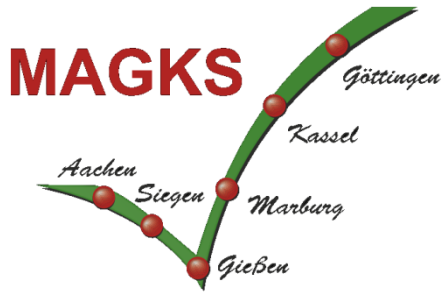

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Economic calculus or personal and social values? A micro-econometric analysis of the acceptance of climate and energy policy measures

March 2017

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Abstract

Based on data from a representative survey among more than 2200 households, this paper empirically examines the agreement to the German energy transition in total and to six single energy policy measures, which are components of this challenging national policy approach. Our micro-econometric analysis with uni- and multivariate binary and ordered probit models reveals that both economic calculus and personal and social values are relevant for this agreement. An expected future electricity price increase due to the energy transition (which especially incorporates the price expectations in the hypothetical case that the measures of the energy transition are withdrawn) is significantly negatively correlated with the agreement to the two core measures of the energy transition, namely the nuclear phase-out and the financial support of the expansion of renewable energies. While other economic variables like income and energy expenditures also have some significant effects, our estimation results especially reveal that political identification and other personal values are at least equally relevant. For example, an overall left-green orientation is significantly positively correlated with the agreement to the energy transition in total and especially to the aforementioned core measures of the energy transition, which are also significantly positively affected by strong environmental values. Our econometric analysis suggests that studies that only include economic variables or only include personal and social values in order to explain the acceptance of policy measures can lead to biased estimation results and thus distorted conclusions. For policy makers our study additionally identifies important skeptical population groups which might be addressed in order to increase the acceptance of climate and energy policy measures like the German energy transition.

JEL classification: Q48, Q54, A13, C25

Keywords: Climate and energy policy measures, energy transition, energy cost expectations, political identification, environmental values, uni- and multivariate binary and ordered probit models

1. Introduction

The UNFCCC (United Nations Framework Convention on Climate Change) Conference of the Parties (COP21) in December 2015 in Paris has led to an agreement among the global community on the reduction of global warming (UNFCCC, 2015). In October 2016, enough countries have ratified the agreement so that it came into force in November 2016. A main component of the agreement are the so-called "nationally determined contributions", i.e. each country that ratifies the agreement has to set a target for the reduction of greenhouse gas emissions. However, the amount of this target is completely voluntary and furthermore there is no enforcement mechanism if a set target is not met. But even if a country is willing to meet an ambitious target, it is the question how these targets can be translated into national regulations. Previous international climate negotiations and corresponding national climate policy measures have shown that their success especially depends on the acceptance by citizens of the respective countries. Therefore, knowledge about the determinants of the agreement to specific measures and thus the identification of population groups who agree or disagree is very helpful, especially for policy makers.

The German energy transition towards renewable energies ("Energiewende"), which was at the beginning of the 1980s only a vision of some environmentalists in the political debate (e.g. Strunz, 2014), is currently one of the most challenging and disputed national energy policy measures worldwide. It is especially characterized by two measures, namely the financial support of the expansion of renewable energies and the nuclear phase-out (e.g. Frondel et al., 2015). Due to the relevance of the latter measure, the energy transition is not exclusively a climate policy approach. Nevertheless, in line with the Paris agreement, the reduction of greenhouse gas emissions is still a main objective. The first progress report of the energy transition by the Federal Ministry for Economic Affairs and Energy (BMWi, 2014) suggests a reduction of the greenhouse gas emissions by 55% until 2030 and at least by 80% until 2050 compared with the values in 1990, especially by increasing the share of renewable energies among the gross electricity consumption to at least 80% in 2050. The main instrument for the support of renewable energies is the Renewable Energy Act (Erneuerbare-Energien-Gesetz, EEG), which came into force already in 2000.

While the energy transition in total, but also their two core measures are widely accepted by a majority in the German population (e.g. BDEW, 2015, Andor et al., 2016), they are

still criticized by some groups in the political (e.g. by the Liberal Democratic Party, FDP) and academic (e.g. Frondel et al., 2015) arena. This opposition especially refers to the feed-in-tariff system for the promotion of renewable energies, which would be a major driver of increasing energy prices (see e.g. the discussion in Gawel et al., 2015). But also the power grid expansion, which is another component of the energy transition, is controversial, even in large parts of the population as several protest campaigns by local citizens' initiatives show. Against this background, we empirically analyze the determinants of the agreement to the energy transition in total and to six single energy policy measures, which are components of the energy transition. In addition to the already mentioned three measures, we thus also consider the support of research to improve the efficiency of gas and coal power plants, the financial support of the expansion of electromobility, and the financial support of saving energy in households and industry.

Empirical analyses of the individual acceptance of climate and energy or more generally environmental policy measures suggest the relevance of economic factors like income (e.g. Kahn and Matusaka, 1997) and especially prices or costs (see e.g. the stated choice experiments in Dietz and Atkinson, 2010, Bristow et al., 2010, Saelen and Kallbekken, 2011, Carlsson et al., 2011, 2013, Shin et al., 2014, Lundhede et al., 2015, Gevrek and Uyduranoglu, 2015, Contu et al., 2016, Ščasný et al., 2017). However, it should be noted that personal benefits of measures that lead to a reduction of greenhouse gas emissions, but also other energy policy measures like the nuclear phase-out or the power grid expansion are widely non-excludable and non-rival and thus have a public good character (e.g. Bornstein and Lanz, 2008). Against this background, many studies show that the contribution to public goods (and especially to climate protection) is not only driven by economic factors or self-interest, but also by other motives and thus personal or social values such as the political identification (e.g. Kahn, 2007, Dastrup et al., 2012, Carlsson et al., 2012, Costa and Kahn, 2013, Schwirplies and Ziegler, 2016, Ziegler, 2017).

The relevance of political identification is also shown for the agreement to environmental and specifically climate and energy policy measures (e.g. Kahn and Matsusaka, 1997, Thalmann, 2004, Hammar and Jagers, 2006, Bornstein and Lanz, 2008, Attari et al., 2009, Jagers et al., 2010, Unsworth and Fielding, 2014, Ziegler, 2017). The generally revealed positive effect of a left-green identification can be explained by the controversial positions of different parties. While in Germany all dominant parties more or less support an energy transition, right-wing and especially far right-wing parties (e.g. the

party “Alternative for Germany”, AfD) often strongly criticize at least several energy policy measures such as the financial support of the expansion of renewable energies as aforementioned, but also the speedy nuclear phase-out. In contrast, the Social Democratic Party (SPD), the Left Party (Die Linke), and especially the Green Party (Bündnis 90 / Die Grünen) more strongly support several components of the energy transition. In line with, for example, Ziegler (2017), we therefore also expect positive effects of a left-green identification on the agreement to the energy transition in total and to the six single energy policy measures in our empirical analysis.

