, and Strand, 2004). Whether the household surroundings are urban or rural, is likely to make an impact although results are somewhat complex. Small towns are more rural and therefore tend to possess environmentally conscious values. Medium and big cities are generally better at implementing policies, which likely leads to higher preferences for environmental protection, according to Torgler and García-Valiñas. Therefore, the effect of this variable can be ambiguous.

3.2 On Purchase Barriers

Several studies have explored the possible barriers of consumers to undertake energy efficient investments (Reynolds et. al, 2010). Kjærulf studied such barriers for consumers in Denmark and found that the most important were high initial price, doubts as to whether or not the investment would provide real cost savings and concerns regarding quality (1997). The magnitude and extent of such barriers, depend on situational matters for the consumer. High investment price and lack of financing, has naturally proven itself a primary barrier for consumers of developing countries in several studies (Meyers, 1998). Lack of information was also reported to make a significant impact on purchase barriers. A study from Thailand reported hindrances of adoption of energy efficient technologies to include lack of investment capital, lack of trust in technologies and a preference for short term payback (ARRPE, 2000).

3.3 On Policies and Labelling

In order to properly address the urgency of environmental protection, energy usage must be regulated on a grand scale. Without proper incentives in place to regulate energy consumption, there may easily arise a significant free-rider problem. Especially in rich countries with low electricity prices. So, in order to achieve cooperation between different agents in the energy market, regulation must be in place (Rand & Nowak, 2013). One such regulation, is the EU energy efficiency labelling system. According to the EU, transparency in energy labelling is crucial for a fair market and for consumers to make a clear decision according to their preferences. Better labelling is thought to push less energy effective appliances out of the market and reduce energy costs. The EU's labelling system allows for a common ground for European consumers to gain knowledge on energy efficiency of appliances. The Energy Labelling Directive started including home appliances in 2008. It has been revised several times. Wiel and McMahon reviewed the effect of labelling and energy efficiency policies in their US study, arguing that governments should implement efficiency standards and labelling programs, but with caution (2003). Such efforts, they argue, are but the most effective long-term resolutions any government can implement. Labelling provides an energy efficiency standard that can be useful for both end users as well as utility companies and government energy-conserving agencies, the researchers claim. Labelling can be extremely effective, but it does, they argue, strongly depend on how it is presented to the consumer. Several factors contribute to whether or not this is achieved successfully. One such factor is the credibility of the labelling program. Other factors include level of market support and format of label. For the consumer, an effective labelling program will provide enough information to push energy wasting products out of the market and incentivise cost-effective and energy-effective technology. Wiel and McMahon assert that when labelling and efficiency programs are applied successfully, over time it provides a positive development in the marketplace for the consumer. Referring to US statistics, they demonstrate how energy efficiency standards and incentives have provided the consumer with lower electric bills as well as an increase in available products in the market at lower prices. Although benefits are many, the researchers plead for caution upon implementation of such regulations. If applied unnecessarily or inappropriately, regulations can lead to a number of unwanted consequences, including disrupted trade, limiting consumer choice and add to product cost. Koo, Kim, Hong, Choi and Lee discus the importance of policies and its implications in consumer preferences for energy efficiency in cars (2012). Drawing on political implications of energy policies, they argue that energy efficiency grading and regulation are of great importance of both consumers and governments. Several countries have implemented policies intended to regulate energy efficiency. Some of these policies include energy labelling. The success of such policies, they argue, depends on the policy makers ability to properly understand consumers and their preferences. The market and its consumer activities are determining factors in terms of successful implementation. As governments cannot completely control consumer choice and usage, they must find the appropriate manner to direct consumers. The researchers argue that due to this, a policy that is in theory appropriate and applied with effort, will be unsuccessful if the market does not react duly. In order to meet targets, implementation, they argue, is key. Reynolds et. al offers further insight on policy implications for energy efficiency, in their study on compact fluorescent lighting in Saint Lucia (2010). Their research revealed several factors affected willingness to pay for energy efficient light bulbs, amongst them geographical location. Results also proved that government sponsored education and subsidy programs were formative on energy saving technologies. However, the researchers discovered that such programs could only be effective in the long run, if the consumers could clearly identify the low-quality products - the “lemons” - in the market. Transparency, in other words, is vital in order to affect consumer behaviour. The benefits of energy efficiency, are many. On a national level, energy efficiency can lead to less fossil fuel imports and thereby lessen dependence on other countries. Certain countries would gain more political independence and economic control if energy efficiency were to improve significantly.

Researchers agree that for any kind of regulation of energy consumption to be effective, it must work in tandem with an array of other efforts. Labelling or a particular policy will never be single-handedly responsible for making a significant impact on consumer behaviour. Energy efficiency labels and regulations must work in combination with other policy instruments to form a rich portfolio of energy reducing efforts to make a real impact (Wiel & McMahon, 2013. Reynolds et. al., 2010. Thøgersen, 2005). National policies, regulations and implementation of such, may partly provide an explanation as to why countries differ in their consumers' willingness to pay for energy efficient appliances.

4. Methodology

For this study, data from the European Social Survey (2016) is used to explore how people differ in their environmental consciousness across countries in a multiple regression analysis. The model is formulated as follows:

$$\text{“How likely to buy most energy efficient home appliance”} =$$

$$B_0 + (\beta_n * \text{country } n) + (\beta_i * \text{control variable } i) + \varepsilon_i$$

Through various econometric explorations in STATA, I will investigate how and to what extent there are differences amongst consumers of 24 different countries. The hypothesis is formulated as follows:

$$H_0: \beta_{country,n} = 0$$

$$H_1: \text{not } H_0$$

In my first model, I will use Norway as base category and get β- coefficients for all other 22 countries that will inform us on how they compare to Norway in terms of how much more or less likely it is for their inhabitants to be willing to purchase the most energy efficient home appliance. The coefficient is an average value of the environmental consciousness of that country as it compares to Norway. This model will be expanded using individual-level control variables. Here we assume that the effect of control variables on environmental consciousness is the same in all countries. Individual level control variables are variables such as age, gender, education, income and type of living area. These are all readily available in the existing ESS dataset. In another model, we will not use base category, but rather create land dummies for all countries. In this model we will include country-level control variables; GDP per capita and electricity prices. These are not present in the existing data and such data is merged in the set after being extracted from the EU-website. In this data, information on Russia, Israel and Switzerland is not available. Although relevant information does exist elsewhere, I chose not to include them in further models as the format was different from the rest and proved difficult to merge in a sensible manner. For my analysis, I will use control variables to create models that depict the change in country coefficients before and after adding country-level control variables. I will look into to what extent this accounts for some of the country variations. Based on these results, I will also present 2 maps of Europe where all countries are colour-coded according to their coefficients. The intention is to detect potential regional patterns as well. This may perhaps indicate societal norms of a region or the success of implementation of policies. In order to examine the real effect of GDP per capita and electricity prices on country differences, I created two land dummies. First, I created a land-dummy based on only individual level control variables. Through regression, I asked STATA to predict $\bar{Y}$. Then I generated an error term (ε_i) based on the differences between Y and $\bar{Y}$. By finding the mean of ε_i, I was able to extract a country dummy. Afterwards I repeated this sequence in STATA, but this time I added country level control variables (GDP and electricity prices) to the initial regression. This resulted in a second country dummy. By using these two country dummies, I created a scatterplot in order to determine the effect of GDP and electricity prices on country variation.

5. Data, Measurement and Modelling

5.1 Data

The following analysis was conducted using results from the European Social Survey (ESS) round 8th in 2016 (2nd edition) and some additional data were acquired from Eurostat (the statistical office of the European Union). The main purpose of the ESS survey, as it is stated on their website, is to assemble and interpret data of Europe's social condition[1]. This includes the shifting attitudes, perceptions, values and behaviours among citizens in the different countries. Several areas and topics are examined and make part of the extensive questionnaire. The survey is cross-national and carried out every other year. The ESS uses cross-sectional, probability samples which are representative of all persons aged 15 and over resident within

[1] European Social Survey (2016): ESS8- 2016 Documentation Report. Edition 2.1. Bergen, European Social Survey Data Archive, NSD - Norwegian Centre for Research Data for ESS ERIC

private households in each country. To ensure that the ESS data can be used to make inferences about the general population and to minimise the margin of error, each country must achieve a minimum effective sample size of 1500 (after discounting for design effects). For countries with a population of less than 2 million, this number is reduced to 800. Taking these factors into account, countries must decide how many participants they will select from their sampling frame, i.e. their gross sample size, and predict how many completed interviews they will need to achieve (their net sample) in order to meet their effective sample size. (from website) In round 8, there were 44, 387 survey participants altogether from 23 different countries. These countries included Austria, Belgium, Switzerland, Czech Republic, Germany, Estonia, Spain, Finland, France, United Kingdom, Hungary, Ireland, Israel, Iceland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Russian Federation, Sweden, and Slovenia. Israel has the highest response rate (74,37%) and Germany has the lowest (30,61%).