However, previous studies also show that not only political identification, but also other non-economic motives and especially environmental values, which reflect (besides political orientation) another component of worldviews (e.g. Attari et al., 2009), play an important role for climate protection activities (e.g. Kotchen and Moore, 2007, Attari et al., 2009, Unsworth and Fielding, 2014, Delmas and Lessem, 2014, Schwirplies and Ziegler, 2016, Ziegler, 2017) and for the support of climate and energy policies (e.g. Attari et al., 2009, Unsworth and Fielding, 2014, Ziegler, 2017). In order to quantify environmental values, many of these studies use indicators on the basis of the New Ecological Paradigm (NEP) scale, which was developed by Dunlap et al. (2000). This approach is based on the concept that a multi-item scale is a more reliable measure of environmental values than a single-item variable (e.g. Kotchen and Reiling, 2000). Dunlap et al. (2000) also show that higher NEP scores are positively correlated with the support of pro-environmental policy behaviors. In line with these studies, we also use a NEP scale as indicator for environmental values in our empirical analysis and expect that not only a left-green orientation, but also this NEP score has positive effects on the agreement to the energy transition in total and to the six single energy policy measures.

The contribution of our study to empirical analyses of the agreement to environmental, climate, and energy or even other policy measures is three-fold. First, we consider several economic variables in order to examine whether self-interest plays a role. Besides (household) income (like in many of the aforementioned studies and in line with Kahn, 2002, and Wu and Cutter, 2011, who also consider environmental policy measures in California), we additionally analyze (household) energy expenditures, which might have a negative effect on energy policy measures that lead to higher energy prices according to economic calculus. Our main economic indicators refer to (subjective) expected future energy price developments due to the energy transition. However, such simple price ex-

pectations seem to be insufficient explanatory factors if price expectations in the hypothetical case that the measures of the energy transition would not be taken are ignored. Instead, it can be hypothesized that only the expectation that the prices increase faster (or decrease slower) due to the energy transition compared to the hypothetical case that the measures of the energy transition are withdrawn is negatively correlated with the agreement to the energy transition in total and to single energy policy measures. We therefore construct corresponding indicators for four energy sources and forms, namely electricity, natural gas, heating oil, and gasoline/diesel.

Second, we consider a wide range of personal and social values. The analysis of political identification as our main factor is in line with the studies as discussed above. However, Kahn and Matsusaka (1997) or Bornstein and Lanz (2008) do not use data at the individual, but at the regional (i.e. county or municipal) level and thus only consider local political preferences. In contrast, we examine both the relevance of local political preferences and individual political identification to identify whether regional or personal values are dominant (whereas e.g. Thalmann, 2004, only considers an indicator for the latter in his empirical analysis). Besides the additional inclusion of environmental values, which are measured on a NEP scale as discussed above, we also consider the relevance of religious values, i.e. local religiousness with respect to the dominance of Catholics or Protestants. Several studies show that (Christian) religious values are highly correlated with macroeconomic indicators as well as general economic and social behavior (see e.g. the overviews in Hilary and Hui, 2009, Renneboog and Spaenjers, 2012, Shu et al., 2012), especially including behavior on financial markets (e.g. Kumar, 2009, Kumar et al., 2011, Kumar and Page, 2014), but also sustainable and pro-environmental behavior (e.g. Carlsson et al., 2012, Martin and Bateman, 2014, Cui et al., 2015) including socially responsible or controversial investing (e.g. Hood et al., 2014, Borgers et al., 2015).

Third, with respect to our main indicators of personal values, we consider a much more sophisticated categorization of political identification (see also the discussion in Unsworth and Fielding, 2014). Previous empirical studies mostly consider one-dimensional indicators for a left-green or a right-conservative orientation (e.g. Kahn and Matusaka, 1997, Thalmann, 2004, Hammar and Jagers, 2006, Bornstein and Lanz, 2008, Attari et al., 2009, Jagers et al., 2010, Unsworth and Fielding, 2014). However, it is possible that political orientations are interrelated, which cannot be captured by the simple left-green and right-conservative split, especially in Europe. In Germany, for example, the identifi-

cation with conservative policy can be correlated with an ecological and particularly with a liberal identification, in contrast to the often very sharp differences between liberals and conservatives in the USA. In order to better understand the different drivers of political identification, we consider four variables for the identification with conservative, liberal, social, and ecological policy, respectively, which are not mutually exclusive.

Our empirical analysis is based on data from a representative computer-assisted telephone survey in Germany. It might be argued that stated agreements to policy measures in surveys can be unreliable since the statements are not binding (e.g. Kahn, 2002). This is the reason why several studies do not consider survey-based data, but data from referenda, especially in California (e.g. Kahn and Matusaka, 1997, Wu and Cutter, 2011) and Switzerland (e.g. Bornstein and Lanz, 2008). In our case of the energy transition such analyses are obviously not possible since Germany does not have any instrument of direct democracy at the federal level. However, the main problem of such studies is that they are based on aggregated data at the regional (i.e. county or municipal) level since referendum data are not available at the individual or household level under anonymous voting. According to, for example, Wu and Cutter (2011), this can lead to strong aggregation biases in the analysis of effects of several (aggregated) variables on the (aggregated) approval to policy measures. In order to avoid these biases and to disentangle the effects of personal and regional values, we therefore use survey-based data for our empirical analysis, which is in line with, for example, Thalmann (2004), Hammar and Jagers (2006), Attari et al. (2009), Jagers et al. (2010), Unsworth and Fielding (2014), or Ziegler (2017).

Our micro-econometric analysis with uni- and multivariate binary and ordered probit models reveals that both economic calculus and personal and social values are relevant for the agreement to the energy transition in total and to single energy policy measures. Our measure for the expected future electricity price increase due to the energy transition is significantly negatively correlated with the agreement to the two main components of the energy transition, i.e. the nuclear phase-out and the financial support of the expansion of renewable energies. While other economic variables like income and energy expenditures also have some significant effects, personal values are obviously at least equally relevant. With respect to political preferences, for example, an overall left-green orientation is significantly positively correlated with the agreement to the energy transition in total and especially to the aforementioned main components of the energy transition. In

addition, the agreements to the nuclear phase-out and to the financial support of the expansion of renewable energies are also significantly positively affected by strong environmental values. In contrast, a high share of regional votes for the main left-wing parties has only a significantly positive effect on the agreement to the power grid expansion, whereas the religious environment as further indicator for social values has no robust significant effects.

The remainder of the paper is organized as follows: Section 2 presents the data and the variables in our micro-econometric analysis. Section 3 reports some descriptive statistics, explains the econometric approaches, and discusses the estimation results. Section 4 draws some conclusions.

2. Data and variables

The data for our empirical analysis were collected from a representative computer-assisted telephone survey among 2243 households in Germany.[1] The survey was carried out between March and May 2015 by the market research company Sozialwissenschaftlichen Umfragezentrum (SUZ GmbH) in Duisburg, Germany, which was jointly commissioned by the Centre for European Economic Research (ZEW), Mannheim, and the University of Kassel. On the basis of a random sample of German households, household members who were at least 18 years old and who were sufficiently informed about the energy consumption in the household (mostly the heads of the household) were asked for the interviews. The questionnaire comprised two parts: One larger part (coordinated by ZEW) that refers to the energy consumption and the measurement of energy poverty and a smaller part (coordinated by the University of Kassel) that refers to attitudes toward energy policy measures, the energy transition, and their economic consequences. The empirical analysis in this paper is particularly based on the data from this second part of the questionnaire.

Those respondents who have at least a basic understanding of the German energy transition[2] were asked how strongly they agree to the measures of the energy transition on a

[1] Specifically, the survey is based on a random sample of telephone numbers including both landline and mobile phone numbers. The sample of landline numbers especially also comprises those numbers that are not listed in the telephone directory.

[2] The participants were asked which of the following statements they are most likely to agree with: „I have never heard about it", "I have heard about it, but do not exactly know what it is about", or "I know what it is about". Only the small group of 76 respondents who stated that they have never heard about the German transition was excluded from the question about its acceptance.

symmetric scale with five ordered response categories ranging from (1) "totally disagree" to (5) "totally agree". In addition, all respondents (and not only those respondents with a basic understanding of the energy transition) were asked how strongly they agree to six single energy policy measures, which are components of the German energy transition: The nuclear phase-out, the financial support of the expansion of renewable energies (e.g. wind and solar energy), the support of research to improve the efficiency of gas and coal power plants, the financial support of the expansion of electromobility, the financial support of saving energy in households and industry, and the power grid expansion. The response options of these six questions ranged again between (1) "totally disagree" and (5) "totally agree" on a five-point symmetric ordered scale. For the econometric analysis, we consider the corresponding seven raw ordinal variables and additionally construct seven aggregated dummy variables which take the value one if one of the two highest categories (4) or (5) were indicated, respectively.

Our main economic explanatory variables in the econometric analysis to explain the agreement to the energy transition in total and to the single energy policy measures refer to the expected future price developments of different energy sources and forms due to the energy transition. Considering five ordered response categories on a symmetric scale, the respondents were therefore asked whether the prices especially for electricity, but also for natural gas, heating oil, and gasoline/diesel will on average "strongly decrease", "weakly decrease", "remain almost equal", "weakly increase", or "strongly increase" within the next five years, respectively. However, as discussed above, these price expectations seem to be insufficient explanatory factors if individuals have similar price expectations in the case that the measures of the energy transition would not be taken. We instead assume that only the relationship between the expected energy price developments due to the energy transition and the expected energy price developments in the hypothetical case that the measures of the energy transition are withdrawn is relevant.[3]

Considering the same five ordered response categories on a symmetric scale ranging again from "strongly decrease" to "strongly increase", the respondents were therefore also asked for their expectations of the prices for the four energy sources and forms within the next five years in this hypothetical case. On this basis, we construct the four dummy variables "expected price increase electricity due to energy transition", "expected

[3] In fact, preliminary estimations have shown that this variable alone for the expected increase of electricity or other energy prices has no robust significant effect on the agreement to the energy transition in total and to the single energy policy measures.

price increase natural gas due to energy transition", "expected price increase heating oil due to energy transition", and "expected price increase gasoline/diesel due to energy transition" that take the value one if the values for the first variable (which refer to the expectations with the current measures of the energy transition) is higher than the values for the second variable (which refer to the hypothetical expectations without the measures of the energy transition). The variable for electricity is included in all econometric models. In contrast, since it cannot be theoretically hypothesized that the other variables are related to the agreement to all energy policy measures, the variables for natural gas, heating oil, and gasoline/diesel are only included in the econometric analysis of the agreement to the energy transition in total and to the financial support of saving energy in households and industry. In addition, the variable for gasoline/diesel is included in the econometric analysis of the agreement to the financial support of the expansion of electromobility.

We consider two further economic explanatory variables that refer to the household net income and the household energy expenditures. In order to control for the different household sizes, we consider the weighted household income per capita that is based on a usual approach in official statistics (e.g. Statistisches Bundesamt and Wissenschaftszentrum Berlin für Sozialforschung, 2013), which weights the first person in the household with the factor one, children with the factor 0.3, and other household members who are older than 14 years with the factor 0.5. The variable "equivalized income" is then the corresponding weighted net income in Euro divided by 1000.[4] Furthermore, the respondents were asked for the household expenditures for electricity and heating. We weight these energy expenditures by considering the same factors as in the case of income. The dummy variable "high equivalized energy expenditures" takes the value one if the equivalized value is higher than the median in the sample. It should be noted that for both variables we have trimmed the one percent of the highest and lowest values in order to avoid possible incorrect data (e.g. some zero values) and outlier problems.

Our main indicators for personal values as explanatory variables in the econometric analysis refer to political identification. In this respect the respondents were asked how

[4] While we asked for the exact amounts of the net income, the respondents could also select specific income classes if they refused to state the exact amount. For a better approximation of the income these respondents were asked for their position within the income class (i.e. in the middle of the class, above the middle, or below the middle). If these respondents answered to the position question, we assign the lower, middle, and upper quartiles, respectively, on the basis of an assumed uniform distribution of the income within the income classes. If the respondents refused to answer, we assign the mean of the income classes.

strongly they agree to the four following statements: "I identify myself with conservatively oriented policy", "I identify myself with liberally oriented policy", "I identify myself with socially oriented policy", and "I identify myself with ecologically oriented policy". The response options of these four questions ranged again between (1) "totally disagree" and (5) "totally agree" on a five-point symmetric ordered scale. This larger set of items allows a clearly more differentiated pattern of political orientation compared to previous studies as discussed above. Based on these questions, the econometric analysis includes the four dummy variables "conservative policy identification", "liberal policy identification", "social policy identification", and "ecological policy identification" that take the value one if the respondent indicated one of the two highest categories (4) or (5), respectively.

As indicator for environmental values, we consider the NEP scale (e.g. Dunlap et al., 2000), which is a standard instrument in the social and behavioral sciences and is increasingly common in the economic literature as discussed above. It is based on the following six statements:[5] "Humans have the right to modify the natural environment to suit their needs", "Humans are severely abusing the planet", "Plants and animals have the same right to exist as humans", "Nature is strong enough to cope with the impacts of modern industrial nations", "Humans are meant to rule over the rest of nature", and "The balance of nature is very delicate and easily upset". The response options of these six questions ranged again between (1) "totally disagree" and (5) "totally agree" on a five-point symmetric ordered scale. The variable "NEP" is designed by constructing dummy variables that take the value one if the respondent indicated one of the two highest categories (4) or (5) in the case of the three positively keying statements or one of the two lowest categories (1) or (2) in the case of the three negatively keying statements and by adding up the values of the six dummy variables. As a consequence, "NEP" varies between zero and six.