New in this round, is a module on climate change, energy security and energy preferences. This module covers 4 areas: beliefs on climate change, concerns on climate change and security, personal norms, efficacy and trust, and lastly, energy preferences. According to the ESS website, this module aims to increase our understanding of how Europeans' perceptions of climate change, energy security and energy preferences are shaped by national socio-political factors; examine the role of socio-political values and engagement; and examine the relative importance of individual-motivational versus national-contextual variables in public energy preferences. Due to this module being new, there is naturally no historic data on this particular topic from this survey and panel data is not available for this analysis.

Data on two variables were acquired through Eurostat. These were GDP per capita and electricity prices for each country from 2015. Such data were not available on Israel, Russia or Switzerland. I chose data from one year prior to the survey as much of the literature I reviewed suggested recent earlier data on such variables were more likely to detect patterns related to attitudes.

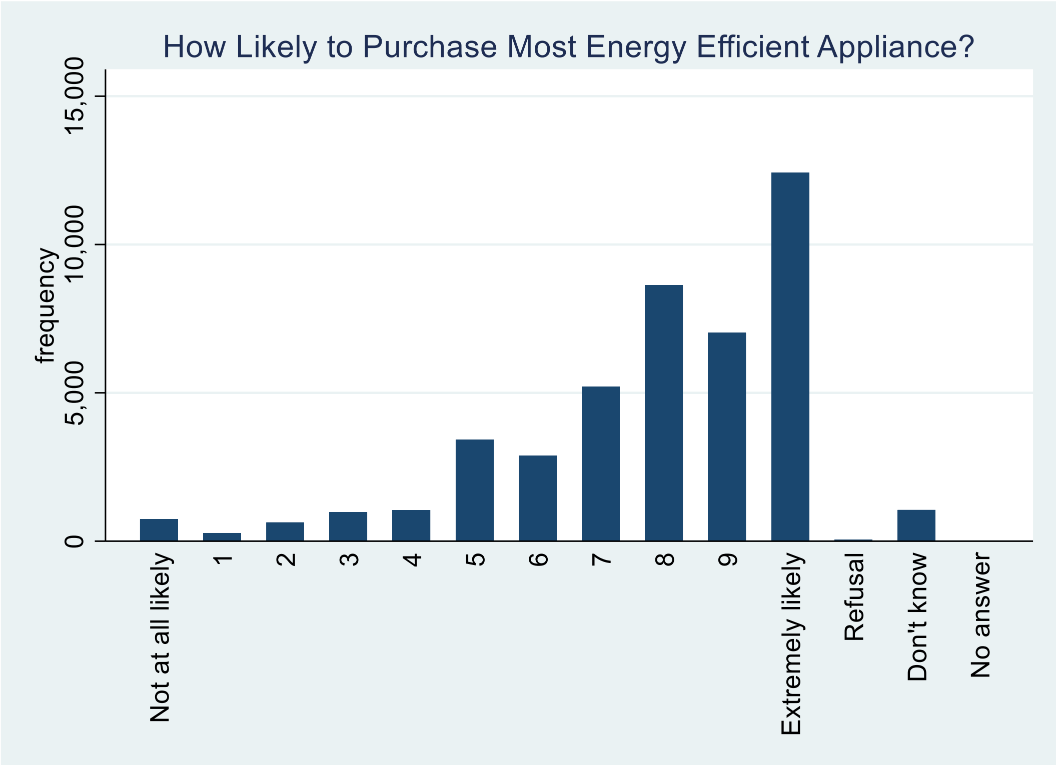
5.2 Measurement

Measuring self-reported willingness to pay for energy efficiency

The dependent variable in all analyses, is “If you were to buy a large electrical appliance for your home, how likely is it that you would buy one of the most energy efficient ones?” (eneffap). Answers were reported as numerical values on a scale from 0 (Not at all likely) to 10 (Extremely likely). Also included were 77 (Refusal), 88 (Don’t know) and 99 (No answer).

I chose this as a dependent variable as it provides an indication of willingness to pay for, and not just attitude towards energy savings measures and climate change. In the dataset, this question is part of the module on climate change. Large electrical equipment for the home includes dish washer, washing machine, fridge, freezer and so on. These are household investments that are usually purchased with the intention of keeping them for a substantial period of time (more than 10 years). It is an investment where quality, life span and price are often the main consideration of the buyer. Many purchasers of such products are relatively young and new home owners with several other substantial costs and debts. A more energy efficient product would not only gain the environment, but also cause a drop in the electrical bill for the consumer. To make energy saving a priority in investments, could indicate that the consumer is concerned with either or both of these aspects. Therefor such a priority must be viewed with caution as it does not necessarily provide evidence of a particular attitude towards climate change. In this paper, however, I consider this variable to provide an indication of consumer attitude towards climate change for two reasons: Firstly, because of the context of the question in the survey. The question is part of the "Climate Change" module and the tone of this part of the survey is very much about energy usage, energy supply and climate change. Other questions on this module include worries about drastic weather changes, dependency on fossil fuels and measures on energy reduction. Secondly, energy efficiency could potentially be reflected in a higher price, which would possibly even out savings over time and perhaps deplete the monetary advantage. Because of this I consider this variable to provide insight into consumer behaviour in terms of environmental friendliness, but keep in mind statistical results can be ambiguous. The results from this question, resulted in the following distribution:

Table 1: Distribution of Dependent Variable



By far the most common response was 10: “Extremely likely”, which was given by 12 428 respondents. 741 chose 0: “Not at all likely”. From 1 to 10 the upwards sloping curve is fairly smooth except for two mild interruptions at 5 and 9. 46 respondents refused to answer, 1055 did not know and 10 had no answer.

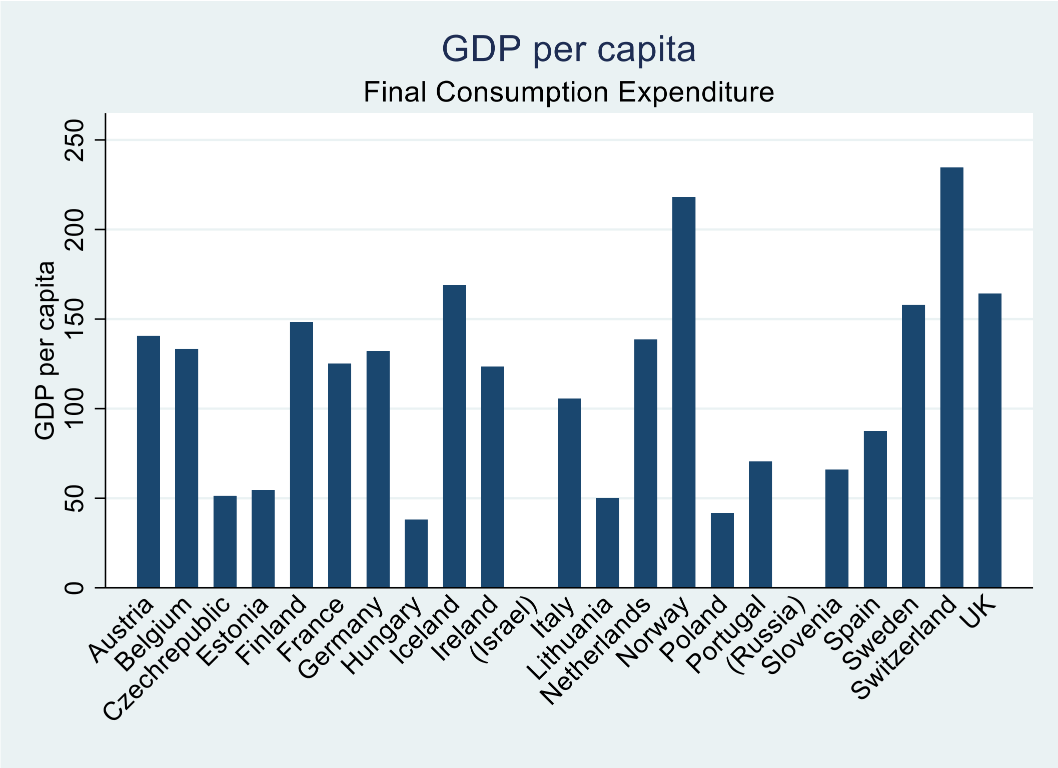
Independent variable

The independent variable of which I will be investigating differences in the dependent variable, is European countries. There are 23 countries altogether in the survey, respondents in parenthesis: Austria (2 010), Belgium (1 766), Switzerland (1 525), Czech Republic (2 269), Germany (2 852), Estonia (2 019), Spain (1 958), Finland (1 925), France (2 070), United Kingdom (1 959), Hungary (1 614), Ireland (2 757), Israel (2 557), Iceland (880), Italy (2 626), Lithuania (2 122), Netherlands (1 681), Norway (1 545), Poland (1 694), Portugal (1 270), Russian Federation (2 430), Sweden (1 551) and Slovenia (1 307). These countries represent a variety of Europe in terms of sizes, location, political, economic and cultural values. In the initial model, Norway is used as base category to which other values are compared.