With respect to further motives, we also analyze social values at the regional level. In line with the individual political identification, we consider the variable "regional frequency left-wing parties" for local political preferences. It is measured by the share of votes at the constituency level for the main left-wing parties, i.e. the Social Democratic

[5] The construction of NEP scales is not consistent in previous empirical studies, i.e. only very few studies (e.g. Kotchen and Reiling, 2000) use all 15 items with exactly five ordered response categories for the agreement to the statements as suggested by Dunlap et al. (2000) (see also Ziegler, 2017). We refer to Whitmarsh (2008, 2011) who points to pilot studies that showed that many respondents had difficulties to interpret nine of the 15 NEP items.

Party (SPD), the Left Party (Die Linke), and the Green Party (Bündnis 90 / Die Grünen), at the last German parliamentary elections ("Bundestagswahl") 2013. The basis for the calculation of these shares for each observation is the assignment of the postcodes of the households to the constituencies. Furthermore, we consider the religious environment by examining the shares of Catholics and the shares of Protestants at the county level. The basis for the calculation of these shares for each observation are data from the last German census 2011 and the assignment of the postcodes of the households to the counties. Due to high shares of unknown religious affiliation in some counties, however, we do not consider the raw shares of Catholics or Protestants, but the dummy variable "Catholic environment" that takes the value one if the share of Catholics in the county is higher than the share of Protestants.

Finally, we include several control variables in our econometric analysis. While the dummy variable "female" takes the value one if the respondent is a woman, the dummy variables "foreign" and "high education" take the value one if the respondent has a migration background (i.e. if the respondent is born abroad or is no German citizen) and if the highest level of education is at least secondary ("Abitur"). Furthermore, the variable "age" is the age of the respondent in years and the dummy variable "kids" takes the value one if one or more children live in the household of the respondent. Finally, we control for regional heterogeneities, which seems to be important for the acceptance of several energy policy measures according to Andor et al. (2016). We include the dummy variable "Eastern Germany" that takes the value one if the respondent lives in the federal states of the former East Germany (i.e. Mecklenburg-Western Pomerania, Brandenburg, Thuringia, Saxony-Anhalt, Saxony) plus Berlin.

3. Empirical results

3.1. Descriptive statistics

While Table 1 reports the detailed frequencies of the agreement to the energy transition in total and to the six single energy policy measures, the upper part of Table 2 reports the means and standard deviations for the corresponding aggregated dummy variables as discussed above. The tables reveal that about half of the respondents generally agreed to the measures of the energy transition (i.e. indicated the two highest categories). This seems to be a rather low agreement compared to the results of other studies. However, it should be noted that the questions in empirical studies about the acceptance of the energy

transition often differ substantially. BDEW (2015), for example, asked for the importance of the energy transition and reports that about 90% of the German respondents indicated that the energy transition is either "very important" or "important". However, other survey results in that study reveal that a majority of the respondents is dissatisfied with the progress of the energy transition. Furthermore, it should be noted that the question in BDEW (2015) is based on a scale with only four ordered response categories including the alternatives "less important" and "not important at all". Our survey results on the basis of the five ordered response categories reveal that more than a third of the participants indicated the middle category (3) and only about 12% of the participants disagreed to the measures of the energy transition by indicating the two lowest categories (1) and (2). Therefore, our results do not generally contradict the results of other studies.

Table 1 and the upper part of Table 2 additionally reveal a stronger agreement to several single energy policy measures: More than three quarters of the respondents agreed (by indicating the two highest categories) to the nuclear phase-out (more than 63% of the participants even totally agreed to this measure), the financial support of the expansion of renewable energies, and the financial support of saving energy in households and industry. While the agreement to the financial support of the expansion of electromobility and the power grid expansion is lower, the support of research to improve the efficiency of gas and coal power plants is interestingly the lowest and the only measure for which the agreement is even lower than the agreement to the energy transition in total. The more critical view on this measure can be explained by the strong rejection of the use of coal or even the new construction of coal power plants as reported in Andor et al. (2016) so that the efficiency improvement in such plants is obviously not sufficient for a higher acceptance. Nevertheless, our results strengthen the results of previous studies (e.g. Andor et al., 2016) that the most important measures of the energy transition are highly accepted or at least not generally rejected by the majority of the German population.

Table 2 additionally reports the means and standard deviations of the explanatory variables in the econometric analysis. In order to classify the descriptive statistics for the expected future price developments due to the energy transition, we first take a brief look on the underlying main components of the variables.[6] As expected, a strong majority of nearly 85% of the respondents stated that the price for electricity will on average (strongly or weakly) increase within the next five years. The corresponding values for natural

[6] These values are not reported in Table 2 due to brevity.

gas, heating oil, and gasoline/diesel are about 83%, 87%, and 88%, respectively. Especially the result for electricity is not very surprising. In Germany there is a controversial debate about the increase of electricity prices (e.g. Gawel et al., 2015), particularly as a consequence of the support of renewable energy sources in the electricity sector by feed-in-tariffs in accordance with the EEG. While this measure is heavily criticized as discussed above, the discussion obviously neglects the possible price increases if the measures of the energy transition are withdrawn. At least the expectations of the majority of our respondents are clear in this respect: Between about 61% (for electricity) and 78% (for gasoline/diesel) of them stated that even in this case the prices would on average (strongly or weakly) increase within the next five years.

As a consequence, only a minority of the respondents indicated that the prices for the four energy sources and forms increase faster (or decrease slower) due to the energy transition compared to the hypothetical case that the measures of the energy transition are withdrawn. In line with the aforementioned price discussion, it is not surprising that the value of about 41% is highest for electricity. However, this means reversely that nearly 59% of the respondents did not expect that the electricity prices increase faster (or decrease slower) due to the energy transition. This high value naturally comprises a large frequency of nearly 40% of the respondents who expected that the electricity price development is equal with and without the measures of the energy transition, but nearly 19% of the respondents even stated that the electricity prices increase slower (or decrease faster) due to the energy transition. In addition, for the three other energy sources and forms, the frequencies of the respondents who indicated that the prices increase faster (or decrease slower) due to the energy transition are even smaller with values between about 25% and 31%. Therefore, the fear that the energy transition alone causes strong price increases for electricity or other energy sources and forms is obviously not shared by the majority of the German population.

With respect to political identification, Table 2 reveals that the frequencies for an orientation to conservative or liberal policy are clearly lower than the frequencies for an orientation to social or ecological policy. While the high mean of nearly 50% for the identification with ecological policy seems to be surprising, it should be mentioned that this identification should not be equated with the agreement to the Green Party since almost all political parties in Germany claim that their policy is ecologically oriented. These claims are supported by our results that the two variables “conservative policy identifica-

tion" and "ecological policy identification" are nearly uncorrelated and thus not negatively correlated so that orientations to conservative and ecological policies are not mutually exclusive. Nevertheless, the low value for a liberal identification and the high value for an ecological identification as well as the high average value for our NEP variable differ from the corresponding results in Ziegler (2017). However, the questions in the underlying surveys in Germany slightly differ and the survey for the latter study was already carried out in 2013. Furthermore, it was a computer-based survey and not a telephone survey as in the current study. Therefore, it is possible that a social desirability bias toward "green" questions is a bit higher in this study. Nevertheless, such biases should not distort the estimation results in our econometric analysis if all relevant explanatory variables are included.

3.2. Econometric approaches

The dependent variables for the econometric analysis of the agreement to the measures of the energy transition in total and to the six single energy policy measures are binary or ordinal. Therefore, we use binary and ordered probit models. The underlying continuous latent variables y_{ij}^* for respondent i (i = 1,…, n) and for the j = 1,…, 7 dependent variables can be specified as:

$$y_{ij}^* = \beta_j' x_i + \varepsilon_{ij}$$

The k-dimensional vector $x_i = (x_{i1}, \dots, x_{ik})'$ comprises the explanatory variables as discussed above (which vary across the six single energy policy measures as aforementioned). The vectors β_j contain the corresponding unknown parameters and ε_{ij} are the standard normally distributed error terms for each j.

In the case of binary probit models, these unobservable latent variables can be related to the observed binary dependent variable y_{ij} that takes the values one if respondent i indicated one of the two highest categories (4) or (5) for the agreement to the energy transition in total or to the six single energy policy measures as follows:

$$y_{ij} = \begin{cases} 1 & \text{if } y_{ij}^* \geq 0 \\ 0 & \text{if } y_{ij}^* < 0 \end{cases}$$

In the case of ordered probit models, these unobservable latent variables can be related to the observable indicated alternative among the m = 1,…, 5 ordered response categories as follows:

$$y_{ij} = m \quad \text{if } \kappa_{m-1,j} < y_{ij}^{*} < \kappa_{mj}$$

The κ_{mj} are the threshold parameters with $\kappa_{0j} = -\infty < \kappa_{1j} < \cdots < \kappa_{4j} < \kappa_{5j} = \infty$.

While the use of common univariate binary and ordered probit models is appropriate for the analysis of the agreement to the energy transition in total, we consider multivariate binary and ordered probit models for the joint analysis of the agreement to the six single energy policy measures that allow for potential correlations between the six dependent variables in the error terms of the underlying latent variables. While univariate binary and ordered probit models can be commonly estimated by the maximum likelihood method (ML), the estimation of multivariate binary and ordered probit models requires the application of the simulated maximum likelihood method (SML) using the Geweke-Hajivassiliou-Keane (GHK) simulator (Börsch-Supan and Hajivassiliou, 1993, Geweke et al., 1994, Keane, 1994). In this respect, we use 50 random draws in the GHK simulator. Furthermore, we always consider robust estimations of the standard deviations of the parameter estimates according to White (1982). All estimations (just like the calculations in Table 1 and Table 2) were conducted with the statistical software package STATA. For the SML estimation of the multivariate binary and ordered probit models we specifically used the Stata module "CMP" according to Roodman (2011).

3.3. Estimation results

Table 3 reports the ML estimations of univariate binary and ordered probit models for the determinants of the agreement to the energy transition in total. It reveals that respondents from Western Germany significantly more often agree to the measures of the energy transition.[7] Besides this control variable only two further explanatory variables are robustly significantly correlated with the dependent variables across both model approaches.[8] With respect to our main economic explanatory variables, the parameters for

[7] With respect to the interpretation of the estimation results in ordered probit models, we use such simpler phrases for brevity in the following. We thus abstain from the specific interpretation in the case of a significantly positive parameter that the corresponding variable is significantly positively correlated with increasing values of the dependent variables (i.e. with an increasing agreement to the energy transition). Furthermore, we do not point in this case to the significantly positive correlation with the highest value (5) of the dependent variable ("totally agree") and the significantly negative correlation with the lowest value (1) of the dependent variable ("totally disagree").

[8] We generally interpret the relationships for the price expectations and the political identification as correlations rather than causal effects since we cannot completely exclude the possibility that the agreement to the energy transition in total or several energy policy measures affects the (stated) price expectations or political identification. For future research, panel data analyses might be useful to identify a causal relationship between these explanatory and dependent variables.

the variable “expected price increase heating oil due to energy transition” are significantly negative in both model approaches, which points to the relevance of economic calculus for the agreement to the energy transition. While it seems to be rather surprising that only the variable for heating oil, but not for the other energy sources and forms (and especially not for electricity) is significantly correlated with the dependent variable, it should be noted that the four explanatory variables are highly positively correlated with each other. In fact, further estimations show that the parameter for electricity is weakly significantly negative in some model specifications if the variables for the other three energy sources and forms are excluded.

However, the estimation results show that individual political identification and thus personal values are obviously more relevant. While the parameters for a conservative, liberal, or social orientation are not significantly different from zero, the identification with ecological policy has an expected strong significantly positive correlation with the agreement to the energy transition in total. In this respect, it should be mentioned that the two variables “social policy identification” and “ecological policy identification” are highly positively correlated. Against this background, further estimations show that “social policy identification” is also significantly positively correlated with the dependent variables if “ecological policy identification” is excluded as explanatory variable. Therefore, an overall left-green identification seems to be strongly correlated with the agreement to the energy transition in total, whereas a liberal-conservative orientation seems to be less important for the explanation of the dependent variables. In contrast, the parameter of “NEP” is not significantly different from zero, even in further estimations that exclude “ecological policy identification” due to the positive correlations between these two variables. These results suggest that, irrespective of political identifications, strong environmental values alone do not lead to higher or lower agreements to the energy transition in total, but that the agreement is especially correlated with a strong identification with ecological policy.

Table 4 and Table 5 report the SML estimations of multivariate binary and ordered probit models for the determinants of the agreement to the six single energy policy measures. First of all, the tables underpin the importance of applying multivariate instead of univariate probit models due to the significantly positive correlations in the error

terms of the underlying latent variables.[9] The estimation results for the explanatory variables strengthen the relevance of economic calculus since the variable for the expected electricity price increase is strongly negatively correlated with the agreement to the nuclear phase-out and also somewhat less robustly with the agreement to the financial support of the expansion of renewable energies. Furthermore, the significantly positive effect of equivalized income on the agreement to the nuclear phase-out and its significantly negative effect on the agreement to the financial support of saving energy in households and industry (at least in the ordered probit model) are in line with economic self-interest if the nuclear phase-out leads to higher energy costs and thus to relatively higher burdens for low-income households and if the measures for saving energy lead to relatively lower cost savings for high-income households. Finally, the significantly negative effect of high equivalized energy expenditures on the agreement to the power grid expansion (at least in the binary probit model) is also in line with economic self-interest if this measure leads to higher electricity and thus energy prices with higher burdens for households with high energy expenditures.