Explanatory variables – macro level

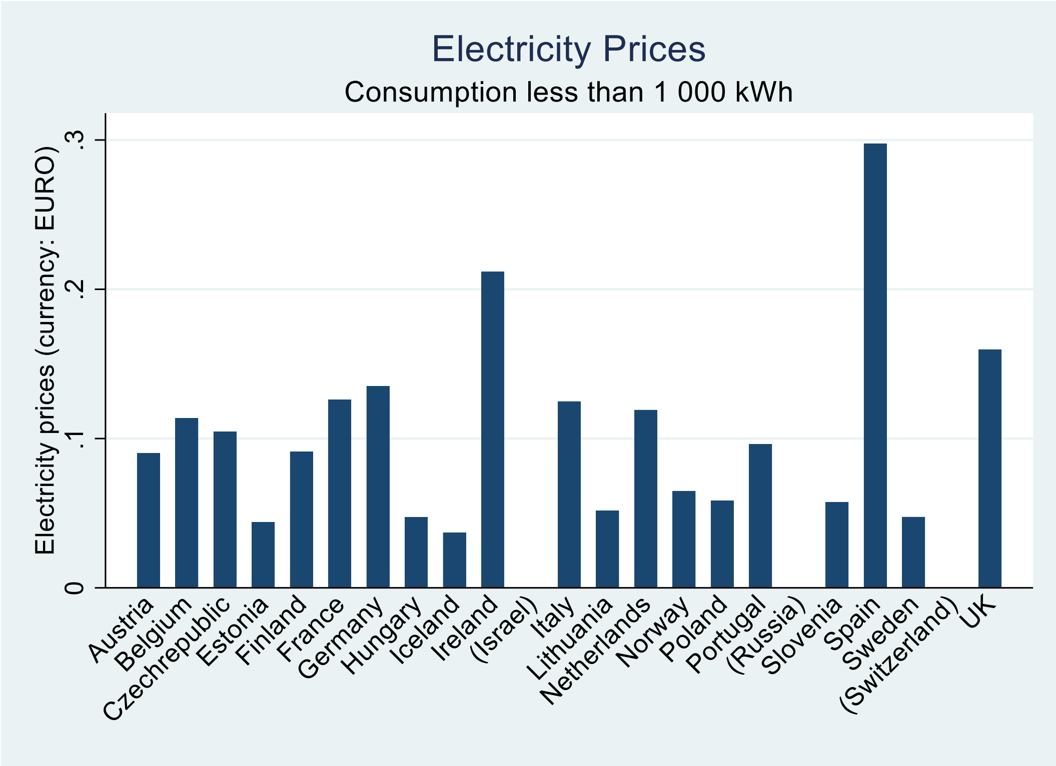
GDP per capita from 2015, measured in million Euros at final consumption expenditure, was extracted from Eurostat's website. Please find complete overview of GDP per Capita at Appendix 1.

Table 2: Distribution of GDP per Capita over Countries



Electricity prices from 2015, also extracted from Eurostat, were measured in Euros. Please find complete overview of electricity prices attached as Appendix 2.

Table 3: Distribution of Electricity Prices over Countries



Explanatory variables – individual level

The variables included in the model, have all been addressed in previous literature and research and found proven to make an impact on the likelihood of environmental awareness in the consumer. For correlations of individual level variables, please see Appendix 3.

Gender

Gender of respondents in this survey, is coded as a numeric variable where Male is 1, Female is 2 and No Answer is 9. In this survey there are 21 027 males, 23 351 females, 9 respondents declined to answer and 9 missing cases of this variable. The gender ratio male to female is fairly balanced. Male is base category in the model. Based on previous studies on gender and climate consciousness, being female is assumed to have a positive effect on the likelihood of being willing to pay for energy efficiency.

Age

Age in this dataset is calculated from given year of birth of respondents. Values are numeric and ranging from 15 years of age to 100. Respondents under the age of 20, are dropped from the analysis as they are unlikely to purchase large home appliances. There are 44 232 respondents who have given their year of birth and 155 missing cases. In Sweden all respondents over 90 years old, are reported as 90 years old for anonymity reasons. In our model, age will be handled as continuous variable and, due to previous literature suggesting a vaguely U-shaped curve of the effect of age on energy consumption awareness, age squared will also be included.

Education

In the survey, education is measured according to the International Standard Classification of Education (ISCED 2011). This classification system was developed by UNESCO in the mid-1970's and is intended to create a system for enabling comparison between the varied education systems between countries. In the dataset, the variable is generated from a much more complex variable (edulvlb), which covered a broader spectrum of specific educational levels, into a simpler and more general form: Highest level of education, ES – ISCED (eisced). Eurostat's online tables show data for three aggregate levels: low, medium and high education. For the purpose of research paper, I will appropriate this variable in a similar fashion by categorizing the variable in the following way:

	ISCED (2011)
Low education	Levels 1 - 2
Medium education	Levels 3 - 5
High education	Levels 6 - 7

The frequency of cases in each category is 11 249 respondents with low education, 22 148 with medium education and 10 773 with high education. Please note that the categories for low and high education contain 2 levels from ISCED (2011), while the category for medium education contain 3 levels. Thus "medium education" is the largest category by definition. Low education is base category. According to several studies, higher education is assumed to be linked to climate consciousness. In other words, we expect medium and high education to make a positive impact on the dependent variable. There are data for 44 258 respondents and 129 missing cases. Variable values that do not fit into these categories (1, 55, 77, 88, 99), are dropped from model.

Household income

According to existing research, higher income is linked to increased likelihood of being environmentally conscious. In addition, a higher income yields a broader choice of variety in terms of investing in household items. Some products are out of reach for people of lower income. In the survey, the question for household net income was to choose an alternative that describes your household's total income, after tax and compulsory deductions, from all sources. The alternatives were values from 1: 1st decile to 10: 10th decile and including 77: Refusal, 88: Don't know and 99: No Answer. These last three categories were left out of the final analysis. Household income is another numeric variable in the dataset. This variable is coded and grouped in Stata, before they were included in the econometric models. I have chosen to group this variable in three categories: low (1st to 3rd decile), medium (4th to 7th decile) and high income (8th to 10th decile). 11 8835 respondents belong in the "Low income" category, 15 744 in "Medium" and 8866 in "High income". Please note that the category for medium contains one extra value, making it the largest category in terms of the number of referred values. Unsurprisingly it is also the largest category in terms of number of respondents. Low income is base category and we will be testing for the effect of medium and high income on the dependent variable. There were 36 445 valid cases and 7942 missing.

Living area

Respondents were asked to choose between various categories which best described the area where they live. The categories were coded with numeric values and were a 1: big city, 2: suburbs or outskirts of big city, 3: town or small city, 4: country village, 5: farm or home in countryside, 7: refusal, 8: don't know and 9: no answer. As with the other variables, the last 3 categories will be left out of the final analysis. There were 44 337 valid cases and 50 missing. Existing research suggest that the type of area of living, does in fact impact environmental consciousness. But results are complex and do not provide a clear indication as to which of rural or urban is most likely to make a positive impact on the likelihood of a person being environmentally conscious. In this analysis, urban area includes category 1 and 2. Rural area includes 3, 4 and 5. In the analysis, "Rural area" will be used as base category and "Urban area" will be included in model to test for its effect as compared to base category.

6. Findings

In the following section the results from the econometric analyses in STATA will be presented. First, the initial regression model without control variables will be introduced. In this model we will shortly review how countries differ in their willingness to purchase the most energy efficient home appliance without controlling for any variables that may affect the dependent variable. This is the starting point of further analyses in this study. In this initial model, Norway is used as base category and other countries are evaluated in terms of how they differ from Norway. Following this, we will expand on the model by introducing control variables at the individual level. The result of this will be presented here as a second version of our model and we will be able to review whether such variables account for a significant part of the differences between each country and Norway. We will not, however, go in detail about each control variable at the individual level as it is of lesser importance for the aim of this particular study. The next model will not include any base category due to the addition of continuous country level control variables. The variables are GDP per capita and electricity prices for all countries from 2015. These variables are, as suggested through theory and existing literature, more likely to be related to differences amongst countries and as such will be investigated further in our analysis. Methodological implications and suggestions for further research will be discussed at the end of this chapter.

6.1.1 Model 1

The main inquiry in this study is to investigate if there are differences amongst European countries in terms of environmental consciousness. The initial model is therefore a simple regression model:

$$\textit{“How likely to purchase most energy efficient home appliance”} = \beta_0 + \beta_n \text{*country}_n + \varepsilon_i$$

Please find complete STATA output attached as Appendix 4.