In contrast, the significantly negative effect of this variable on the agreement to the support of research to improve efficiency of gas and coal power plants is obviously not related to economic stimuli. However, in line with the results for the agreement to the energy transition in total, Table 4 and Table 5 also reveal the expected strong relevance of political identification, especially for the agreement to the nuclear phase-out. The corresponding strong significantly negative correlations with a conservative or liberal orientation and the strong significantly positive correlations with a social and especially an ecological orientation suggest that the historically extremely ideologically colored discussion about the role of nuclear energy has not been completed with the policy change toward the energy transition by the former conservative-liberal government after the nuclear catastrophe of Fukushima in 2011. While the overall opposition to the nuclear phase-out is very small as discussed above, this small minority is still active in the public debate and its opposition is obviously not only due to economic calculus, but especially due to an overall identification with right-liberal policy and an opposition to left-green policy.

[9] The only exception is the insignificant correlation between the agreement to the nuclear phase-out and the agreement to the support of research to improve efficiency of gas and coal power plants in the error terms.

The estimation results for the agreement to the financial support of the expansion of renewable energies are similar, but somewhat less pronounced and especially refer to strong differences between a conservative (at least on the basis of the ordered probit model) and ecological identification. Interestingly, the identification with ecological policy is significantly negatively correlated with the agreement to the support of research to improve efficiency of gas and coal power plants, at least in the binary probit model. This suggests that the identification with green policy is especially strongly correlated with a rejection of the use of coal or even the new construction of coal power plants which is already shared by a large majority of the respondents as discussed above. Instead, the agreement to the support of research to improve efficiency of gas and coal power plants is only significantly correlated with an orientation to liberal policy, at least in the ordered probit model.

Furthermore, other personal and social values also matter. As expected, "NEP" has a significantly positive effect on the agreement to several energy policy measures, especially on the agreement to the nuclear phase-out, but also on the agreement to the financial support of the expansion of renewable energies. Moreover, environmental values have significantly positive effects on the agreement to the financial support of the expansion of electromobility and of saving energy in households and industry, at least in the ordered probit model. In contrast, it never has a significant effect on the agreement to the remaining two energy policy measures. These results are in line with the reservations against the use of coal or even the new construction of coal power plants and against a power grid expansion among several respondents with strong environmental values. In fact, it is often claimed in the public debate that especially environmental groups and supporters of left-green parties would hamper the necessary expansion of the power grids. However, our estimation results point to the opposite direction since respondents in regions with a high share of votes for the main left-wing parties significantly more often agree to this expansion. While this is the only significant effect of our variable for the political or ideological environment, the variable for the religious environment has even no robust significant effect on the agreement to any of these six energy policy measures.

With respect to the control variables, the estimation results in Table 4 and Table 5 reveal that female respondents significantly more often agree to the nuclear phase-out, the financial support of the expansion of renewable energies, and the financial support of sav-

ing energy in households and industry. This is, for example, in line with the results for the support of publicly financed climate policy in Ziegler (2017) and with the results for other individual contributions to the public good climate protection such as voluntarily offsetting carbon emissions (e.g. Schwirplies and Ziegler, 2016) or reducing the consumption of meat and dairy products (e.g. Lange et al., 2017). In contrast, women significantly less often agree to the support of research to improve efficiency of gas and coal power plants and to the power grid expansion. Furthermore, respondents with a migration background significantly less often agree to the nuclear phase-out on the basis of the ordered probit model, whereas "high education" and "kids" have no robust significant effects on the agreement to any of the six energy policy measures. In contrast, the agreement to the support of research to improve the efficiency of gas and coal power plants and to the power grid expansion is significantly higher with increasing age and respondents from Western Germany significantly more often agree to the nuclear phase-out and the financial support of the expansion of renewable energies, which is also in line with the results in Lange et al. (2017) and Ziegler (2017).

4. Conclusions

Based on data from a representative survey among more than 2200 households, this paper empirically examines the agreement to the German energy transition in total and to six single energy policy measures, which are components of this challenging national policy approach. It is shown that a large majority of more than three quarters of the respondents agrees to its core measures, namely the nuclear phase-out and the financial support of the expansion of renewable energies. However, there is also a small minority of the respondents that disagrees and an even larger minority that does not explicitly agree to the energy transition in total so that it is explicitly accepted by only about half of the respondents. These results are in line with the criticism by some groups in the political and academic arena, which especially refers to the feed-in-tariff system for the promotion of renewable energies, which would be a major driver of increasing energy prices. Therefore, knowledge about the determinants of the agreement to the energy transition and thus the identification of population groups who agree or disagree is certainly very helpful, especially for policy makers who want to increase the acceptance and thus to avoid the failure of some components of the energy transition or even the energy transition in total.

Our micro-econometric analysis with uni- and multivariate binary and ordered probit models reveals that both economic calculus and personal and social values are relevant. The main economic indicators refer to (subjective) expected future energy price developments due to the energy transition. Instead of only analyzing simple price expectations, however, we construct indicators that also incorporate the price expectations for four energy sources and forms, i.e. electricity, natural gas, heating oil, and gasoline/diesel, in the hypothetical case that the measures of the energy transition would not be taken. Our estimation results reveal that an expected future electricity price increase due to the energy transition is significantly negatively correlated with the agreement to the nuclear phase-out and the financial support of the expansion of renewable energies. Furthermore, the significantly positive effect of equivalized income on the agreement to the nuclear phase-out and its significantly negative effect on the agreement to the financial support of saving energy in households and industry as well as the significantly negative effect of high equivalized energy expenditures on the agreement to the power grid expansion are in line with economic self-interest.

As expected, our estimation results thus suggest that economic costs and benefits play an important role for the acceptance of policy measures like the energy transition. This strengthens the view that not only for economic reasons, but also for its acceptance, the energy transition should be implemented as cost efficient as possible in order to restrict the energy and especially electricity price increases. In fact, the German government has amended the EEG several times especially in order to reduce the feed-in-tariffs and thus the electricity price increases. However, our empirical analysis also suggests that many citizens expect increasing energy prices that are not only due to the measures of the energy transition. Surprisingly, the public and academic debate about the energy transition mostly exclusively refers to its costs. In contrast, the mid- and especially long-term costs that arise in the case of a withdrawal from several measures of the energy transition such as the nuclear phase-out (e.g. the costs for the final disposal of radioactive waste) or the expansion of renewable energies (e.g. the costs for environmental and climate damages by coal power plants) are rarely discussed. Therefore, it seems that the population is already at a more advanced stage than the public debate. Nevertheless, a broader discussion of these costs might further increase the acceptance of the energy transition.

However, political identification and other personal values are obviously at least equally relevant for the agreement to the energy transition as economic calculus. With respect to

political orientation, for example, an overall left-green identification is significantly positively correlated with the agreement to the energy transition in total and especially to the nuclear phase-out and the financial support of the expansion of renewable energies. In addition, these two measures are also significantly positively affected by strong environmental values. In contrast, a high share of regional votes for the main left-wing parties has only a significantly positive effect on the agreement to the power grid expansion, whereas the religious environment as further indicator for social values has no significant effects. These estimation results identify important skeptical population groups which might be addressed by policy makers in order to further increase the acceptance of the energy transition. In addition, our econometric analysis suggests that studies that only include economic variables or studies that only include personal and social values in order to explain the acceptance of policy measures can lead to biased estimation results and thus distorted conclusions.

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Tables

Table 1: Frequencies of agreement to the measures of the energy transition and to individual energy policy measures

	Strength of agreement					
Measures	(1) (total disagreement)	(2)	(3)	(4)	(5) (total agreement)	Total frequencies
Energy transition	109 (5.11%)	155 (7.27%)	800 (37.54%)	621 (29.14%)	446 (20.93%)	2131 (100%)
Nuclear phase-out	171 (7.70%)	102 (4.59%)	269 (12.11%)	277 (12.47%)	1403 (63.14%)	2222 (100%)
Financial support of expansion of renewable energies	57 (2.56%)	86 (3.86%)	339 (15.21%)	517 (23.19%)	1230 (55.18%)	2229 (100%)
Support of research to improve efficiency of gas and coal power plants	259 (11.85%)	331 (15.15%)	702 (32.13%)	482 (22.06%)	411 (18.81%)	2185 (100%)
Financial support of expansion of electromobility	153 (7.04%)	213 (9.81%)	601 (27.67%)	598 (27.53%)	607 (27.95%)	2172 (100%)
Financial support of saving energy in households and industry	60 (2.72%)	91 (4.13%)	362 (16.42%)	661 (29.98%)	1031 (46.76%)	2205 (100%)
Power grid expansion	77 (3.55%)	149 (6.87%)	524 (24.17%)	621 (28.64%)	797 (36.76%)	2168 (100%)

Table 2: Descriptive statistics

Variables	Number of observations	Mean	Standard deviation
Agreement energy transition	2131	0.501	0.50
Agreement nuclear phase-out	2222	0.756	0.43
Agreement financial support of expansion of renewable energies	2229	0.784	0.41
Agreement support of research to improve efficiency of gas and coal power plants	2185	0.409	0.49
Agreement financial support of expansion of electromobility	2172	0.555	0.50
Agreement financial support of saving energy in households and industry	2205	0.767	0.42
Agreement power grid expansion	2168	0.654	0.48
Expected price increase electricity due to energy transition	2084	0.413	0.49
Expected price increase natural gas due to energy transition	1792	0.309	0.46
Expected price increase heating oil due to energy transition	1827	0.271	0.44
Expected price increase gasoline/diesel due to energy transition	2042	0.251	0.43
Equivalized income	1953	1.867	0.88
High equivalized energy expenditures	1682	0.499	0.50
Conservative policy identification	2124	0.196	0.40
Liberal policy identification	2112	0.181	0.39
Social policy identification	2150	0.530	0.50
Ecological policy identification	2145	0.495	0.50
NEP	2183	4.771	1.28
Regional frequency left-wing parties	1590	0.430	0.09
Catholic environment	1590	0.448	0.50
Female	2243	0.436	0.50
Foreign	2237	0.090	0.29
High education	2178	0.551	0.50
Age	2222	53.873	14.88
Kids	2243	0.233	0.42
Eastern Germany	1952	0.141	0.35

Table 3: Maximum likelihood estimates (robust z statistics) in (univariate) binary and ordered probit models, dependent variables: agreement energy transition, number of observations: 785

Explanatory variables	Binary probit model	Ordered probit model
Expected price increase electricity due to energy transition	0.05 (0.41)	-0.03 (-0.33)
Expected price increase natural gas due to energy transition	0.09 (0.61)	0.22* (1.81)
Expected price increase heating oil due to energy transition	-0.42*** (-2.70)	-0.28** (-2.46)
Expected price increase gasoline/diesel due to energy transition	0.10 (0.67)	-0.04 (-0.37)
Equivalized income	-0.04 (-0.72)	-0.02 (-0.47)
High equivalized energy expenditures	-0.14 (-1.44)	-0.08 (-0.93)
Conservative policy identification	0.13 (1.13)	0.02 (0.23)
Liberal policy identification	0.12 (0.98)	-0.03 (-0.29)
Social policy identification	0.01 (0.05)	0.05 (0.57)
Ecological policy identification	0.48*** (4.42)	0.50*** (5.53)
NEP	0.02 (0.62)	-0.00 (-0.10)
Regional frequency left-wing parties	-0.60 (-0.97)	-0.30 (-0.58)
Catholic environment	-0.14 (-1.25)	-0.10 (-1.11)
Female	0.02 (0.25)	0.08 (1.04)
Foreign	-0.01 (-0.08)	-0.12 (-0.73)
High education	0.03 (0.32)	-0.09 (-1.13)
Age	-0.00 (-0.27)	0.00 (0.83)
Kids	-0.20* (-1.72)	-0.02 (-0.21)
Eastern Germany	-0.33** (-2.35)	-0.26** (-2.23)
Constant	0.27 (0.59)	-- (--)

Note: * (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively

Table 4: Simulated maximum likelihood estimates (robust z statistics) in the multivariate binary probit model, overall number of observations: 976