6.1.2 Model 1.2

In the following model we added control variables at individual level to our initial Model 1.1. In this model we aimed at detecting whether some of the country variance could be due to variables at individual level. Control variables include gender, age, education, household income and type of living area. In terms of base categories, male, young, low education, low income, and urban type of living area are used.

$$\textit{“How likely to purchase most energy efficient home appliance”} =$$

$$\beta_0 + \beta_n{*}country_n + \beta_{gender}{*}gender + \beta_a{*}age + \beta_{a2}{*}age^2 + \beta_{education}{*}education + \beta_{income}{*}income + \beta_{livingarea}{*}livingarea + \varepsilon_i$$

6.1.3 Model 1 Results

Model 1.1 and 1.2 produced the following output:

Table 4: Model 1 Results

	(1) eneffap	(2) eneffap
c_austria	1.092***	1.143***
	(0.000)	(0.000)
c_belgium	1.101***	1.165***
	(0.000)	(0.000)
c_switzerl~d	1.237***	1.314***
	(0.000)	(0.000)
c_czechrep~c	0.937***	0.959***
	(0.000)	(0.000)
c_germany	1.536***	1.581***
	(0.000)	(0.000)
c_estonia	0.721***	0.726***
	(0.000)	(0.000)
c_spain	1.053***	1.118***
	(0.000)	(0.000)
c_finland	0.932***	0.933***
	(0.000)	(0.000)
c_france	0.987***	1.056***
	(0.000)	(0.000)
c_uk	0.313***	0.365***
	(0.000)	(0.000)
c_hungary	0.654***	0.657***
	(0.000)	(0.000)
c_ireland	0.714***	0.703***
	(0.000)	(0.000)
c_israel	0.710***	0.801***
	(0.000)	(0.000)
c_iceland	-0.0647	-0.0426
	(0.494)	(0.656)
c_italy	1.370***	1.461***
	(0.000)	(0.000)
c_lithuania	1.146***	1.050***
	(0.000)	(0.000)
c_netherla~s	0.590***	0.674***
	(0.000)	(0.000)
c_poland	1.255***	1.350***
	(0.000)	(0.000)
c_portugal	1.475***	1.546***
	(0.000)	(0.000)
c_russia	-0.659***	-0.772***
	(0.000)	(0.000)
c_sweden	0.554***	0.538***
	(0.000)	(0.000)
c_slovenia	1.099***	1.153***
	(0.000)	(0.000)
gender		0.172***
		(0.000)
agea		0.0693***
		(0.000)
agea2		-0.000573***
		(0.000)
education		0.130***
		(0.000)
householdi~e		0.000320
		(0.429)
livingarea		0.0266**
		(0.004)
_cons	6.928***	4.213***
	(0.000)	(0.000)
N	43276	40873

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

For Model 1.1, results prove that our coefficients are not zero at confidence above 99.99%. We observe that country of residence does have a significant impact on the likelihood that a consumer will be willing to purchase the most energy efficient home appliance. Without controlling for any other factors, all countries but two, have positive β-values. Russia has the highest and Iceland has the lowest of the negative β-values. Statistics on Iceland are not significant. That implies only consumers from Russia are less likely to be willing to purchase the most energy efficient home appliance than consumers from Norway. Consumers from all other countries are in general more likely to be willing. R-squared is 0.05, which is percentage of variance explained in model. Missing data on 1 111 survey participants reduced the number of observations accounted for here from N = 44 387 to N = 43 276.

In Model 1.2 missing data on further 2 403 survey participants reduced the number of observations accounted for here from N = 43 276 in the initial Model 1.1 to N = 40 873 when individual level control variables are added. R^2 grew from 0,05 in Model 1.1 to 0,08 in Model 1.2. This was expected as more variables are included in the second model. Values are low and indicate that much information is not yet covered in our model. Most country betas do not change remarkably from the addition of individual level control variables. Iceland and Russia remain the only negative β-values, but results for Iceland is still not significant. This indicates that Russia is the only other country where consumers are less likely than Norway to purchase the most energy efficient home appliance. Israel, Italy and Poland experience changes of more than +0.1 to their β-values. When the effects of the control variables are accounted for, these countries indicate a higher likelihood of consumers opting for the most energy efficient home appliance (as compared to Norway). Portugal, Germany, Italy and Poland are the countries with the highest β-values in the results from the multiple regression model. This implies consumers from these countries have a higher likelihood of being willing to purchase the most energy efficient appliance, as compared to other countries in the survey. Germany has the highest β-value of all countries in this analysis. Russia has the lowest significant β-value, suggesting this is the only country in this survey where consumers are less likely than in Norway, to make an environmentally conscious household investment. After Norway, the UK, Sweden, Hungary and the Netherlands have the lowest β-values, indicating the least likelihood of consumers being willing to purchase the most energy efficient appliance.

Control variables offer some explanation to the country variation and is clearly an influencing factor at the individual level. Upon controlling for gender, using Male as base category and assuming Female has a positive effect on dependent variable, statistics on countries remain not significantly changed. A separate test was done for all control variables singularly to check for the specific effect. Gender cannot account for much of the impact of country of residence on dependent variable, although Female does have a positive and significant impact on dependent variable itself. No β-values changed much at all and none changed direction from the addition of individual level control variables. Russia and Iceland remain only negative betas and results on Iceland remain not significant. Missing gender did not provide any useful insights and result was not significant. Controlling for age, proves it does not account for much of the country effect on dependent variable and β-values remained similar in direction and magnitude. Upon controlling for the effect of age alone on country betas, the β-value for the UK drops slightly and significance level for this variable is now at $P < 0.001$. This is effect is so small it is hardly of real consequence in this context. The β-value for Age is positive, which implies that an increase in years of age of respondent implies an increase in likelihood he or she will be willing to purchase most energy efficient home appliance. The effect of age is however assumed to have a rather complex nature in terms of effect on dependent variable. The β-value for Age-squared negative, very slight in magnitude and significant. Education did not provide much explanation for country variance and β-values remained similar. One noteworthy exception is perhaps Iceland. When controlling for the isolated effect of education, β-value for Iceland changed from negative to positive. Results were however still not at significant level. Household net income (not significant) and type of living area did not, as an isolated effect, account for any country variation.

Throughout the development of our model and as we have added on control variables known through previous research to be likely to make an impact on dependent variable, our country β-values and level of significance have not altered in any noteworthy manner, as expected. Portugal, Germany, Italy and Poland have the highest country β-values and Russia, the UK and Sweden have the lowest (if not counting Norway). In general, the Nordic countries have fairly low scores. Russia is the only one with a negative country β-value, implying it is the only country in Europe where its residents are less likely than Norwegians to be willing to purchase most energy efficient home appliance.

6.2 Model 2

In this model, we have explored the effect of country level control variables GDP and electricity prices on the dependent variable. These variables are continuous and base category is dropped.

6.2.2 Model 2 Results

Together with the individual level control variables, STATA output provided the following results:

Table 5: Model 2 Results

	(1) eneffap
gender	0.183***
	(0.000)
agea	0.0114***
	(0.000)
education	0.139***
	(0.000)
householdi~e	0.000315
	(0.462)
livingarea	0.0488***
	(0.000)
GDP	-0.00432***
	(0.000)
elprices	1.472***
	(0.000)
_cons	6.642***
	(0.000)
N	35041

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Please find complete STATA output attached as Appendix 6.

This model observes the effect of our control variables on the dependent variable. R^2 for this model is 0.026. It is a low value and indicates that these factors only accounts for a very small part (2.6%) of the variance. A low R^2 is not surprising in this study as we are investigating variables that are connected to a larger, complex picture, such as cultural norms, environmental politics and other societal variables. Missing data on 9 346 survey participants reduced the number of observations accounted for here from N = 44 387 to N = 35 041. As we can observe, the direct effect of GDP per capita on our dependent variable is negative and small at -0.00432 and significant at $p<0.001$. This indicates that a higher GDP per capita is associated with less likelihood of a consumer being environmentally conscious in terms of household investments, given their country of residence. The effect of electricity prices, is larger at 1.472, positive and also significant at $p<0.001$. In other words, higher electricity prices imply higher likelihood of a consumer from such a country being willing to pay for the most energy efficient appliance. The effect of electricity prices is larger than the effect of GDP per capita. In other words, the likelihood of a consumer from some country will be more or less likely to be willing to pay for energy efficiency, depend more on electricity prices than GDP per capita (relative income) in terms of magnitude.

6.3 Country Variation

In order to obtain insight into the extent of country variation and the real effect of GDP per capita and electricity prices on country variation, land dummies were estimated with and without country level control variables. We did so by first retrieving the difference between the observed and predicted values for our dependent variable. The observed value for Y (willingness to purchase the most energy efficient home appliance), is a result of an intricate and vast array of socioeconomic and other variables. In the model in this study, explanatory variables such as age, gender, education, income and type of living area are included (X_1, X_2, …, X_n). Each of these variables have a specific effect ($\gamma_1, \gamma_2, \ldots, \gamma_n$), which can be positive or negative, on our dependent variable. Any selection of explanatory variables is likely to produce an error term, ε.

$$Y = \alpha + \gamma_1 X_1 + \gamma_2 X_2 + \varepsilon_i$$

By regressing our model, we can make a predicted value for our dependent variable based on given information about the consumer's socioeconomic status (explanatory variables) and our predicted coefficients.

$$\hat{Y} = \hat{\alpha} + \hat{\gamma}_1 X_1 + \hat{\gamma}_2 X_2$$

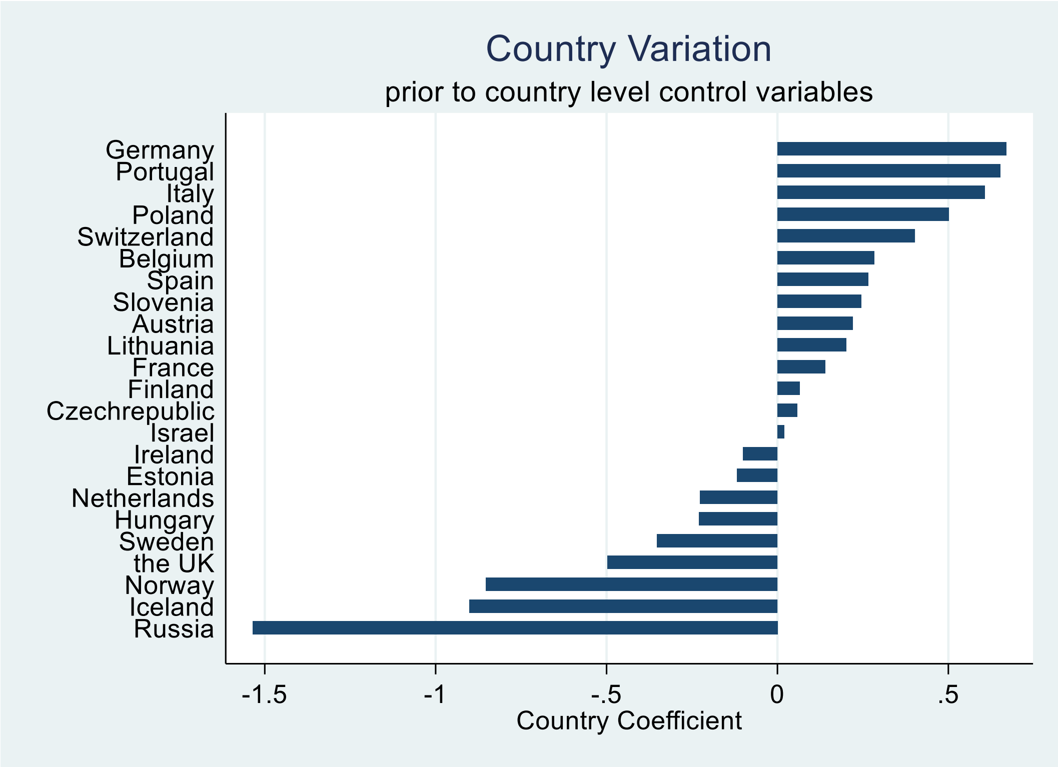
The difference between the observed and our predicted value for the dependent variable, is ε_i.

$$\varepsilon_i = Y - \hat{Y}$$

The mean of ε_i, as it provides information about variation not accounted for by our explanatory variables, can be used to calculate land dummies. Land dummies can serve to tell us about country specific effects on the dependent variable. By comparing land dummies, we can address country variation directly. By producing more than one set of dummies with various control variables, we may also investigate the true effect of some specific variables. In this study, we are mostly interested in investigating the effect of GDP per capita and electricity prices. For our first land dummy, the regression includes only individual level control variables. The second land dummy is calculated in a similar fashion, but in the regression GDP per capita and electricity prices are included. These land dummies inform us of how likely it is for a consumer to be willing to purchase the most energy efficient home appliance, given their country of residence alone. Land dummies can be compared in order to review country variations. In this study, such calculations were done in STATA and produced the following output:

Land dummies 1: Country variation prior to controlling for country level control variables GDP per capita and electricity prices.

Table 6: Country Variation Prior to Country level Control Variables



In order to make a clear distinction between positive and negative country coefficients, they are presented here graphically as bars. As we can observe, the chart is skewed. More countries have positive than negative coefficients and amongst the positive coefficients there is less variation in terms of magnitude. Germany, Portugal, Italy and Poland have the highest coefficients. Amongst the negative values, there are fewer countries and they vary more greatly in magnitude. Russia, Iceland, Norway and the UK have the lowest values. Russia is a distinct outlier here while the other coefficients are all between (-1,1). In terms of geographic locations, we may observe that the countries at the top of our list are all central European or

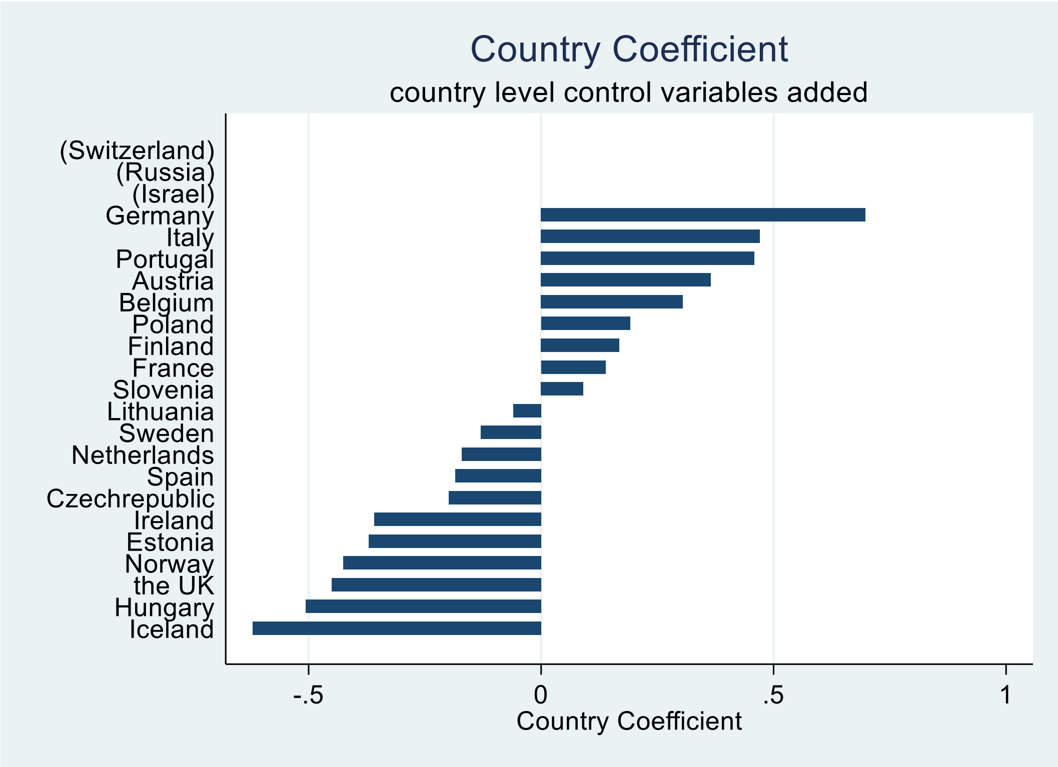
Mediterranean. None of the Nordic countries are at the top. At the lowest end of the scale, however, Nordic and northern countries dominate. It is interesting to note this geographical distinction for many reasons. One reason is that much existing research suggests that environmental efforts and awareness is conditional on social norms. Such norms are linked to historical attitudes, such as the habit of always turning the light off when you leave a room. This again, can be linked to historically high electricity prices (which can linger even after such prices may have dropped). Or, off course, it may be due to a country specific environmental awareness caused by political efforts (such as well working policies) and media attention. In either case, it may be interesting to note not only country differences but also regional and cultural characteristics. In the following map of Europe, coefficients are grouped together and colour coded in an effort to highlight such distinctions. Cold colours (blue) are designated negative coefficients and warm colours (yellow-orange) indicate positive values. The intensity of the colour reflects the magnitude of the coefficients. In other words, dark blue indicates a high and negative coefficient, and bright red indicate high and positive coefficient. Countries not part of this study, are grey by default.

Figure 2: Country Variation Prior to Country level Control Variables

As we may observe in the map, there are no country coefficients that corresponds with the magnitude of Russia, on neither side of the scale. The majority of central and southern Europe is lightly positive in their coefficients. In other words, residents of most of central Europe and along the Mediterranean are have a higher likelihood of being inclined to pay for energy efficiency than those of the northern parts of Europe in general. As already indicated above, this could for example be due to electricity being relatively more expensive in central Europe and along the Mediterranean. In order to check for this, we may repeat the above process and add on control variables for GDP per capita and electricity prices. This resulted in the following STATA output:

Land dummies 2: Results for country variations after controlling for country level control variables GDP per capita and electricity prices[2].

Table 7: Country Variation with Country level Control Variables



Some country coefficients, such as for Lithuania, Czech Republic and Spain, changes from positive to negative after controlling for GDP per capita and electricity prices. This indicates that for these countries, the likelihood of residents being willing to pay for energy efficiency

[2] Please note that at Eurostat, data was not available on Switzerland, Russia or Israel. Although data would have been possible to obtain elsewhere, it proved difficult to get it in matching format as the rest. Therefore, these countries will be left out of the following analysis.

is dependent on electricity prices being relatively high to income and that once this is accounted for, the country coefficient itself drops from positive to negative (residents are less likely to be willing to pay for energy efficiency, were it not for the relatively high electricity bills). This is a possible indicator that these countries are less environmental conscious and more interested in future cost savings when they evaluate energy efficiency in home appliances. Other countries vary somewhat in magnitude, but no outliers. This indicates that although GDP and electricity prices may affect some likelihood of environmental consciousness, it is to a somewhat limited degree. In terms of regional characteristics, we may now review this development in the map:

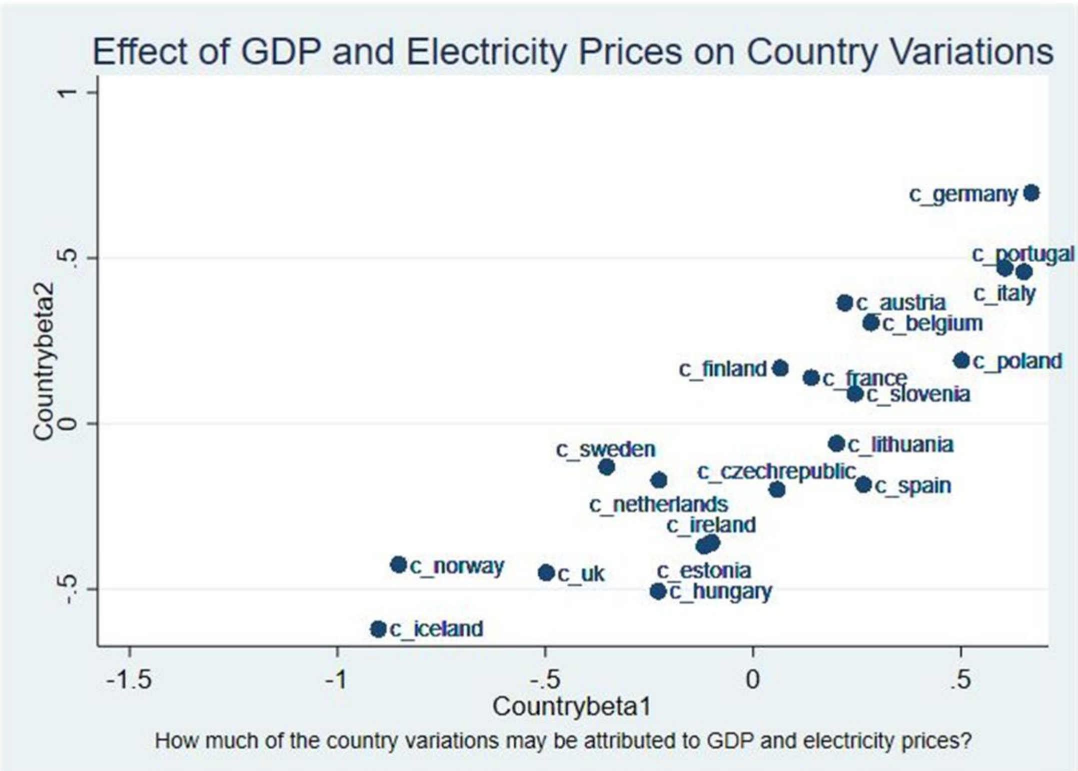
Figure 3: Country Variation with Country level Control Variables

As we can see, central Europe and the Mediterranean appear somewhat more diverse after GDP per capita and electricity prices are accounted for. Although some changes do occur, most evidently by the aforementioned countries and also as the coefficient for Poland drops, we may hardly argue for a clear trend in terms of effect of chosen control variables. Residents of most of northern Europe, except for Finland, remain unlikely to be willing to pay for energy efficiency. Finland is interestingly situated both geographically and culturally close to other Nordic countries, but do not appear to share their distinct unwillingness to pay for energy efficiency. On the contrary, Finland seem to have a positive, albeit mild, likelihood of being environmentally conscious even after the relativeness of electricity prices to income is accounted for. This could possibly be due to effective political efforts, policies and media coverage all contributing to an environmental awareness amongst Finns. Results from our model suggest that GDP and electricity prices account for only a very small part of country variations and also that there exist regional patterns across Europe. As has been suggested in previous literature, social norms and culture are likely related to environmental consciousness. These are often regionally attributed and not necessarily country specific, and can help explain some of the variation and patterns detected here.

6.4 The Effect of Country Level Control Variables on Country Variations

In order to address the real effect of GDP per capita and electricity prices on country variation, the land dummies 1 and 2 will be presented in the following scatterplot to detect any trends:

Table 8: Effect of GDP per Capita and Electricity Prices on Country Variation



If GDP per capita and electricity prices as we have measured them here, made a clear impact on our dependent variable, we would be able to observe that effect here (as a downward sloping line). According to these results, GDP and electricity prices cannot explain the majority of country variations. This could be due to a number of reasons. If this model was based on panel data, taking several years of data into effect, we would be able to account for historical prices and thereby we could possibly have been able to account for attitudes towards energy consumption in a more fruitful manner. In that case, results of the effect of GDP and electricity prices could be different. Other possible explanations for this evident lack of effect, include political efforts and policies. In Germany, both electricity prices and GDP per capita are close to the median. Still their likelihood of being environmentally conscious is much higher than other comparable countries. This indicate that energy policies are likely to have been well implemented in the German society and that Germans are likely to have adopted energy conscious attitudes towards their household investments. It is interesting to note that countries at the lowest end of the spectrum, have in common a high GDP per capita. These countries may depend more heavily on effective policies in order to incentivise environmental efforts in household investments and avoid the “free rider”-problem.

Exploring national prosperity (GDP per capita) and electricity prices and comparing these to each country’s β-value, does in some cases confirm established beliefs from theory and existing literature. Portugal, Italy, Poland, Slovenia, Lithuania, France, Estonia, the Netherlands, Sweden, the UK, Norway and (Iceland) all appear to display compatible results for β-values as they do for electricity over GDP per capita. This implies that these countries display economic behaviour in line with consumer theory suggesting that as usage prices are high compared to income, consumers are more likely to be willing to invest in energy efficient appliances and vice versa. There are also discrepancies for some countries’ β-values and respective electricity price over GDP. Some countries display a willingness to pay for energy efficiency in appliances, that is not in line with consumer theoretic intuition. Germany, Austria, Czech Republic, Ireland and Hungary provide β-values that are somewhat surprising in light of electricity prices / GDP. Czech Republic, Ireland and Hungary have amongst the highest electricity price in relation to income in all of Europe. Yet consumers of these countries display low willingness in purchasing the most energy efficient home appliance. Other countries that display a discrepancy in expected β-values, include Germany in particular and also to some extent Belgium and Austria. These countries display a higher willingness to pay for energy efficiency than other countries with similar levels of electricity price to income ration. Germany have a similar ratio as Estonia, but with twice the β-value. Germany stands out as particularly environmentally aware, whether due to successful implementation of policies, inherent attitudes or other factors.

7. Conclusion

To purchase a home appliance, is for most a fairly expensive and quite rare occasion. Several factors are taken into account: initial investment cost, perceived quality, usage cost and energy efficiency. A preference for energy efficiency, can account for an environmentally friendly attitude and also for future savings on usage costs. The preference for energy efficiency varies amongst consumers. Researchers argue that in terms of environmentally friendly energy usage, efficiency is more effective a tool than direct energy limitations. In order to provide incentives for energy efficiency amongst consumers, several efforts have been made. The EU has implemented an energy efficiency labelling system for home appliances in order to provide the consumers of Europe an opportunity to make informed purchase decisions. This provides a common ground for Europeans wishing to make an environmentally friendly investment for their home. Still, consumers of different European countries vary in their willingness to pay for energy efficiency. Some countries stand out as particularly interesting in our results. Finland and Germany both have a somewhat unexpected high likelihood of being environmentally conscious as compared to other countries with similar characteristics. In general, consumers of Nordic countries are less likely to be environmentally conscious in their household investments. Central and Mediterranean countries are in general more inclined to make energy efficient appliance purchases. This variation can be due to a number of reasons. According to microeconomic theory, it would likely be connected to relative electricity prices and GDP per capita of each country. In this particular model and with the specific measure of variables used here, we were not able to detect such an effect. We conclude that GDP per capita and electricity prices from the previous year, do not account for country variations in environmental purchases in the following year. Still, we would not necessarily rule the effect of those variables out, but assume it is possible that they are in fact part of a rich landscape shaping environmental awareness. Measured over time in panel data, these variables could potentially yield a different result. Other possible explanations for country variations, include implementation of policies and general information available to the consumer. Social norms could also shape regional characteristics, which could account for some variation. The Nordic region is characterized by relatively small countries with high GDP per capita and low electricity prices. Over time this may have resulted in a carelessness in attitude towards energy consumption. These countries may be prone to the so-called “free rider”-problem. To conclude this paper, we may state that there does exist significant evidence of variation in environmental awareness across countries in Europe. This variation is due to a rich landscape of influences and causal effects.

7.1 Methodological Implications and Suggestions for Further Research

Our model is able to detect differences amongst countries in regard to environmental consciousness. The ESS represent a vast amount of data and many variables, making it a rich opportunity for investigating a complicated landscape. There are, however some notable fragilities to this approach. Firstly, our dependent variable, is a self-reported measure of environmental consciousness on a rating scale. It is not in fact an actual measurement of a real purchase. This implies a risk of survey participants being inclined to exaggerate their answer. A consumer may for example project a more environmentally friendly attitude in a questionnaire regarding a hypothetical situation than what they may have actually been willing to pay for in reality. The tone of the survey, clearly indicates the positive aspect of being inclined to purchase the most energy efficient appliance, and so participants may be inclined to respond with a higher number on the scale. Due to this, the element of behavioural economics is relevant to keep in mind when reviewing results. In addition, there is also an issue with using a scale for the dependent variable. Intervals are not more specified than by numbers. It is also worth noting that using a single measure as our dependent variable to investigate cross country differences, may cause some issues as it is bound by a number of influences. In terms of using our dependent variable as a measurement of environmental consciousness, there is a significant limitation to only looking at willingness to purchase an energy efficient appliance. There are many ways in which to be environmentally friendly and one may do other efforts than just this specific action.

In terms of methodological implications of findings, we have touched upon missing data earlier. Although it would have been interesting to investigate the effect of control variables on an outlier like Russia, but in terms of determining general country variations and how much of that variation is attributed to control variables, leaving out 3 countries for the last analysis is not likely to have impacted the overall trend. In terms of choice of model, it is worth noting that several studies that were reviewed used hierarchical linear modelling. By clustering independent variables, they were able to extract information on several group characteristics (for example regional). This could have been a discerning method for detecting patterns across Europe. Lastly worth a mention, is the low value for R^2. This could cause issues in terms of using this model for future predictions.

For future research on country differences, as more data becomes available, historical GDP per capita and electricity prices for all countries could provide more insight. Panel data could possibly better account for the real effect of these variables. Data were not available at the time of this study, but if ESS continue to carry out their survey including their section on climate change, a more extensive dataset could provide a fruitful base for such research. Also recommended, is the use of more objective measures of environmental consciousness. Willingness to purchase the most energy efficient home appliance could be coupled with another measure for real sales for example. These suggestions could offer an opportunity to distinguish between selection and causation effects.

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Appendix 1: GDP per Capita

UNIT	Percentage of EU27 (from 2019) total per capita (based on million euro, EU27 from 2019), current prices									
NA_ITEM	Final consumption expenditure									
GEO/TIME	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
European U	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
European U	103,6	104,0	103,8	105,3	104,8	106,1	108,2	106,0	104,8	104,7
European U	121,5	121,5	120,9	122,6	121,9	123,4	125,7	122,8	120,5	119,9
Euro area (E	117,4	116,3	115,4	115,0	114,8	114,3	113,6	113,4	112,8	112,6
Euro area (1	115,8	114,8	114,3	113,9	113,8	113,8	113,6	113,4	112,8	112,6
Euro area (1	118,9	117,9	117,2	116,7	116,5	116,5	116,2	116,0	115,3	115,0
Belgium	131,1	131,3	132,4	134,7	135,5	134,9	133,3	133,5	132,4	131,5
Bulgaria	20,9	21,1	22,3	23,6	22,9	23,3	24,1	24,6	25,7	27,5
Czechia	52,6	54,0	55,0	53,6	52,4	50,0	51,3	52,7	55,6	59,2
Denmark	170,7	170,6	168,6	171,4	170,5	170,4	169,6	168,3	166,9	165,7
Germany (u	125,6	125,4	126,8	129,2	131,1	132,1	132,1	132,4	132,3	:
Estonia	42,1	41,5	44,1	47,4	50,6	52,7	54,5	56,2	57,9	60,7
Ireland	135,7	126,7	122,8	121,5	120,9	122,5	123,5	125,0	124,3	125,7
Greece	104,3	96,6	86,9	80,1	75,4	73,6	71,5	69,6	68,4	67,3
Spain	95,1	93,7	91,3	88,2	86,2	86,5	87,5	87,6	87,8	:
France	126,9	126,4	126,1	126,4	126,8	126,1	125,1	124,2	122,7	121,7
Croatia	43,9	43,1	42,5	41,8	41,4	40,3	40,0	40,7	42,0	:
Italy	114,5	113,3	112,5	109,6	107,3	106,0	105,6	105,1	104,3	103,5
Cyprus	101,7	100,7	99,1	97,0	90,2	88,0	87,2	86,8	87,4	88,4
Latvia	37,2	36,2	39,8	42,9	45,1	46,3	46,8	47,5	49,9	:
Lithuania	40,6	39,4	42,5	45,0	47,0	48,8	50,1	52,2	54,7	:
Luxembourg	204,4	202,2	203,0	208,0	209,5	210,9	209,8	204,6	203,8	206,8
Hungary	38,0	38,0	37,9	37,4	37,2	37,3	38,0	38,7	40,7	:
Malta	64,1	63,9	65,5	66,7	67,2	67,8	69,1	67,4	66,3	69,0
Netherlands	144,6	143,1	141,5	140,8	140,6	140,2	138,7	137,2	136,1	:
Austria	136,6	135,9	137,8	140,1	141,1	141,5	140,6	139,8	138,7	:
Poland	35,3	39,3	39,9	40,6	40,7	41,4	41,6	40,4	42,8	44,0
Portugal	76,3	76,4	72,7	68,6	68,9	69,7	70,6	71,5	71,7	:
Romania	26,0	25,5	25,9	26,2	27,1	28,4	29,7	31,9	34,7	36,8
Slovenia	70,6	70,1	69,9	68,3	66,2	66,0	66,0	67,1	67,3	:
Slovakia	50,7	50,0	50,5	51,2	51,4	51,9	52,5	52,7	53,5	54,9
Finland	138,9	139,6	143,7	147,2	149,1	149,2	148,3	147,7	144,8	:
Sweden	130,3	146,3	155,8	162,8	166,3	160,1	157,9	157,9	154,0	144,6
United King	129,0	132,2	130,1	141,9	138,2	148,1	164,3	146,9	137,1	136,2
Iceland	120,0	128,5	133,3	141,1	143,8	155,5	169,0	191,9	214,9	:
Liechtenstei	:	:	:	:	:	:	:	:	:	:
Norway	196,6	217,8	225,6	241,7	238,8	228,8	218,1	212,6	212,5	207,8
Switzerland	177,4	190,7	210,0	214,2	210,3	210,8	234,7	225,7	215,7	:
North Mace	16,9	16,8	17,2	17,2	17,7	17,8	18,3	18,3	:	:
Albania	14,5	14,3	14,5	14,8	15,2	15,8	15,9	16,5	17,1	:
Serbia	22,4	21,2	23,5	22,3	23,2	22,6	21,6	21,5	22,4	23,8

Appendix 2: Electricity Prices

NRG_CONS	Consumption less than 1 000 kWh - band DA									
NRG_PRC	Energy and supply									
CURRENCY	Euro									
GEO/TIME	2008S2	2009S2	2010S2	2011S2	2012S2	2013S2	2014S2	2015S2	2016S2	2017
Belgium	0,1993	0,1297	0,1296	0,1293	0,1314	0,1135	0,1095	0,1136	0,1172	0,1335
Bulgaria	0,0419	0,0445	0,0486	0,0418	0,0488	0,0439	0,058	0,0604	0,0583	0,0406
Czechia	0,1064	0,1141	0,1054	0,1051	0,1154	0,1063	0,1014	0,1046	0,1047	0,1094
Denmark	0,0834	0,0501	0,0636	0,0712	0,0565	0,052	0,0499	0,0433	0,0564	0,0388
Germany (until 1990 fo	0,1319	0,1291	0,1385	0,1305	0,1409	0,1389	0,1424	0,1352	0,1251	0,1261
Estonia	0,0314	0,0329	0,032	0,0324	0,0503	0,0488	0,0478	0,0441	0,0456	0,0430
Ireland	:	:	:	0,2243	0,2991	0,3018	0,2953	0,2118	0,1915	0,1625
Greece	:	0,0548	0,0505	0,0804	0,0817	0,102	0,1112	0,1231	0,1048	0,0990
Spain	0,1835	0,1828	0,1637	0,1674	0,1348	0,25	0,2671	0,2976	0,2693	0,3094
France	:	:	:	:	0,1181	0,1287	0,1214	0,1261	0,1255	0,1225
Croatia	0,0947	0,0753	0,074	0,0838	0,0991	0,1123	0,0933	0,0881	0,0898	0,0821
Italy	0,1252	0,132	0,1221	0,1061	0,1247	0,1305	0,1314	0,1249	0,1371	0,1378
Cyprus	:	:	0,1509	0,1883	0,2269	0,1857	0,1739	0,1283	0,1127	0,1527
Latvia	0,0492	0,0494	0,0491	0,0401	0,023	0,013	0,0133	0,0528	0,0494	0,0485
Lithuania	0,038	0,0372	0,0462	0,0487	0,0491	0,0481	0,0503	0,0516	0,0403	0,0382
Luxembourg	0,0929	0,1301	0,099	0,1102	0,1006	0,086	0,0865	0,0765	0,0725	0,0672
Hungary	0,0756	0,0844	0,0762	:	0,0747	0,0576	0,0477	0,0474	0,0482	0,0472
Malta	0,0987	0,194	0,3738	0,3892	0,3946	0,3846	0,3284	0,3308	0,3247	0,3475
Netherlands	0,1126	0,1209	0,109	0,1109	0,1155	0,1171	0,1225	0,1192	0,1156	0,1145
Austria	0,0758	0,0787	0,0787	0,0976	0,0968	0,0978	0,0962	0,0902	0,0877	0,0800
Poland	0,052	0,0548	0,0621	0,0614	0,0666	0,0607	0,0579	0,0585	0,0571	0,0532
Portugal	0,1238	0,1511	0,0795	0,0764	0,1138	0,0827	0,1016	0,0962	0,0905	0,0776
Romania	0,0367	0,031	0,0337	0,0347	0,0284	0,0399	0,0422	0,0453	0,0464	0,0492
Slovenia	0,0481	0,0594	0,058	0,0617	0,0672	0,0643	0,0601	0,0574	0,0579	0,0560
Slovakia	0,0818	0,0739	0,0834	0,077	0,0859	0,0793	0,0696	0,0626	0,0615	0,0538
Finland	0,0847	0,0849	0,0901	0,0988	0,0973	0,0987	0,0931	0,0913	0,0889	0,0887
Sweden	0,0725	0,0613	0,0751	0,0746	0,0687	0,0637	0,054	0,0475	0,0552	0,0489
United Kingdom	0,1114	0,116	:	0,1288	0,152	0,1679	0,1857	0,1597	0,1531	0,1267
Iceland	:	:	:	:	0,0307	0,0305	0,0333	0,037	0,0441	0,0489
Liechtenstein	:	:	:	:	:	:	0,0728	0,0815	0,0758	0,0708
Norway	0,0867	0,0759	0,094	0,0879	0,0799	0,0893	0,0815	0,0649	0,077	0,0717
Montenegro	:	:	:	0,0346	0,072	0,0814	0,0831	0,0846	0,071	0,0380
Former Yugoslav Repu	:	:	:	:	:	:	:	0,0673	0,0445	0,0517
Albania	:	:	:	:	:	:	:	0,0683	0,0695	0,0713
Serbia	:	:	:	:	:	0,018	0,0383	0,0473	0,0518	0,0612
Turkey	0,0828	0,0785	0,0898	0,0628	0,0839	0,0762	0,0747	0,0628	0,0647	0,0501
Bosnia and Herzegovi	:	:	:	:	0,0506	0,0614	:	0,0824	0,0851	0,0894
Kosovo (under United	:	:	:	:	:	0,0325	0,0726	0,0758	0,0771	0,0508
Moldova	:	:	:	:	:	:	:	0,0583	0,06	0,0668

Appendix 3: Correlation Matrix Individual-level Variables

	gender	agea	agea2	educat~n	househ~e	living~a
gender	1.0000					
agea	0.0252	1.0000				
agea2	0.0267	0.9827	1.0000			
education	0.0216	-0.2391	-0.2593	1.0000		
householdi~e	0.0060	-0.0768	-0.0662	-0.0023	1.0000	
livingarea	-0.0152	0.0789	0.0706	-0.1871	-0.0012	1.0000

Appendix 4: STATA Output Model 1.1

Source	SS	df	MS			
				Number of obs	=	43,276
				F(22, 43253)	=	105.02
Model	11507.8532	22	523.084235	Prob > F	=	0.0000
Residual	215443.863	43,253	4.9810155	R-squared	=	0.0507
				Adj R-squared	=	0.0502
Total	226951.717	43,275	5.24440709	Root MSE	=	2.2318

eneffap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
c_austria	1.091665	.0757601	14.41	0.000	.9431734	1.240156
c_belgia	1.101093	.0778881	14.14	0.000	.9484309	1.253755
c_switzerland	1.237068	.0808663	15.30	0.000	1.078569	1.395567
c_czechrepublic	.936939	.0739695	12.67	0.000	.7919573	1.081921
c_germany	1.535913	.0706744	21.73	0.000	1.39739	1.674436
c_estonia	.7213633	.0758015	9.52	0.000	.5727909	.8699357
c_spain	1.053156	.0771167	13.66	0.000	.9020062	1.204307
c_finland	.931982	.0765347	12.18	0.000	.7819727	1.081991
c_france	.9872655	.0753089	13.11	0.000	.8396587	1.134872
c_uk	.3132598	.0761826	4.11	0.000	.1639406	.4625791
c_hungary	.6544717	.0800337	8.18	0.000	.4976041	.8113393
c_ireland	.7136962	.0714682	9.99	0.000	.5736172	.8537752
c_israel	.7100604	.0726641	9.77	0.000	.5676374	.8524834
c_iceland	-.064697	.0945964	-0.68	0.494	-.2501077	.1207137
c_italy	1.369888	.0724048	18.92	0.000	1.227974	1.511803
c_lithuania	1.146003	.0756943	15.14	0.000	.9976408	1.294365
c_netherlands	.5895572	.0788792	7.47	0.000	.4349525	.7441618
c_poland	1.254816	.0792118	15.84	0.000	1.099559	1.410073
c_portugal	1.475152	.0851286	17.33	0.000	1.308298	1.642005
c_russia	-.659016	.0740712	-8.90	0.000	-.8041971	-.513835
c_sweden	.5539675	.0806127	6.87	0.000	.395965	.71197
c_slovenia	1.099478	.0842504	13.05	0.000	.9343461	1.264611
_cons	6.928385	.056946	121.67	0.000	6.81677	7.040001

Appendix 5: STATA Output with Individual level Control Variables

Source	SS	df	MS			
				Number of obs	=	40,873
				F(31, 40841)	=	114.46
Model	16805.7606	31	542.121311	Prob > F	=	0.0000
Residual	193428.566	40,841	4.73613686	R-squared	=	0.0799
				Adj R-squared	=	0.0792
Total	210234.326	40,872	5.14372495	Root MSE	=	2.1763

eneffap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
c_austria	1.086183	.0763462	14.23	0.000	.9365427	1.235823
c_belgia	1.155587	.0791316	14.60	0.000	1.000487	1.310687
c_switzerland	1.276755	.0819989	15.57	0.000	1.116036	1.437475
c_czechrepublic	.926388	.0751818	12.32	0.000	.77903	1.073746
c_germany	1.525682	.0717308	21.27	0.000	1.385088	1.666276
c_estonia	.736729	.0763907	9.64	0.000	.5870015	.8864565
c_spain	1.168443	.0780954	14.96	0.000	1.015374	1.321512
c_finland	.9242207	.0771728	11.98	0.000	.7729603	1.075481
c_france	1.020262	.0759564	13.43	0.000	.8713859	1.169138
c_uk	.3615526	.0772731	4.68	0.000	.2100956	.5130095
c_hungary	.6401434	.0809705	7.91	0.000	.4814395	.7988473
c_ireland	.7663678	.0721699	10.62	0.000	.6249132	.9078224
c_israel	.8302667	.0745377	11.14	0.000	.6841712	.9763622
c_iceland	-.0350911	.0951772	-0.37	0.712	-.2216406	.1514583
c_italy	1.508831	.0741154	20.36	0.000	1.363563	1.654099
c_lithuania	1.023127	.0767991	13.32	0.000	.8725994	1.173655
c_netherlands	.6545529	.0795194	8.23	0.000	.4986931	.8104128
c_poland	1.398284	.0803398	17.40	0.000	1.240817	1.555752
c_portugal	1.550723	.0861535	18.00	0.000	1.381861	1.719586
c_russia	-.6939433	.0745227	-9.31	0.000	-.8400093	-.5478772
c_sweden	.5093646	.0812942	6.27	0.000	.3500261	.6687031
c_slovenia	1.121504	.0852259	13.16	0.000	.9544592	1.288548
female	.1972201	.0217164	9.08	0.000	.1546555	.2397847
agea	.0776264	.0148715	5.22	0.000	.0484779	.106775
agea2	-.0006409	.0002958	-2.17	0.030	-.0012207	-.000061
agea3	1.49e-08	1.84e-06	0.01	0.994	-3.60e-06	3.63e-06
edu_medium	.4149972	.0301864	13.75	0.000	.3558312	.4741632
edu_high	.5707765	.0350106	16.30	0.000	.502155	.639398
income_medium	.1867921	.0252272	7.40	0.000	.1373462	.2362381
income_high	.2350309	.0317969	7.39	0.000	.1727082	.2973536
urban	-.0479001	.0240235	-1.99	0.046	-.0949866	-.0008136
_cons	4.289189	.2380007	18.02	0.000	3.822703	4.755676

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Appendix 6: STATA Output Model 2

Source	SS	df	MS			
				Number of obs	=	35,041
				F(7, 35033)	=	132.02
Model	4285.43555	7	612.205079	Prob > F	=	0.0000
Residual	162453.111	35,033	4.63714529	R-squared	=	0.0257
				Adj R-squared	=	0.0255
Total	166738.546	35,040	4.75852016	Root MSE	=	2.1534

eneffap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gender	.1834142	.022709	8.08	0.000	.1389039	.2279245
agea	.0114216	.000684	16.70	0.000	.010081	.0127622
education	.139189	.0066005	21.09	0.000	.1262519	.1521261
householdincome	.0003145	.0004271	0.74	0.462	-.0005227	.0011517
livingarea	.0487911	.0097024	5.03	0.000	.0297741	.067808
GDP	-.0043218	.0002519	-17.16	0.000	-.0048154	-.0038281
elprices	1.472018	.1869279	7.87	0.000	1.105633	1.838402
_cons	6.641659	.0744267	89.24	0.000	6.495781	6.787538

Appendix 7: Do-file 1 (Individual level)

Appendix 8: Do-file 2 (Country level)