	Dependent variables					
Explanatory variables	(1) Agreement nuclear phase-out	(2) Agreement financial support of expansion of renewable energies	(3) Agreement support of research to improve efficiency of gas and coal power plants	(4) Agreement financial support of expansion of electro-mobility	(5) Agreement financial support of saving energy in households and industry	(6) Agreement power grid expansion
Expected price increase electricity due to energy transition	-0.37*** (-3.89)	-0.18* (-1.85)	0.01 (0.14)	-0.12 (-1.26)	0.03 (0.21)	0.06 (0.67)
Expected price increase natural gas due to energy transition	-- (--)	-- (--)	-- (--)	-- (--)	0.01 (0.04)	-- (--)
Expected price increase heating oil due to energy transition	-- (--)	-- (--)	-- (--)	-- (--)	0.13 (0.88)	-- (--)
Expected price increase gasoline/ diesel due to energy transition	-- (--)	-- (--)	-- (--)	-0.07 (-0.73)	-0.08 (-0.53)	-- (--)
Equivalized income	0.12* (1.94)	-0.04 (-0.67)	-0.01 (-0.23)	-0.06 (-1.05)	-0.02 (-0.28)	0.03 (0.46)
High equivalized energy expenditures	0.13 (1.26)	-0.04 (-0.40)	-0.18** (-2.00)	-0.06 (-0.70)	0.08 (0.77)	-0.20** (-2.16)
Conservative policy identification	-0.33*** (-2.96)	-0.16 (-1.47)	0.12 (1.18)	0.10 (0.99)	-0.02 (-0.12)	-0.17* (-1.65)
Liberal policy identification	-0.28** (-2.24)	-0.04 (-0.31)	0.14 (1.31)	-0.15 (-1.32)	0.01 (0.09)	0.18 (1.52)
Social policy identification	0.25** (2.27)	0.12 (1.16)	0.03 (0.30)	0.02 (0.20)	0.04 (0.40)	0.07 (0.71)
Ecological policy identification	0.49*** (4.31)	0.42*** (3.95)	-0.27*** (-2.85)	0.07 (0.73)	0.09 (0.77)	0.01 (0.11)
NEP	0.10*** (2.84)	0.06* (1.69)	-0.01 (-0.39)	0.04 (1.23)	0.06 (1.52)	-0.02 (-0.69)
Regional frequency left-wing parties	-0.37 (-0.60)	-0.04 (-0.07)	0.09 (0.17)	0.32 (0.60)	0.80 (1.23)	1.14** (2.08)
Catholic environment	0.05 (0.41)	-0.12 (-1.02)	-0.01 (-0.08)	0.01 (0.11)	0.08 (0.61)	-0.08 (-0.76)
Female	0.25** (2.50)	0.27*** (2.72)	-0.22** (-2.51)	-0.06 (-0.72)	0.21* (1.95)	-0.20** (-2.29)
Foreign	-0.27 (-1.64)	0.01 (0.06)	0.15 (0.93)	0.17 (1.06)	0.14 (0.73)	0.07 (0.46)
High education	-0.06 (-0.60)	0.18* (1.75)	0.03 (0.38)	0.01 (0.08)	0.18* (1.66)	0.06 (0.67)
Age	0.00 (0.64)	-0.00 (-0.86)	0.01*** (3.10)	0.00 (0.84)	0.00 (0.59)	0.01*** (2.98)
Kids	0.15 (1.30)	-0.04 (-0.39)	0.07 (0.62)	-0.09 (-0.84)	0.09 (0.67)	-0.11 (-1.06)
Eastern Germany	-0.27* (-1.87)	-0.32** (-2.32)	0.15 (1.20)	-0.04 (-0.35)	-0.20 (-1.33)	0.09 (0.66)
Constant	-0.08 (-0.16)	0.59 (1.34)	-0.57 (-1.43)	-0.18 (-0.46)	-0.27 (-0.57)	-0.42 (-1.02)
Simulated correlation coefficients error terms		(2)	(3)	(4)	(5)	(6)
	(1)	0.48***	0.04	0.19***	0.20***	0.23***
	(2)		0.20***	0.28***	0.39***	0.29***
	(3)			0.30***	0.30***	0.25***
	(4)				0.53***	0.42***
	(5)					0.40***

Note: * (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively

Table 5: Simulated maximum likelihood estimates (robust z statistics) in the multivariate ordered probit model, overall number of observations: 976

	Dependent variables					
Explanatory variables	(1) Agreement nuclear phase-out	(2) Agreement financial support of expansion of renewable energies	(3) Agreement support of research to improve efficiency of gas and coal power plants	(4) Agreement financial support of expansion of electro-mobility	(5) Agreement financial support of saving energy in households and industry	(6) Agreement power grid expansion
Expected price increase electricity due to energy transition	-0.26*** (-3.20)	-0.19** (-2.51)	-0.01 (-0.17)	-0.14* (-1.75)	-0.00 (-0.01)	0.01 (0.14)
Expected price increase natural gas due to energy transition	-- (--)	-- (--)	-- (--)	-- (--)	-0.04 (-0.35)	-- (--)
Expected price increase heating oil due to energy transition	-- (--)	-- (--)	-- (--)	-- (--)	0.10 (0.93)	-- (--)
Expected price increase gasoline/ diesel due to energy transition	-- (--)	-- (--)	-- (--)	-0.01 (-0.16)	-0.05 (-0.48)	-- (--)
Equivalized income	0.11** (2.04)	-0.04 (-0.78)	-0.00 (-0.02)	-0.06 (-1.33)	-0.13*** (-2.59)	-0.02 (-0.31)
High equivalized energy expenditures	0.06 (0.66)	-0.07 (-0.81)	-0.15** (-2.03)	-0.02 (-0.29)	0.08 (0.97)	-0.07 (-0.92)
Conservative policy identification	-0.26*** (-2.72)	-0.18** (-2.04)	0.10 (1.19)	0.09 (1.07)	-0.04 (-0.37)	-0.02 (-0.22)
Liberal policy identification	-0.28*** (-2.72)	0.06 (0.58)	0.23** (2.54)	-0.00 (-0.04)	0.08 (0.81)	0.16* (1.73)
Social policy identification	0.22** (2.47)	0.13 (1.59)	0.07 (0.84)	0.01 (0.17)	0.05 (0.62)	0.08 (0.93)
Ecological policy identification	0.57*** (6.08)	0.48*** (5.76)	-0.13 (-1.62)	0.04 (0.51)	0.16* (1.74)	0.03 (0.32)
NEP	0.11*** (3.68)	0.08*** (2.63)	-0.03 (-1.31)	0.06** (2.14)	0.06** (2.03)	-0.01 (-0.28)
Regional frequency left-wing parties	-0.46 (-0.87)	0.11 (0.22)	-0.18 (-0.40)	0.34 (0.75)	0.75 (1.42)	1.17** (2.56)
Catholic environment	0.05 (0.51)	-0.02 (-0.22)	0.01 (0.09)	0.02 (0.19)	0.17* (1.80)	-0.03 (-0.40)
Female	0.15* (1.77)	0.26*** (3.28)	-0.21*** (-2.95)	-0.05 (-0.68)	0.17** (2.03)	-0.19** (-2.54)
Foreign	-0.31** (-2.18)	-0.04 (-0.27)	0.22 (1.57)	0.14 (1.09)	0.17 (1.17)	0.09 (0.67)
High education	-0.08 (-0.91)	0.13 (1.57)	-0.02 (-0.29)	-0.03 (-0.44)	0.07 (0.77)	0.03 (0.39)
Age	0.01* (1.79)	-0.00 (-0.72)	0.01*** (3.53)	0.00 (0.93)	0.01 (1.58)	0.01*** (4.24)
Kids	0.03 (0.28)	-0.09 (-0.96)	0.10 (1.07)	0.06 (0.69)	0.13 (1.32)	0.00 (0.02)
Eastern Germany	-0.21* (-1.70)	-0.22* (-1.95)	0.13 (1.15)	-0.03 (-0.29)	-0.00 (-0.01)	0.08 (0.75)
Simulated correlation coefficients error terms		(2)	(3)	(4)	(5)	(6)
	(1)	0.48***	0.04	0.16***	0.25***	0.18***
	(2)		0.13***	0.34***	0.44***	0.29***
	(3)			0.24***	0.22***	0.22***
	(4)				0.47***	0.39***
	(5)					0.47***

Note: * (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively