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Consumers' attitudes on carbon footprint labelling: Results of the SUSDIET project

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Consumers' attitudes on carbon footprint labelling

Results of the SUSDIET project

Yvonne Feucht and Katrin Zander

Thünen Working Paper 78

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Abstract

English

The purchase of products labelled with Carbon footprints is one option for consumers to act climate-friendly and consumers frequently state that they are interested in this kind of labels. But even though various carbon footprint labelling schemes exist throughout Europe, their market relevance is low. In this context, the present research investigates preferences for climate-friendly food and identifies barriers for climate friendly food choices in the European market.

Using a mixed methods approach combining an online survey (choice experiments and a questionnaire) with qualitative face-to-face interviews, the preferences and willingness to pay for different carbon labels and a climate-friendly claim were explored in six European countries. While the online survey mainly aimed at eliciting consumer preferences for different ways of communicating climate-friendliness, the face-to-face interviews which were based on the results of the online survey, deepened and broadened the quantitative results. Thereby, consumers' perceptions of climate-friendly food and their information needs with respect to climate-friendly food are elicited.

Our results show that the presence of a carbon label on a product increases the purchase probability and that consumers are willing to pay a (small) price premium for a carbon label in all countries under investigation (France, Germany, Italy, Norway, Spain, Germany, UK). However, the contribution of a carbon label to a more climate-friendly consumption will be limited. Main reasons are the lack of knowledge of climate friendly actions, reluctance to change consumption habits (e.g. meat and dairy consumption), time preference and uncertainty regarding the relevance of climate change. Consumers appear to be frequently overstrained with respect to climate-friendly buying decisions. Policy makers and retailers are challenged to set appropriate structures to support climate-friendly consumption.

Keywords: Carbon footprint labelling; consumer research; climate change; climate-friendly food; mixed methods; choice experiments

Deutsch

CO₂-Labels sollen es Verbrauchern ermöglichen, klimafreundlich einzukaufen. Verbraucher äußern immer wieder, dass sie Interesse an solchen Kennzeichnungen haben um entsprechende Produkte zu kaufen. Obwohl es mehrere CO₂-Labels in verschiedenen europäischen Ländern gibt, ist ihre Marktbedeutung nach wie vor gering. Vor diesem Hintergrund untersucht die vorliegende Studie Verbraucherpräferenzen für klimafreundliche Lebensmittel und benennt die Hindernisse bzw. Barrieren einer stärkeren Nutzung dieser Kennzeichnungen in Europa.

Es wurde ein Mixed-Methods-Ansatz verwendet, bei dem eine quantitative Online-Erhebung mit qualitativen Face-to-Face-Interviews kombiniert wurde. Gegenstand der Online-Erhebung waren Choice Experimente und ein Fragebogen zu Wissen und Einstellungen zum Klimawandel. Es wurden Verbraucherpräferenzen für verschiedene CO₂-Labels, für eine CO₂-Botschaft sowie für andere Nachhaltigkeitsangaben, wie regionale Herkunft und ökologische Erzeugung vergleichend untersucht. Die quantitativen Online-Erhebungen fanden in Deutschland, Frankreich, Italien, Norwegen, Spanien und Großbritannien statt. Die qualitativen Face-to-face Interviews dienten der vertiefenden Analyse der Ergebnisse der Online Erhebungen und erfolgten exemplarisch in Deutschland, Frankreich und Großbritannien.

Die quantitative Online-Erhebung zeigt, dass die Präsenz eines CO₂-Labels die Kaufwahrscheinlichkeit erhöhte. In allen untersuchten Ländern waren die Konsumenten bereit, mehr für ein mit einem CO₂-Label gekennzeichnetes Produkt zu bezahlen. Im Vergleich zu regionaler oder ökologischer Erzeugung schnitten die CO₂-Label jedoch meist schlechter ab. Insgesamt wurde deutlich, dass die meisten Verbraucher keine CO₂-Label kannten, obwohl sie zumindest in Frankreich und UK im Handel anzutreffen sind.

Die Ergebnisse zeigen aber auch, dass das Wissen über den Beitrag des Lebensmittelkonsums zum Klimawandel gering war. Möglichkeiten sich klimafreundlich zu verhalten waren vielfach unbekannt. Allerdings, galt der Kauf von regionalen und ökologischen Produkten bei vielen als klimafreundlich. Die Bereitschaft den klimaschädlichen Konsum von Fleisch- und Milchprodukten zu reduzieren war dagegen gering – auch weil den Testpersonen die Zusammenhänge nicht bekannt waren.

Am Beispiel des CO₂-Labellings wird aufgezeigt, welche Folgen geringes Verbraucherwissen, damit unbekannte und unsichere Zusammenhänge, Misstrauen in Kennzeichnungen und Zeitpräferenz für die Wirksamkeit einer Nachhaltigkeits-Kennzeichnung haben. Eine Veränderung des Konsumverhaltens braucht staatliche (oder privatwirtschaftliche) Regulierung und Anreizsetzung.

Keywords: CO₂-Labels, Verbraucherforschung, Klimawandel, Klimafreundliche Lebensmittel, Mixed methods, Kaufexperimente.

1 Introduction

Sustainability issues are gaining weight in people's value systems and they are reflected to a certain degree in consumers' (food) purchase decisions (e.g., Alves and Edwards 2008). These are the good news when aiming at increasing the sustainability of food consumption. But, observed market shares are still low and various studies found that consumers' favourable attitudes towards environmental issues are not reflected in their purchase behaviour (Kuckartz et al. 2007; Rückert-John et al. 2012; Laureati et al. 2013). The reasons for this phenomenon, frequently referred to as attitude-behaviour gap, are supposed to be budget constraints, information overload and limited knowledge (Rückert-John et al. 2012, Vermeir and Verbeke 2006). Consumers' limited knowledge seems to be particularly relevant with respect to sustainability in food consumption so that there might be a need to better inform consumers (Vanhonacker et al. 2013; Laureati et al. 2013; White et al. 2009; Lorenzoni et al. 2007). Further reasons are supposed to be the low degree of trust in labelling and other communication means and limited perceived relevance of own behaviour (low perceived consumer effectiveness) (Vanhonacker et al. 2013). Risk and time preference refer to the trade-off between immediate and certain satisfaction of needs such as pleasure (taste, convenience) combined with low expenditures on the one hand and future and uncertain benefits such as health and environmental protection aligned with higher expenditure on the other hand (see also Kahneman and Tversky 1979). Finally, perceived quality, health and other hedonic attributes are very powerful triggers still driving everyday consumption, and making sustainability less relevant (Laureati et al. 2013; Vermeir and Verbeke 2006).

Against this background, the present study aims to identify major barriers for consumers to make sustainable food choices and to analyse consumer preferences for sustainability labelling with the example of Carbon Footprint (CFP) labelling. CFP labelling is of interest due to the challenges climate change poses to society and the important role consumer behaviour has in this respect. Greenhouse gas emission reduction goals rely in part on individuals' preparedness to follow a climate-friendly lifestyle and consumer behaviour is at the centre of changing general consumption patterns (O'Neill and Hulme 2009). Based on the analysis of consumer behaviour and the drivers for this behaviour, well targeted measures which may motivate consumers to change their behaviour in order to increase sustainability can be developed.

In order to achieve the defined goals we conducted three research steps. In a first step the literature with respect to consumers' perception of climate conscious behaviour was reviewed and an analysis of existing CFP labelling schemes on international level was done. In the second step a survey combining choice experiments with a questionnaire was conducted to elicit consumer preferences, the impact of motivations, attitudes and other psycho- and socio-demographic variables on sustainable food choices. The third step consisted of face-to-face interviews with consumers in order to assess the influence of time preference and risk as well as consumers' attitudes towards climate change and information on consumers' buying

behaviour in more detail. From our findings we concluded on reasons for the lack of success of earlier CFP initiatives and on the implications.

2 Literature review

2.1 Barriers for the uptake of Carbon Footprint labelling schemes

Sustainable behaviour has many facets; one of them is climate-friendly food consumption. Food production and consumption contribute significantly to the production of global greenhouse gas emissions and represent a possibility for consumers to actively take part in the mitigation of climate change and to foster a sustainable society (Haubach and Held 2015; Voget-Kletschin 2015; Vanclay et al. 2011). A prerequisite for this approach is that consumers know and care about the social and environmental effects of their consumption behaviour and have the motivation as well as the opportunity to act as ecological citizens or ethical consumers (Seyfang 2005).

One way to enable consumers to act 'green' is the implementation of eco-labelling schemes (Onozaka et al. 2015). This strategy is also used to foster climate-friendly behaviour by the introduction of Carbon Footprint labelling (CFP) labelling schemes (also called carbon label or CO₂-label) on the markets. The various CFP labels in European markets have thus far only minor relevance in most European countries even though different studies show that consumers are generally concerned about climate change and favour the introduction of a carbon label for food (Accenture 2007; Gadema and Oglethorpe 2011; Grunert et al. 2014; Hartikainen et al. 2014; Onozaka et al. 2015).

Different barriers for the missing success of the schemes have been identified. The information provided by carbon labels is often not readily comprehended by consumers. For instance, in a UK-study 89% of the respondents were confused about carbon labelling (Gadema and Oglethorpe 2011). The underlying concept and its implications are complicated and sometimes even scientifically controversial such as the calculation of the carbon footprint itself (Baldo et al. 2009; Boardman 2008; Burger et al. 2010; Onozaka et al. 2015).

Another barrier for a broader acceptance of CFP labels by consumers is the fragmented presence of CFP labels within a product category. Many CFP labels are only shown for some products in a product category, for example brand products. This fragmentation hinders the comparability of products and thus climate-friendly trade-offs (Boardman 2008).

Climate-friendly consumption is often associated with perceived reduced product quality and the feeling of renunciation by many consumers (Lüth et al. 2009). People frequently refuse to pay a price-premium for climate-friendly products and state that they would only consider buying climate-friendly products if the climate-friendliness would be a cost-neutral side-effect of the respective product with all other product attributes remaining the same

(Grunert et al. 2004; Hartikainen et al. 2014; Lüth et al. 2009). Several studies indicate that climate-friendliness is of less importance to European consumers than other ethical product attributes (e.g., animal welfare, organic production, eco-friendly packaging) (European Commission 2009; Guenther et al. 2012; Hartikainen et al. 2014). Another major barrier to a more climate-friendly behaviour is consumers' low knowledge about the carbon footprint and about the impact of food consumption on climate change (e.g., Beattie and Sale 2009; Hartikainen et al. 2014; Upham et al. 2011). Consumers lack an understanding of the potential to make environmentally and climate-friendly choices by adjusting their food consumption habits and have therefore only a limited ability to act according to their interest in climate-friendly behaviour (Beattie and Sale 2009; Gadema and Oglethorpe 2011; Hartikainen et al. 2014). People struggle to conceptualize climate change and to relate it to their everyday life due to its' abstract and complex nature (Lorenzoni and Pidgeon 2006).

Hagen and Pijawka (2015), Whitmarsh et al. (2011) as well as Lorenzoni et al. (2007) argue that climate change is mainly perceived as a risk which is remote in space and time so that personal risks are frequently underestimated while the risk for the society as a whole and for future generations is appreciated. Accordingly, time preference and risk perception presumably influence climate-friendly behaviour. Since many people underestimate the risks resulting from climate change, their willingness to engage in actions to tackle climate change for their own well-being is frequently low to moderate. They perceive little personal benefit from engaging in this kind of activities (Berry et al. 2009; Upham and Bleda 2009).

Also, altruistic motives such as a perceived moral obligation towards future generations motivate people to act against climate change (e.g., Lorenzoni and Pidgeon 2006). Previous studies underline that the perceived consumer effectiveness of one's efforts to mitigate climate change is a strong predictor of intention to perform climate-friendly actions (Lorenzoni et al. 2007; Semenza et al. 2008; Truelove and Parks 2012). If consumers think that their purchase behaviour has no or a negligible impact on climate change they might refer from buying products with a carbon label. Shifting the blame and denying personal responsibility is another important barrier to engagement (Lorenzoni et al. 2007). Individuals have to feel responsible for climate change in order to engage. Other barriers are distrust in information sources and scepticism about the causes and effects of climate change (Lorenzoni et al. 2007; Upham et al. 2011).

2.2 Overview of CO₂-labels for food products

Carbon footprint labelling schemes are based on the calculation of the carbon footprint which can be broadly defined as the climate effect of a product which takes into account the whole value chain from the production of the raw material to the final product, including the transport and the retail and in some calculations also the use, recycling and disposal stage (Burger et al. 2010). Today, various CFP labelling initiatives for food products exist worldwide (Burger et al. 2010; Guenther et al. 2012; Schaefer and Blanke 2014; Tait et al. 2011). Many of

them are based on 'Equivalent carbon dioxide' (CO₂e) which is used to indicate the effect of different greenhouse gases on a common scale. Inspired by the category systems used by Schaefer and Blanke (2014), Burger et al. (2010) and Walter and Schmidt (2008) we differentiate between four approaches used to communicate the climate effect of a product:

- Single numeric CO₂e value: Label showing a single absolute CO₂e value
- CO₂e value combined with a colour code: Label exhibiting a colour code in combination with an absolute CO₂e value
- Front-runner-label: The best products in a category are labelled
- Climate offset: Label signifying that the GHG emissions of a product are offset to a certain degree.

2.2.1 Single numeric CO₂e value

Labels with a single numeric CO₂e value are found in Canada, France, Japan, South Korea, Thailand and the UK. In France the supermarket chain Leclerc displays a numeric CO₂e value on the price tag and an accumulated CO₂e value for the whole purchase on the receipt. In Canada the Canadian initiatives Carbonlabels.org and Carboncounted.com offer a CO₂-label with an absolute number (Guenther et al. 2012; Schaefer and Blanke 2014). In Japan the Ministry of Economy, Trade and Industry (METI) launched a carbon footprint label which can be found on food and beverage products (Alves and Edwards 2008; Finkbeiner 2009; METI 2010). In South Korea the government launched a voluntary carbon label "Cool" in 2009 (Schaefer and Blanke 2014; Guenther et al. 2012). Thailand also introduced a voluntary carbon labelling scheme with an absolute number in 2009 (Guenther et al. 2012). In the UK the supermarket chain Tesco's uses the CO₂-label issued by the NGO Carbon Trust since 2009 but decided to phase out the label in 2012 due to high costs and missing uptake by other retailers (Schaefer and Blanke 2014; Quinn 2012). A survey undertaken by Tesco's revealed that consumers had difficulties in understanding the label (Guenther et al. 2012; Schaefer and Blanke 2014).

A main issue for carbon labels which display an absolute value is the unit on which the figure is based. Consumers are only able to compare different products if the presented number is based on the same unit for example per 100 g (Boardman 2008; Schaefer and Blanke 2014). Displaying another unit on the label than the one shown on the package might confuse consumers (Boardman 2008). Also the unit used for comparison is a challenge since different product groups differ in their function and nutrient content and it is sometimes very expensive or even impossible to calculate exact numerical values for certain product groups (Röös and Tjärnemo 2011).

2.2.2 CO₂e value combined with colour code

The combination of an exact CO₂e value with a colour code is found in France and Finland. In France, the supermarket chain Casino introduced its own CO₂-label "Indice Carbone" in the year 2008. The "Indice carbone" ranks the carbon footprint of a particular product and the given absolute CO₂e value is standardized to a uniform mass unit of 100g (Burger et al. 2010; Schaefer and Blanke 2014). In Finland the food industry has generally agreed that it is important to jointly proceed in the further development of a carbon footprint standard and that various CO₂-labels would only confuse consumers. In this context, the food company Raisio has developed a carbon footprint standard (Hartikainen et al. 2014). The given CO₂e value is also standardized to a uniform mass unit of 100g. While the carbon label of Casino uses a yellow-green color code, the Raisio system uses a colour code from green, yellow to red. Both approaches allow for a comparison between products but not within a product category as both companies only calculate and display the CO₂-label for their own products (Casino 2015; Schaefer and Blanke 2014).

2.2.3 Front-runner label

The only label in this category is issued by the Swiss based non-profit organization Climatop. The label can be found on food products in Germany, Italy and in Switzerland (Climatop 2014). The label is displayed on products within a 20% CO₂e range based on the average carbon footprint within a product category. The label reads "CO₂ approved by climatop" without showing a CO₂e value. It expires after two years in order to stimulate improvement in carbon reduction measures (Burger et al. 2010; Schaefer and Blanke 2014). The label does not allow for comparison between product categories as no value or scale is given (Bonnedahl and Eriksson 2011). The label has the advantage that it is easily understood by consumers as no additional information about the carbon footprint is needed (Hartikainen et al. 2014; Schaefer and Blanke 2014). Also the label demands less searching effort as there is no need for consumers to compare values and ranks in order to find the most climate-friendly product within a category.

2.2.4 Climate-offset

Climate-offset labels can be found in Germany, New Zealand, Switzerland, the USA and in Sweden. In Germany various labels indicating a carbon neutral production can be found. Examples are the certification scheme by ClimatePartner and the label "STOP CLIMATE CHANGE klimafreundlich" (Guenther et al. 2012; Schaefer and Blanke 2014). Only organic products can be certified according to STOP CLIMATE CHANGE (STOP CLIMATE CHANGE 2016). In New Zealand the CarboNZero label indicates that the greenhouse gas emissions for the certified products are offset. In the USA one carbon offset labels exists: The carbonfund

runs the "Certified Carbonfree" label. In Switzerland the SGS carbon label indicates products which are produced carbon neutral (Guenther et al. 2012; Schaefer and Blanke 2014; SGS 2014). In Sweden the largest organisation for the development of organic standards KRAV and Sigill, which administers the quality label of the Federation of Swedish Farmers, accredit an add-on label indicating carbon neutrality. While Sigill offers a label to the certified producers KRAV integrates the climate criteria in the existing scheme for organic production and does not communicate the climate certification to the consumer (Bonnedahl and Eriksson 2011; Burger et al. 2010; Guenther et al. 2012; Klimatmarkningen 2012).

Similar to the front runner approach, the climate-offset labels do not allow for any more detailed comparison between products besides the presence or absence of such a label. Also the climate-offset labels do not communicate to what extent the GHG emissions were reduced and to what the offset amounts to (Schaefer and Blanke 2014). Thus, the consumers have to rely on the respective certifying body for guaranteeing the reduction and offset of GHG emissions (Walter and Schmidt 2008). Advantages of the climate-offset labels are that they are easily recognizable and understandable due to their straight forward message which demands little prior knowledge (Berry et al. 2008).

3 Methods

To assess consumer preferences for two different CO₂-labels and for climate-friendly products in general as well as the effect of information on climate-friendly behaviour, choice experiments accompanied by a questionnaire were conducted with 6007 consumers in the six European countries France (FR), Germany (DE), Italy (IT), Norway (NO), Spain (ES) and United Kingdom (UK). The chosen countries represent the geographical and cultural variety throughout Europe. The data was analysed with mixed logit models and with descriptive statistical methods.

Following the survey, we conducted face to face interviews with consumers in order to analyse the influence of different factors such as consumers' knowledge, time preference and risk as well as consumers' attitudes towards climate change and information on consumers' buying behaviour in more detail. The interviews followed a semi-structured guideline and were conducted in May 2016 in France, Germany and Scotland. We used qualitative content analysis to interpret the interviews.

3.1 Online survey

3.1.1 Sampling

The choice experiments and the questionnaire were carried out online between the 10th and 18th of June 2015. Participants were recruited by means of a representative online access


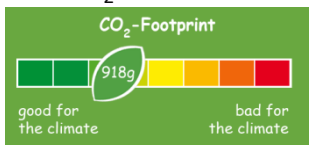
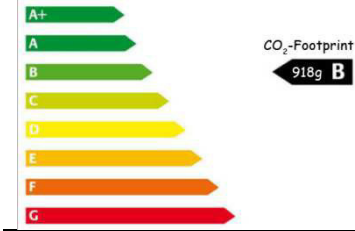
panel run by a commercial market research agency. All surveys were self-administered by the participants. A quota was set for age and gender. The country-specific quotas for the three age groups ('18-29', '30-49', '50-70') were set according to their shares in the total population. Female and male participants took as far as possible equally part in the study. People working in marketing/market research and/or in the food retailing industry were excluded in order to avoid distorted results due to expert knowledge. To ensure that the results are relevant for the market, participants had to be at least partially responsible for the food purchase in their household.

3.1.2 Choice experiments

Choice experiments can be used to elicit preferences for attributes of products, services or policies in economic terms (Mauracher et al. 2013). In choice experiments, participants have to make a choice out of a set of product alternatives. The set of alternatives is called a choice set (Hensher et al. 2005). The alternatives differ with respect to their product attributes (e.g., CO₂-label, local production). The preferences for each attribute are derived from the choices made with respect to the different product alternatives (Hensher et al. 2005; Louviere et al. 2007; McFadden 1974).

In the present study, milk was selected as the target product because it is a widely available product and many consumers regularly buy it. Each alternative varied by five attributes: Claim organic with EU organic label, claim local production, claim climate-friendly, CO₂-label and price (Table 1).

Table 1: Product attributes and their levels used in the choice experiments

Product attributes	Claim local production	Claim organic	Claim climate-friendly	CO ₂ -label	Relative price levels
Attribute levels	Local production	Organic 	Climate-friendly	CO ₂ Scale-label 	0.6
	none	none	none	CO ₂ Energy-label 	1.0
	none	none	none	none	1.4

The existing mandatory EU organic label was used as the certified organic label, whereas local production was indicated by a claim, as a widely adopted label for this claim did not exist in the EU market at that time.

In order to test potential designs for a carbon footprint label, we created two hypothetical labels for the carbon footprint measures. The design of both labels was based on findings by previous studies. Scales had been found to be preferred by consumers, since they allow for comparison due to the relative rankings making the labels more meaningful to consumers (Berry et al. 2008; Boardman 2008; Gadema and Oglethorp 2011; Hartikainen et al. 2014; Upham et al. 2011). Coloured scales correspond to traffic lights and are therefore intuitively understandable (Berry et al. 2008; Rööß and Tjärnemo 2011). Hartikainen et al. (2014) as well as Leire and Thidell (2005) found that some consumers seek supplementary information in addition to simplified, color-coded labels such as the exact number of CO₂-equivalent. Given this, a combination of a scale and a number allows for direct comparison between product categories and to other actions (Berry et al. 2008).

In this research two different labels were tested, both of them were designed according to the outcome of earlier studies as cited above. Both labels combine scales with an absolute number for the CO₂ equivalent per unit. The CO₂Scale-label was inspired by the carbon index of the French retailer Casino ("l'indice carbone") since we wanted to test one CO₂-label which already existed on the market. In order to adjust the CO₂Scale-label more to the mentioned criteria we changed the colouring of the scale from green shades to traffic light like colours. Nonetheless, the general design of the CO₂Scale-label might have been more familiar to French participants than to participants from other countries. The CO₂Energy-label was based on the idea of the EU energy label since we wanted to test if participants prefer a more familiar design. Additionally, the indication of A-G is easier to remember for people than a number which might make the CO₂Energy-label more accessible due to faster recognition than the CO₂Scale-label. The carbon footprint level for the two labels was determined based on information from the study by Fritsche et al. (2007).

Regarding price, we tested three different levels in the choice experiments. The absolute prices used in the experiments (see Table 2) were inferred from the average market price for 1 l of UHT milk in the respective study countries one month before the experiments were conducted. The average market price equals price level 1.0. In all study countries the relative price levels tested were the same: 0.6, 1.0 and 1.4.

Table 2: Prices in the choice experiments for all study countries^a

Price levels	DE	ES	FR	IT	NO	UK
0.6	€0.50	€0.59	€0.66	€0.73	NOK10.80 (€1.12)	£0.43 (€0.59)
1.0	€0.85	€0.99	€1.10	€1.21	NOK18.00 (€1.87)	£0.71 (€0.97)
1.4	€1.19	€1.39	€1.54	€1.69	NOK25.00 (€2.60)	£1.00 (€1.36)

^a Prices in Euro for Norway and UK are based on the exchange rates by the European Central Bank on the 6th of January 2016

Within the choice experiments each participant was presented with various choice sets, each of them consisting of three different product alternatives (see Figure 1 for an example). We decided to use forced choice sets since we found it less probable that consumers refer from the purchase because of the combination of attributes in a choice set. A no-choice alternative might have falsely increased the weight of the more enriched attributes (Parker et al. 2011).

Figure 1: Example of a choice set

SPSS software was used to create an orthogonal fractional factorial design for the choice experiments. The design resulted in 64 choice sets. We divided the sample into eight blocks with eight choice sets each. So, eight choice sets were presented to each participant in random order to reduce any effects of order or learning (Onozaka and McFadden 2011). Since the eight blocks were not equally often shown to the participants in each country, some blocks were more prevalent than others. In order to ensure orthogonality of each block we

reduced the blocks with higher participating rate to the number of the block with the lowest participating rate in each country by means of random sampling in the respective blocks. This procedure resulted in equal version sizes and a total sample of 5944 individuals for inclusion in the analysis of the choice experiments. The orthogonality of each version is also a prerequisite for calculating the partial log-likelihood values (Lancsar et al. 2007). Before the choice tasks, a short instruction was presented to the participants: "Please imagine that you wish to purchase UHT-milk. In what follows, we will present you with 8 choice situations. Each choice situation corresponds to an individual shopping transaction. In each, please choose one milk product out of the three on offer by clicking "buy".

3.1.3 Econometric models and partial log likelihood

The choice experiments were analysed with mixed logit models (ML) (also called random parameter logit) using the software NLogit 5.0. Mixed logit models as other discrete choice models are based on the assumption that the utility of choosing alternative i out of a choice set of J alternatives consists of two components: the observed utility V_i and the random error term e_i . The random term e_i catches the unobserved utility. In our study, all variables except 'price' were categorical variables and as such transformed into dummy variables. The variable 'CO₂-label' was split into two dummy variables, one for each tested CO₂-label ('CO₂Scale' and 'CO₂Energy'). We included 'Price' as a metric variable and assumed that it has a linear effect on utility:

$$U_i = \beta_{\text{Price}} \text{Price} + \beta_{\text{Local}} \text{Local} + \beta_{\text{Organic}} \text{Organic} + \beta_{\text{Claim}} \text{CO}_2 \text{Claim} + \beta_{\text{CO}_2 \text{Scale}} \text{CO}_2 \text{Scale} + \beta_{\text{CO}_2 \text{Energy}} \text{CO}_2 \text{Energy} + e_i$$

The probability ($Prob$) that alternative i is chosen out of a choice set of J alternatives is expressed by:

$$Prob_i = \frac{\exp V_i}{\sum_j \exp V_j}$$

All product attributes apart from 'price' were modelled as random parameters. Different functional forms were tested for the random parameters. The final functional forms were chosen after considering the best model fit based on log-likelihood ratio-tests as recommended by Hensher et al. (2005). The random parameters for the 'local', 'organic' and 'claim' variables were assumed to be normally distributed, whereas we selected a uniform distribution for the variables 'CO₂Scale' and 'CO₂Energy'. This approach was chosen because it is difficult to define a priori how consumers perceive particular food claims (Onozaka and McFadden 2011). The 'price' variable entered the models as fixed parameter as recommended by Revelt and Train (1998). After thoroughly testing over a range of draws and with different draw methods (standard Halton sequences and shuffled uniform vectors) we decided to use Halton draws with 100 replications for all estimations.

In comparison to traditional multinomial logit models, ML models have the advantage that they account for preference heterogeneity with respect to the tested product attributes. Thus, they allow assessing unbiased estimates of individual preferences (Birol et al. 2006). The test for heterogeneity is done by analysing the standard deviations of the random parameters. Heterogeneity is present if the coefficient for the standard deviation is significantly non-zero (Hensher et al. 2005). Afterwards, possible sources for any heterogeneity can be elicited by estimating interaction terms between each random parameter and other variables (Hensher et al. 2005).

In our study we first estimated ML models for each country without interaction terms in order to detect the presence of heterogeneity and to calculate the partial log-likelihood values for the attributes in the choice experiments. In the following we refer to these models as basic ML models. In a next step, we estimated seven ML models with interaction terms for the attributes which indicate climate-friendliness ('CO₂Scale', 'CO₂Energy' and 'CO₂Claim') for each country. The number of ML models with interaction terms resulted from the covariates considered in our study: In accordance with our research goals, we examined interactions between the attributes indicating climate-friendliness and eight different covariates originating from the questionnaire accompanying the choice experiments (see chapter 3.1.4):

- 'Message' is the covariate that stands for the message presented directly before the choice task,
- 'LabelScep' is the covariate that stands for scepticism towards labels,
- 'TimePref' is the covariate which signifies time preference,
- 'Risk' is the covariate which represents the propensity to take personal risks,
- 'PCE' is the covariate which signifies perceived consumer effectiveness,
- 'SubjKnow' is the covariate which represents subjective knowledge,
- 'CC_Concerned' and 'CC_Ignorant' are the two covariates which represent attitudes towards climate change (both covariates were considered in one ML model with interaction since they are based on the same construct 'attitudes toward climate change').

The covariate 'Message' was binary since the participants were either presented with a message before the experiments or not. To explore if an a priori given message with respect to climate-friendly purchase behaviour influences the purchase of climate-friendly products we split the participants in each country into two groups. One group received no prior information treatment, whereas the other group was presented with the following message: "Private consumption contributes significantly to climate change. Do something about it! Purchase climate-friendly products!". The message was designed in a manner to be informative and activating. These two attributes are essential for triggering pro-environmental behaviour (Berry et al. 2008; Robinson et al. 2002; Scholder Ellen et al. 1991; Vanhonacker et al. 2013; Vermeir and Verbeke 2008). Also White et al. (2009) as well as Burger et al. (2010) underline that action-based information instead of general awareness rising is needed in order to activate consumers to act against climate change. We expected

that an information treatment with respect to climate-friendly purchase behaviour would positively influence the participant's preference to buy climate-friendly products. Previous studies have found that information impacts an individual's preference (Lusk et al. 2006; Onozaka et al. 2010; Uchida et al. 2014).

The 'LabelScep' covariate consisted of the mean scores over the four items measuring the general scepticism towards labels. The covariate 'TimePref' was also based on the mean scores over the two items measuring this construct. The 'Risk' covariate referred to the participants own assessment of their willingness to take risks for themselves on a 7-point Likert scale and was interval scaled. The covariates 'PCE' and 'SubjKnow' were also each assessed on a 7-point Likert scale. The 'CC_Concerned' and 'CC_Ignorant' covariates were deduced from a factor analysis conducted with all the items measuring the attitudes towards climate change. While the 'CC_Concerned' covariate represents a general concern about climate change, the 'CC_Ignorant' covariate signifies the ignorance of climate change and the refusal to accept the existence of it. We call the ML models with interactions here ML II.

We calculated the relative impact of the different product attributes by means of partial log-likelihood for each country according to the procedure described by Crouch and Louviere (2004). For each country we removed each attribute from the basic ML model one-at-a-time and retained the associated log-likelihood. Afterwards, we calculated the log-likelihood differences between the respective basic model and the model with attribute omitted, thus obtaining the partial log-likelihood values. These values indicate the explanatory power of the removed product attribute. The higher the contribution of the partial log-likelihood of an attribute to the total log-likelihood the more 'important' it is in explaining choices. In order to receive the relative influence of each product attribute, the single partial log likelihood values were divided by the sum of all values for each country (Crouch and Louviere 2004; Louviere and Islam 2008; Lancsar et al. 2007).

3.1.4 Questionnaire

To collect additional information on consumers' attitudes and behaviour, the choice experiments were accompanied by a consumer survey. The questionnaire was developed in German and English and then translated into the other languages by professional translation services and by means of the back-translation method. The questionnaires were pre-tested in the respective national languages and checked by native speakers. The questionnaire comprised 28 closed questions and took together with the choice experiments around 15 to 20 minutes on average to complete. At the beginning, the participants were asked to rank the importance of 10 product attributes in their purchase decision. Afterwards, they were introduced to the choice experiments.

The questionnaire which followed the choice tasks measured a variety of constructs including behaviour, attitude, perceptions, motives, subjective knowledge with respect to climate

change, perceived consumer effectiveness (PCE), trust in labels, time preference and uncertainty/risk perception.

The participants were probed for their understanding of the two carbon labels from the choice experiments. The two labels were shown again and participants were asked to indicate from which information they can derive from these labels. Afterwards, the participants were asked if they trusted the respective labels. In the following, participants were confronted with nine statements in order to elicit their attitudes towards climate change (7-point Likert scale ranging from 'do not agree at all' to 'fully agree'). The nine statements were:

- Climate change is a good thing.
- Climate change is a serious problem.
- All the talk about climate change annoys me.
- I am concerned about climate change.
- Future generations will find solutions to deal with the impacts of climate change.
- We should burden future generations as little as possible with the consequences of climate change.
- Climate change threatens our future.
- The effects of climate change will not affect me.
- Climate change does not exist.

Previous studies show that the perceived consumer effectiveness (PCE) of one's efforts to mitigate climate change is a strong predictor of intention to perform the climate-friendly action (Lorenzoni et al. 2007; Semenza et al. 2008; Truelove and Parks 2012). Therefore, we measured the PCE with five statements (see also Kim and Choi 2005; Roberts 1996; Scholder Ellen 1994) on a 7-point Likert scale:

- My consumption patterns have no influence on climate change.
- Each person's behaviour can contribute to the mitigation of climate change.
- There is not much that I can do about global warming.
- I can reduce the effects of climate change by purchasing climate-friendly products.
- I think it is a good idea to introduce labels indicating the climate-friendliness of food products.

We used Cronbach's alpha for assessing the internal reliability consistency of the measure of the PCE. Cronbach's alpha for the PCE construct exceeded 0.8, displaying good reliability.

One barrier to engage into measures against climate change is a lack of knowledge (Lorenzoni et al. 2007). Subjective knowledge has been found to have a strong impact on purchase-related behaviour (Flynn and Goldsmith 1999). Consumers with greater subjective knowledge are likely to feel more certain about the quality of their choices (Raju et al. 1995). "[...] people have to have a basic knowledge about environmental issues and the behaviours that cause them in order to act pro-environmentally in a conscious way" (Kollmuss and Aygeman 2002:

250). We thus included three statements to explore consumer's subjective knowledge. We asked participants to rate how much they felt they knew about climate change in general, compared to an average person and if they think that people who know them consider them as an expert in the field of climate effects of products and services. An additional item was "I know a lot about how to evaluate the climate-friendliness of products and services". All items were measured on a 7-point Likert scale ranging from 'do not agree at all' to 'fully agree'. This measure is in line with measures used in previous studies (Brucks 1985; Flynn and Goldsmith 1999). The Cronbach's alpha for the total sample yielded a value of 0.89.

To examine if participants would be willing to direct their food consumption into a more climate-friendly direction, we gave seven different options to the participants to choose from. For each option participants could either indicate 'yes', 'maybe' or 'no'. We also included two options not related to food ('Driving your car less' and 'Fly less frequently'). We included the options of a reduction in meat and dairy products since there exists a broad scientific consensus that a reduction of animal-based foods and in particular meat as well as dairy produces would substantially lower the greenhouse gas emissions of households (Carlsson-Kanyama and Gonzalez 2009; Dagevos and Voordouw 2013; Rööß and Tjärnemo 2011). Afterwards, we asked participants which actions they already undertake to tackle climate change. The participants could choose between same seven possibilities and answer 'yes' or 'no' for each.

Lorenzoni et al. (2007) found that allocating responsibility for tackling climate change away from the individual was a major barrier to engage against climate change, we thus assessed participants' perception of responsibility to act against climate change. On a 5-point Likert scale ranging from "no responsibility" to "very high responsibility" participants indicated which level of responsibility they ascribed to the government, the industry, non-governmental organizations, the citizens and themselves.

Later on, we asked if participants already purchased products labelled as climate-friendly and if not, if they would be prepared to buy products labelled as climate-friendly. In the following, participants had to state their motives for buying products labelled as climate-friendly by choosing three statements out of a list of eight:

- It feels good to do something about climate change.
- We have a responsibility for future generations.
- The impacts of climate change are mostly felt by people in poorer countries. This is unacceptable from an ethical perspective.
- Climate change reduces the habitat for wildlife. I do not like that.
- I want to avoid negative consequences for my own life.
- I do not want to have to pay for future risks that could have been avoided.
- I feel obliged to act and do something about climate change.
- None of these statements.

General scepticism towards labels was examined by using the same 7-point Likert scale to assess the level of agreement with four items ('I am not sure if a product which is marked as climate-friendly is actually better for the climate'; 'I do not trust all the different kinds of labels'; 'Labels are just a marketing trick' and 'Most of the labels on food products can be trusted'). The Cronbach's alpha for this measurement was 0.77.

Time preference indicates an individuals' willingness to trade a current utility for a future benefit and presumably is an important factor for sustainable behaviour (Cornelissen et al. 2008; Huston and Finke 2003; Young et al. 2010). Time preference was elicited with two items ('I am already busy enough handling my life today. The future does not interest me' and 'I have to get along with what I have. I cannot show consideration for the future') measured on a 7-point Likert scale ranging from 'do not agree at all' to 'fully agree'. The Cronbach's alpha for the time preference construct yielded a value of 0.71.

Afterwards participants had to estimate their willingness to take risks for themselves on a scale from one to seven ranging from 'I try to avoid risks as much as possible' to 'I am very risk taking'. This estimation served to assess the personal risk perception. Finally, sociodemographic indicators such as the education, household size and the monthly net income were asked for.

3.2 Face-to-face interviews

Aim of the face-to-face interviews was to go more into depth and to better understand the results rendered by the choice experiments and the questionnaire.

In total 32 interviews were conducted, 11 in Germany and Scotland, respectively and 10 in France. All interviews were directed by the same interviewer in national languages. Participants were selected based on a snowball procedure and had to be at least partially responsible for doing the grocery shopping in their household. A maximum of seven participants per country was allowed to have an academic degree and the majority of the participants in each country needed to be women in order to reflect the responsibility for grocery shopping in Europe.

The interviews followed a guideline which ensured that all important topics were covered. Nevertheless, free flowing argumentation by the participants was allowed for when appropriate. At the beginning of each interview, consumers were asked to report on their understanding of climate change, on their personal experience with the consequences of climate change and on what climate change meant to them. Then we probed for knowledge about the impact of food production and consumption on climate change and participants' understanding of climate-friendly purchase behaviour with respect to food. In a next step, we discussed the participants' preparedness to reduce milk and meat consumption in order to mitigate climate change. Also, we discussed barriers as well as incentives for climate-friendly

food purchase behaviour. Time preference and risk perception were addressed by asking the participants if it did matter to them that the impact of their climate-friendly actions will become only visible in the future and for the relevance of the fact that the impacts of climate change are not exactly certain. Furthermore, we explored participants' information needs with respect to climate-friendly food consumption and their understanding of the EU organic logo. Each interview lasted for half an hour to an hour and was audio recorded.

The interviews were transcribed by native speakers. For the analysis of the transcripts we used content analysis according to Mayring (2010) and the software MAXQDA version 11. The basic unit of analysis was a word. The category system was developed beforehand in line with the findings of the online survey. The coding scheme was pretested with 6 interviews, two for each country, and adjusted where necessary. Each text segment could be assigned to more than one category.

4 Results of the online survey and discussion

4.1 Sample characteristics

In total 6007 people participated in the study (Table 3). The majority of the participants (41%) were aged between 30 and 49, followed by the group from age 50 to 70 (35%). The participants in the UK were slightly younger than in the other countries while the German sample showed the highest share of the oldest age group. In comparison to census data in the six countries, people with higher education (12 or 13 years of school visit, college or university degree) are overrepresented in our data. This must be taken into account when evaluating the results. Several studies show that the education level impacts the understanding of sustainability labels and eco-friendly purchasing behaviours. People with higher education tend to have a better understanding of sustainability labels and are more willing to buy carbon labelled products (Chuanmin et al. 2014; Grunert et al. 2014; Gadema and Oglethorpe 2011). Nevertheless, psychosocial variables have been shown to be more influential in the prediction of the purchase behaviour of sustainably produced food than demographics (Robinson et al. 2002).

Table 3: Sociodemographic characteristics of the sample (per country) (online survey)

	<i>Germany</i>	<i>UK</i>	<i>France</i>	<i>Italy</i>	<i>Spain</i>	<i>Norway</i>
<i>Gender</i>						
Female	49.7%	50.1%	50.8%	50.6%	50.1%	51.4%
Male	50.3%	49.9%	49.2%	49.4%	49.9%	48.6%
<i>Age</i>						
18-29	23.1%	26.9%	25.0%	21.0%	20.9%	22.9%
30-49	40.6%	39.3%	39.5%	44.1%	43.7%	41.0%
50-70	36.4%	33.8%	35.5%	34.9%	35.4%	36.2%
<i>Household size</i>						
1	24.9%	20.7%	20.8%	8.7%	8.5%	27.0%
2	39.5%	32.9%	33.3%	21.4%	23.8%	35.0%
3	17.0%	17.8%	19.0%	29.8%	30.8%	15.5%
4	13.7%	19.9%	18.5%	29.3%	27.3%	14.7%
5 and more	4.9%	8.8%	8.5%	10.8%	9.6%	7.8%
<i>Number of children under the age of 18</i>						
0	63.1%	54.2%	51.5%	60.8%	51.5%	59.5%
1	19.7%	22.3%	24.9%	22.2%	29.0%	17.9%
2 and more	17.2%	23.5%	23.6%	17.0%	19.5%	22.7%
<i>Education</i>						
No formal qualification	0.2%	4.2%	2.6%	0.5%	0.8%	0.5%
About 10 years of school visit	48.9%	24.1%	15.6%	15.1%	14.7%	5.7%
12 or 13 years of school visit	27.3%	19.5%	34.9%	50.1%	40.3%	35.8%
College or university degree	23.7%	52.2%	46.9%	34.3%	44.2%	58.0%
<i>N</i>	1001	1000	1000	1003	1002	1001

4.2 Questionnaire

In the questionnaire which accompanied the choice experiments several questions were asked to collect additional information on consumers' knowledge and attitudes regarding climate change and the impact of individual behaviours (see chapter 3.1.4). Some of the results are presented in the following subchapters.

4.2.1 Importance of product attributes

When comparing different product attributes for their relevance climate-friendliness scored on average 3.52 (SD=1.08) (see Figure 2). In line with the trend towards local food and the results of the experiments, local sourcing was more important to consumers than climate-friendly production and organic (Feldmann and Hamm 2015; Zepeda et al. 2006). Local sourcing, eco-friendly production and country of origin were nearly equally important to

consumers. The consumers in our study rated hedonic or egoistic attributes, such as quality/taste and healthiness as more important attributes of food in the purchase situation than all ethical attributes. These findings confirm the results by Gadema and Oglethorpe (2011) as well as Hartikainen et al. (2014). Healthiness was with an average of 4.28 (SD=0.81) nearly equally important to consumers as the price (M=4.29, SD=0.81). Animal welfare standards were the most important attribute (M=3.85, SD=1.05) of all ethical attributes. The importance of climate change appears to be secondary compared to other environmental, personal and social issues (Lorenzoni and Pidgeon 2006).

Figure 2: Importance of various product attributes in the purchase decision for food

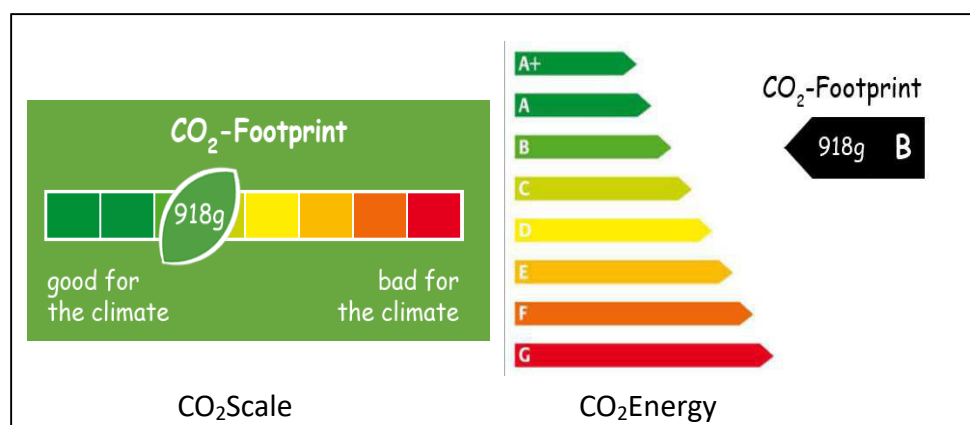


Question: How important is each of the product attributes in your purchase decision?
(Likert scale: 1-‘not important’ to 5-‘important’).

4.2.2 Appreciation of Carbon-Labels

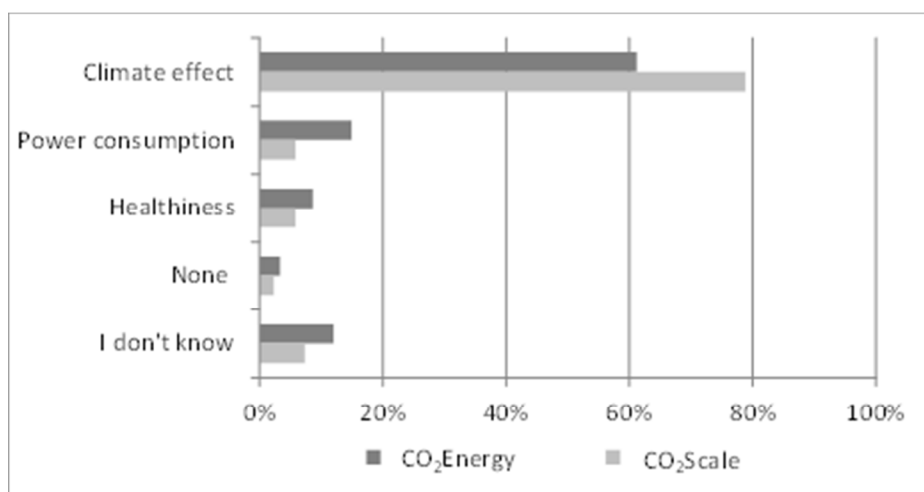
As described above, we designed two carbon-footprint labels which were tested against each other (see Figure 3).

Figure 3: Carbon Footprint labels used in this research



The basic idea was to explore which label would be more suited for introduction in the European market. As indication for suitability we took the degree of comprehensibility of the presented labels and the indicated trust in the shown labels. Regarding comprehensibility, both labels scored similar. And most of the participants correctly stated that the two labels indicated the climate effect of a product (see Figure 4). However, the CO₂Scale-label was more comprehensible than the CO₂Energy-label as more participants answered that it was an indicator for a product's climate effect. The CO₂Energy-label was more often wrongly interpreted as indicating the power consumption of a product and as such was confused with the European energy label.

Figure 4: Comprehension of the two CFP labels tested



Question: "Which information can you derive from this label? Please indicate by ticking below which statement applies to the label."

Regarding trust, both labels ranked similar. With respect to the CO₂Scale label 42% of the participants stated to trust it while 39% said so regarding the CO₂Energy label.

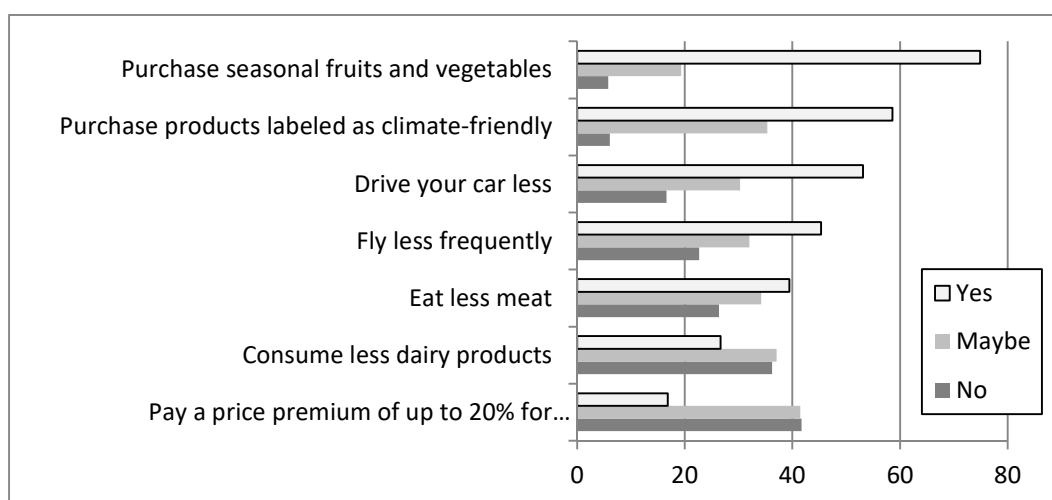
In general, the majority of the participants (72%) favoured the introduction of a label indicating the climate-friendliness of food products ($M=5.27$, $SD=1.43$). This is in accordance with other studies who also found that European consumers appreciate carbon labels on food products (Accenture 2007; Gadema and Oglethorpe 2011; Lüth et al. 2009).

4.2.3 Climate-friendly behaviour

When asked for their actual purchase behaviour regarding climate-friendly products, the majority of the participants (55.5%) answered to buy at least sometimes climate-friendly products. Out of those, who stated to not buy climate-friendly products, 29% indicated that they would buy or might maybe be willing to purchase climate-friendly products in the future.

Different options exist to behave in a climate-friendly manner: Participants were most willing to tackle climate change by purchasing seasonal vegetables and fruits followed by buying climate-friendly products in general (see Figure 5). This is in line with White et al. (2009) and Laureati et al. (2013) who stated that consumers foremost associated environmental conscious behaviour on food with the purchase of local or domestic products. The participants in our study were the least willing to pay a price premium for climate-friendly food (42%). Also Upham and Bleda (2009), Bolwig and Gibbon (2009), Hartikainen et al. (2014) and Vanclay et al. (2011) showed that climate-friendly products are mostly preferred if they do not have a price premium. On the other hand, consumers are ready to spend more for organic and locally produced food (Upham and Bleda 2009). This finding supports the potential competition between carbon labelled products and other low impact indications. Besides buying seasonal vegetables and fruits, participants were more inclined to reduce driving by car and flying than changing their consumption behaviour regarding meat and milk products.

Figure 5: Willingness to take different actions against climate change (% of participants)



Question: Which of the following steps would you personally take in order to tackle climate change?

Since consuming less meat and milk products would mean a change in diet for many consumers this reluctance is not surprising. Vanhonacker et al. (2013), Tobler et al. (2011); White et al. (2009) and Whitmarsh et al. (2011) came to similar conclusions in their studies. Another reason for the low popularity of the reduction of meat and milk products might be that many people do underestimate the impact of eating meat and milk products on climate change (Truelove and Parks 2012).

4.2.5 Constructs influencing climate-friendly behaviour

Previous research shows that various constructs influence pro-environmental purchase behaviour, amongst others attitudes, trust in labels, PCE, subjective knowledge and motives.

In this research, participants were asked for their attitudes about climate change. Most of the participants were concerned about climate change since agreement with statements which expressed concern ranged from 69% to 80%. Instead, the agreement for the five statements which expressed an unconcern or ignorance of climate change ranged from 12% to 38%. Only a minority of 11% denied the existence of climate change. The majority of the participants (72%) disagreed with the statement "Climate change is a good thing". 77% of the participants stated that climate change threatens our future. Also 77% felt responsible for inflicting future generations as less as possible with the implications of climate change. However, 71% were at least partially convinced that future generations will find solutions to deal with the impacts of climate change. Additionally, half of the participants were at least partially annoyed with the subject climate change. The high concern about climate change is in accordance with findings by Hagen and Pijawka (2015), Lorenzoni and Pidgeon (2006), Guenther et al. (2012) and White et al. (2009) who underline that the generic awareness seems to be rather high while detailed understanding of the issue is missing. On average people in Europe as well as in the United States associate predominantly negative images with climate change and worry about climate change (Lorenzoni and Pidgeon 2006).

A factor analysis (principal component analysis, rotated) was conducted to condense the outcome of the answers to the various statements and to reduce the number of variables. The analysis resulted in the two factors 'Concern' and 'Ignorance' of climate change (Table 4).

Table 4: Attitudes towards climate change, outcome of a factor analysis

	Concern $\alpha=0.865$	Ignorance $\alpha=0.766$
Climate change is a serious problem	0.860	
Climate change is a menace to our future	0.856	
I am concerned about climate change	0.834	
We should burden future generations as less as possible with the consequences of climate change	0.742	
Climate change is a good thing		0.752
Climate change does not exist		0.741
The effects of climate change will not affect me		0.717
All the talk about climate change gets on my nerves		0.658
Future generations will find a solution for the impacts of climate change		0.611

α = Cronbach's alpha

The general awareness about climate change was also tackled by the results for the measure of subjective knowledge. Participants perceived their own knowledge about climate change as low to medium or respectively thought that they had at least some knowledge but did not consider themselves to have a lot of knowledge (Scale $M=3.7$, $SD=1.37$). The lack of knowledge was also found by for example Hartikainen et al. (2014), Vanhonacker et al. (2013) and Lorenzoni and Pidgeon (2006).

An important factor for the adoption of a label by the consumer is the trustworthiness of the label (Thøgersen et al. 2010; Zander and Zanolli 2013). In our study, the participants were concerning the trustfulness of labels (Scale $M=4.0$, $SD=1.11$). The fact that consumers are to a certain degree sceptical towards labels is also known from other studies (e.g., Feucht and Zander 2015; Thøgersen et al. 2010).

The mean for the PCE-construct was 4.25 ($SD=0.71$). Thus, participants on average only slightly felt they could make a difference through their own behaviour, so they were sceptical about the extent their personal efforts actually contribute to mitigating climate change. Nevertheless, this average number gives reason to assume that a share of consumers think that they can at least make a difference by buying climate-friendly products. Various studies found that a high perceived consumer effectiveness enhances pro-ecological behaviour (Grob 1995; Vanhonacker et al. 2013; Vermeir and Verbeke 2006). Straughan and Roberts (1999) argue that consumers believe in the efficacy of individuals to combat environmental problems is a stronger predictor for pro-environmental behaviour than is environmental concern.

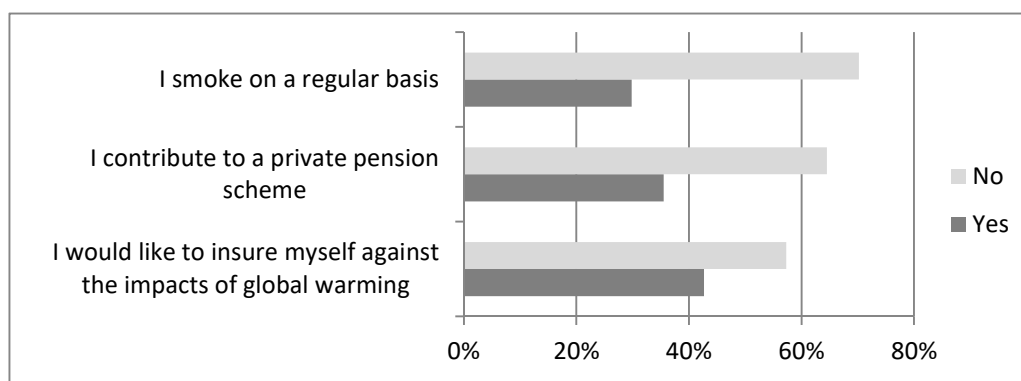
When asked for the motives for purchasing climate-friendly food, the perception of being responsible for future generations was the most pronounced one (26%). Thus, altruism was a

strong argument (Berné-Manero et al. 2014; Brécard et al. 2012; Salladarré et al. 2010). This is in line with findings of Lorenzoni and Pidgeon (2006) who point out that people are predominantly concerned about climate change with respect to societal impacts and in particular to effects on future generations. In the same vein, some participants felt obliged to act and to do something against climate change (14%). An equally important motive was the reduction of habitats for wildlife due to climate change (14%) (see also Whitmarsh et al. 2009). The potential negative implications for personal life (11%) were a slightly stronger motive for buying climate-friendly products than the concern for people in poorer countries (10%). The wish of avoiding the need for paying for risks which might result from climate change was the least mentioned motive (9%).

Time preference was measured making use of two statements ('I am already busy enough handling my life today. The future does not interest me' and 'I have to get along with what I have. I cannot show consideration for the future') (see chapter 3.1.4). The mean of this construct was 3.11 (SD=1.6) indicating that the participants were more future oriented and as such rather willing to trade a current utility for a future benefit.

Analysing the perception of risk or uncertainty is central for understanding consumer behaviour since the individuals' perception of the respective uncertainty influences his or her reaction in a choice situation (Taylor 1974). The participants in our study classified themselves with an average of 3.54 (SD=1.6) on the 7 point scale regarding their personal risk behaviour. This attitude was also reflected in the answers to the statements related to the personal situation of the participants (see Figure 6). The majority of the participants (70%) did not smoke on a regular basis and thus revealing that they prefer health in the future over present pleasures. More than one third of the sample had a private pension scheme and more than 40% of the participants would like to ensure themselves against the impacts of climate change. The answers to all three statements indicate that the participants in our study were rather careful or slightly prepared to take risks.

Figure 6: Risk related behaviour - Agreement (yes) and disagreement (no) with the statements (% of participants)



4.3 Choice experiments

4.3.1 Basic ML models

The results for the basic ML models for each country are presented in Table 5. The estimation of the six basic ML models shows that the overall fit of the models, as measured by McFadden's Pseudo R^2 , was good (Hensher et al. 2005). The model fits differed across countries with the highest model fits found in Norway and the lowest in UK. The mean coefficients of the tested product attributes were significant over all country models. The presence of these product attributes influenced the probability of buying positively, indicated by a positive sign of the coefficients. In line with economic theory, the fixed parameter 'price' had a negative sign which means that with increasing prices the willingness to buy decreased. The standard deviation parameters for all random parameters were significant indicating the presence of heterogeneous preferences among consumers.

The coefficients of the two CO₂-labels were significant and positive, which suggests that products labelled with a CO₂-label were preferred over products without such an indication. This finding is in line with previous research which found that consumers are in favour of a CO₂-label and that carbon labels have a positive effect on the utility of food products (e.g., Eurobarometer 2009; Gadema and Oglethorpe 2011; Grunert et al. 2014; Hartikainen et al. 2014). In all countries, consumers prefer the CO₂Scale label over the CO₂Energy label, that is the mean coefficients for CO₂Scale were significantly higher than those for CO₂Energy (t-test, $p < 0,001$). In general, the probability of buying increased when products were labelled with one of the four tested labels, which is not surprising regarding the trend towards ethical consumerism in particular consumer segments (e.g. Davies et al. 2012; Zander et al. 2013). The claim 'climate-friendly' also enhanced the probability of buying in all countries.

Table 5: Estimation results for the six basic ML models with main effects only

	Coefficients (standard errors)					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	0.7069* (0.06)	1.0818* (0.06)	0.8537* (0.07)	0.5400* (0.06)	0.9981* (0.06)	0.76586* (0.08)
Local (RP)	1.5279* (0.06)	1.0028* (0.05)	1.4202* (0.06)	1.0381* (0.05)	1.2279* (0.06)	1.52489* (0.07)
CO ₂ Claim (RP)	0.3689* (0.05)	0.9993* (0.06)	0.4306* (0.06)	0.2619* (0.05)	0.6544* (0.05)	0.50226* (0.06)
CO ₂ Scale (RP)	1.0552* (0.07)	1.2605* (0.06)	0.8759* (0.07)	0.8665* (0.06)	1.2252* (0.06)	0.68434* (0.07)
CO ₂ Energy (RP)	0.6543* (0.06)	1.0863* (0.06)	0.5028* (0.06)	0.6619* (0.05)	0.8615* (0.06)	0.26518* (0.06)
Price (Fix)	-3.9259* (0.10)	-3.4999* (0.09)	-3.6845* (0.09)	-4.3837* (0.11)	-2.2801* (0.07)	-2.7778* (0.06)
Standard deviations of parameter distributions						
Organic	1.5019* (0.08)	2.0147* (0.07)	1.3309* (0.08)	1.4517* (0.07)	1.3309* (0.07)	1.9100* (0.09)
Local	1.0046* (0.08)	0.8529* (0.07)	1.0049* (0.08)	0.8669* (0.07)	0.9876* (0.07)	1.1244* (0.08)
CO ₂ Claim	1.0463* (0.07)	1.0463* (0.07)	1.0888* (0.07)	0.8610* (0.07)	0.09669* (0.07)	1.1336* (0.08)
CO ₂ Scale	2.0931* (0.12)	1.8661* (0.11)	2.0147* (0.12)	2.0205* (0.11)	1.8953* (0.11)	2.0147* (0.14)
CO ₂ Energy	1.1583* (0.15)	1.2624* (0.14)	1.1039* (0.17)	1.1248* (0.15)	1.3787* (0.14)	0.9844* (0.22)
Model specifications						
N	7808	7808	7680	7744	7616	7680
Log likelihood	-6124.3	-6390.3	-5773.8	-6496.8	-6285.5	-5148.4
McFadden Pseudo R ²	0.2860	0.2550	0.3157	0.2363	0.2488	0.3898

Note: * - Significance on a 99% level

1 - RP=random, Fix=fixed

4.3.2 Relative explanatory power of product attributes

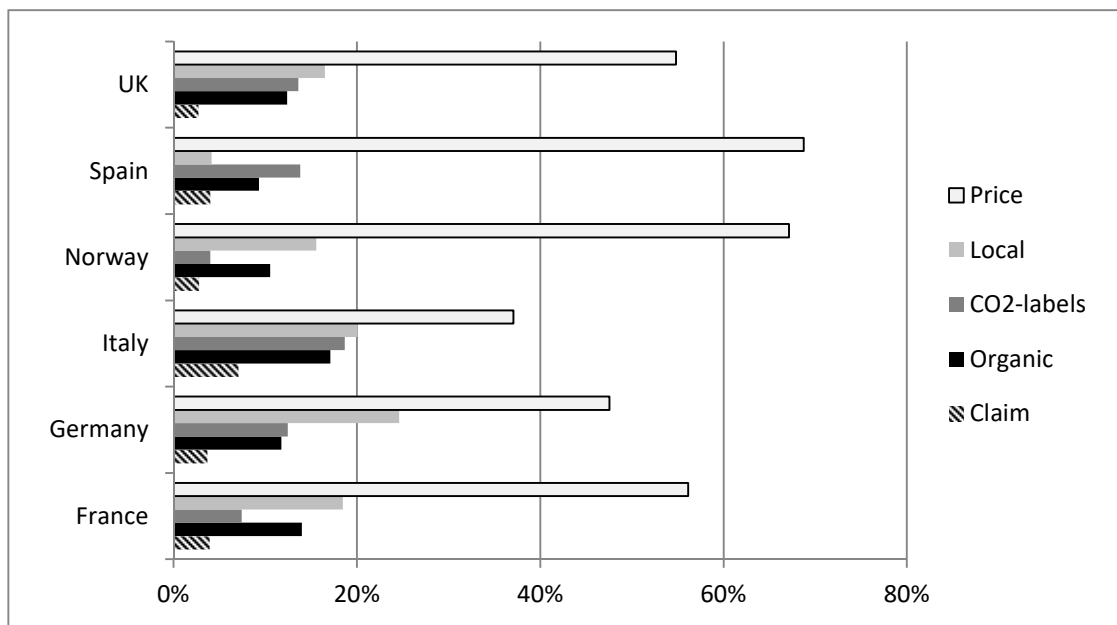
In order to estimate the relative impact of each attribute on the purchase decision, partial-log likelihoods were calculated as explained in chapter 3.1.3. They indicate the explanatory power of the variables.

The ordering of the product attributes based on the explanatory power varied between countries (Figure 7). An exception was the price attribute which had the highest relative impact over all countries. This result is not surprising considering that milk is an everyday

food product, a product with low involvement and which purchase is mainly based on habit (Röös and Tjärnemo 2009).

The product attribute 'local' had the second highest explanatory power after price in all countries except Spain. In Spain, consumers found the CO₂-labels more important than the indication of local production. In general, consumers seemed to favour an indication of local production over an explicit indication of climate-friendliness (Claim and/or CO₂-label) and organic production. This is in line with findings by Onozaka and McFadden (2011) as well as Meas et al. (2014) and the growing popularity of locally sourced food (e.g., Darby et al. 2008; Feldmann and Hamm 2015). In UK, Italy and Germany the carbon footprint labels had a similar impact on the choice response than the indication of organic production. In Spain, the CO₂-labels were more important than the indication of organic production while this effect was reversed in Norway and France. Participants attached more importance to the CO₂-labels than to the claim indicating climate-friendliness. The product attributes 'CO₂-Claim' and 'CO₂-Label' had the least impact in Norway. Our results contradict findings by Gadema and Oglethorpe (2011) and Guenther et al. (2012) which showed that organic was more important to consumers than carbon indications. In this context, our results might indicate a change in consumers' perception of CO₂-labels and on climate change itself over time. Also it might be that consumers were uncertain if and how far organic production is climate-friendly. Zander and Zanolli (2013) show for example that consumers often miss more detailed knowledge about the concept of organic farming. Another reason why organic production was of similar explanatory power than the two tested CO₂-labels in many countries might be that we showed the EU organic logo together with the word "organic" in the choice experiments instead of country specific organic logos (e.g., Biosiegel in Germany and AB in France). This might have lowered the preference for organic production in the experiments since the EU organic logo was often less known by consumers than the respective national logos (Agence Bio 2012; Meyer-Höfer and Spiller 2013; Zander and Zanolli 2013).

Figure 7: Relative explanatory power of product attributes by country (partial-log likelihood)



Several reasons for the higher preferences for 'local' and 'organic' may apply: Consumers are presumably more familiar to the term 'local' and the organic logo as both are actually present in the market. White et al. (2009) and R  s and Tj  rnero (2009) highlighted that some consumers perceive a direct health and quality benefit from organic products, whereas carbon labelling offers no immediate tangible physical benefit. Onozaka and McFadden (2011) and Darby et al. (2008) as well as Feldmann and Hamm (2015) argued that consumers associate local production with the benefits of sustaining local farmland and contributing to the local economy as well as healthiness. Onozaka and McFadden (2011) showed that carbon labelling is complementary to the indication of local sourcing. Participants in their study were more reluctant to purchase local products if they displayed a high carbon footprint which was mostly in the off-season the case. Also Onozaka et al. (2015) found that the provision of a location together with a carbon label reduced carbon emissions due to the fact that consumers were able to take seasonal aspects of production into account with respect to greenhouse gas emissions. Thus, CO₂-labels might actually be suitable for additional information in order to support climate-friendly behaviour in the off-season of local products. Switching from a product to another one where the only difference is origin might be a viable option for many consumers and as such an opportunity to foster climate-friendly consumption (see also Onozaka et al. 2015).

4.3.3 ML models with interactions (ML II)

In order to explore the observed heterogeneity with respect to the product attributes which indicate climate-friendliness ('CO₂Scale', 'CO₂Energy' and 'CO₂Claim') further we estimated seven models with interaction terms for each country (one model for each considered

covariate). Similar to the basic models estimated above, the different ML II models had a good overall fit as indicated by McFadden Pseudo R^2 values. According to the log-likelihood ratio-tests the estimated ML II exhibited better model fit values than the corresponding basic models and as such the ML II represented a statistical improvement over the basic models. The results for the eight models are depicted in Tables 6 to 12. All insignificant interaction terms were excluded from the model estimations as recommended by Hensher et al. (2005).

The first interaction model considered the effect of and the interactions with the message 'Private consumption contributes significantly to climate change. Do something about it! Purchase climate-friendly products!'. According to the interaction terms the message before the experiment ('Message') had, in contrast to our expectations, only little impact on the purchase decisions of the consumers (Table 6). The message did only impact significantly the preference for climate-friendly products in Germany, France and Italy. The message increased the probability of buying products with the CO₂Scale-label in Italy and Germany and of the CO₂Energy-label in Germany. The message also influenced the preference for the products with CO₂Claim in France positively. Grunert et al. (2014) showed in their study that sustainability concerns differ between product categories so that one reason for the low impact of the message might be that milk as a low-involvement product evokes little sustainability concerns in many consumers, and as such participants might have often not considered the information treatment in the choice task. Another reason could be the formulation of the message. Several studies (e.g. Lusk et al. 2006; Uchida et al. 2014; Vermeir and Verbeke 2006; White et al. 2009) point out that the exact formulation of an information treatment is crucial for its impact. Maybe the message promoted climate-friendly purchase behaviour too strongly so that ethically oriented consumers might have been offended.

Table 6: Results for the ML II with the covariate 'Message' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	0.7086***	1.0724***	0.8557***	0.5391***	0.9969***	0.7659***
Local (RP)	1.5261***	1.0013***	1.4188***	1.0384***	1.2278***	1.5252***
CO ₂ Claim (RP)	0.3021***	0.9904***	0.2975***	0.2443***	0.6225***	0.4811***
CO ₂ Scale (RP)	0.8837***	1.2009***	0.8219***	0.9282***	1.1012***	0.6911***
CO ₂ Energy(RP)	0.5528***	1.0797***	0.4841***	0.6571***	0.8104***	0.3041***
Price (Fix)	-3.9348***	-3.4959***	-3.6862***	-4.3802***	-2.2783***	-2.7783***
Interaction terms						
CO ₂ Claim X Message	-	-	0.2646**	-	-	-
CO ₂ Scale X Message	0.3474***	-	-	-	0.2521**	-
CO ₂ Energy X Message	0.2048*	-	-	-	-	-
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-6119.7	-6144.3	-5770.7	-6496.2	-6283.3	-5148.2
McFadden Pseudo R ²	0.2865	0.2837	0.3160	0.2364	0.2490	0.3898

Note: Significance on a 99%***, 95%** and 90%* level

¹ - RP=random, Fix=fixed

Scepticism towards labels negatively influenced the probability of purchasing climate-friendly products in all study countries (see Table 7). The least negative influence was found in the UK. There label scepticism had only a negative effect on the preference for the CO₂Energy-label while it had no significant effect on the other two tested product attributes. Scepticism towards labels had no impact on the purchase probability of products with the CO₂Energy-label in Italy. Consumers' trust which means no or low label scepticism is a central prerequisite for product indications in order to be successful in the market (see e.g., Golan et al. 2001; Zander and Zanoli 2013).

Table 7: Results for the ML II with the covariate label scepticism 'LabelScep' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	0.7056***	1.0793***	0.8565***	0.5395***	1.0019***	0.7186***
Local (RP)	1.5297***	0.9950***	1.4255***	1.0388***	1.2329***	1.5099***
CO ₂ Claim (RP)	1.4112***	1.6947***	1.3663***	0.4537**	1.4351***	1.4577***
CO ₂ Scale (RP)	2.5579***	2.2916***	2.1212***	1.2573***	1.9713***	1.6861***
CO ₂ Energy (RP)	1.9886***	1.8753***	1.4307***	1.0220***	0.8530***	1.0735***
Price (Fix)	-3.9330***	-3.4778***	-3.7056***	-4.3810***	-2.2795***	-2.7743***
Interaction terms						
Co ₂ Claim X LabelScep	-0.2395***	-0.1815***	-0.2174***	-	-0.2003***	-0.2459***
CO ₂ Scalec X LabelScep	-0.3466***	-0.2698***	-0.2931***	-	-0.1945***	-0.2435***
CO ₂ Energy X LabelScep	-0.3070***	-0.2027***	-0.2159***	-0.0868*	-	-0.2015***
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-6119.7	-6128.1	-5749.9	-6494.4	-6270.2	-5134.1
McFadden Pseudo R ²	0.2865	0.2856	0.3185	0.2366	0.2506	0.3915

Note: Significance on a 99%***, 95%** and 90%* level

¹ - RP=random, Fix=fixed

Another model was calculated for the effect of time preference. It showed a negative influence of time preference on the different indications of climate-friendliness (see Table 8). The only exceptions were the preferences for the CO₂Scale-label in UK and the CO₂Energy-label in Italy on which time preference had no significant effect. That is, the stronger the present orientation, the lower the probability of buying climate-friendly products. In other words, the more consumers were ready to trade present gratification for future benefits like health, the more they were inclined to buy climate-friendly products. This is in line with a study by Grebitus et al. (2012) which showed that consumers who are more inclined to delay gratification are more concerned about climate change. Other studies show that the benefits of current lifestyles in some cases, on an individual level, do outweigh the possible risks of climate change (Poortinga and Pidgeon 2003; Zwick and Renn 2002).

Table 8: Results for the ML II with the covariate time preference 'TimePref' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	0.7170***	1.0769***	0.8479***	0.53911***	1.0023***	0.7487***
Local (RP)	1.5381***	0.9923***	1.4224***	1.0419***	1.2296***	1.5523***
CO ₂ Claim (RP)	0.68514***	1.5252***	0.9352***	0.6747***	1.1422***	1.2271***
CO ₂ Scale (RP)	1.9319***	1.7496***	1.4707***	1.0172***	1.4715***	1.5095***
CO ₂ Energy (RP)	1.0667***	1.4062***	1.0568***	1.0095***	0.8594***	0.8532***
Price Fix	-3.9362***	-3.4797***	-3.6848***	-4.3692***	-2.2777***	-2.7931***
Interaction terms						
CO ₂ Claim X TimePref	-0.0958***	-0.1718***	-0.1632***	-0.1357***	-0.1598***	-0.2225***
CO ₂ Scale X TimePref	-0.2705***	-0.1653***	-0.1939***	-	-0.0817**	-0.2410***
CO ₂ Energy X TimePref	-0.1256***	-0.1043**	-0.1786***	-0.0977***	-	-0.1698***
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-6102.2	-6133.2	-5753.8	-6484.2	-6273.3	-5123.5
McFadden Pseudo R ²	0.2886	0.2849	0.3180	0.2378	0.2502	0.3927

Note: Significance on a 99%***, 95%** and 90%* level

¹ - RP=random, Fix=fixed

Another factor tested for its effect on climate-friendly buying behaviour was personal risk perception. We hypothesized that people with a lower propensity to take personal risk have higher preferences for purchasing climate friendly food. Only in some cases an effect could be found (Table 9). In Germany the probability of buying products with a CO₂Claim increased with the preparedness to take personal risks. In contrast, the preference for products with one of the CO₂-labels or with a CO₂Claim decreased with a growing propensity to take risks in France, Italy and Norway. In Spain and UK ones' own risk assessment had no influence on the preference for climate-friendly products. The mixed results with respect to the effect of risk behaviour on the preference for buying climate-friendly products might originate from the low knowledge about the environmental impacts of food of many consumers (European Commission 2009; Hartikainen et al. 2014; Leire and Thidell 2005; Vanhonacker et al. 2013; White et al. 2009). If consumers have problems to connect food and climate change or at least underestimate the impact of food on the climate they will also be unaware of risks for the climate rising from food consumption. As a result, consumers might not take food consumption into account in their own risk calculation with respect to climate change. Also climate change might be a too abstract threat for some consumers as to be incorporated in

one's everyday risk calculation when purchasing food. Climate change is an uncertain phenomenon which is difficult to conceptualize for people (Lorenzoni and Pidgeon 2006).

Another reason for the weak and inconsistent impact of ones' own propensity to take risks on the purchase probability of climate-friendly products might be that the covariate 'Risk' was based on the preparedness of taking risks for oneself instead of the preparedness to take risks for others. People distinguish between the impact of climate change on their personal lives and on the wider society (Bord et al. 1998; Lorenzoni and Pidgeon 2006). Lorenzoni and Pidgeon (2006) highlight in their research that people often do underestimate the risk to themselves resulting from climate change because direct experience with the effects of climate change are frequently missing and climate change is less important in everyday life than other events. Even people living in areas particularly vulnerable to the effects of climate change and being aware of the potential impacts of climate change have difficulties to draw connections to their day-to-day life. In contrast, potential harm resulting from climate change to society is perceived as more severe. People tend to believe in higher risks for future generations (Lorenzoni and Pidgeon 2006) and various studies show that people living today perceive the risks for themselves resulting from climate change as low (Grothmann and Patt 2005; Whitmarsh et al. 2011). People might consider the impacts for them as manageable.

Table 9: Results for the ML II with the covariate risk attitudes 'Risk' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	0.7081***	1.0887***	0.8551***	0.5398***	0.9981***	0.7675***
Local (RP)	1.5524***	1.0137***	1.4213***	1.0378***	1.2289***	1.5370***
CO ₂ Claim (RP)	0.1192	1.0559***	0.4289***	0.2787**	0.7284***	0.7524***
CO ₂ sc (RP)	1.0685***	1.1938***	1.1718***	0.8764***	1.6397***	0.7025***
CO ₂ en (RP)	0.64637***	1.0068***	0.7755***	0.6068***	0.8273***	0.2878***
Price (Fix)	-3.9657***	-3.5189***	-3.6886***	-4.3837***	-2.2842***	-2.8063***
Interaction terms						
CO ₂ Claim X Risk	0.0769**	-	-	-	-	-0.0713*
CO ₂ Scale X Risk	-	-	-0.0816*	-	-0.1167***	-
CO ₂ Energy X Risk	-	-	-0.0755**	-	-	-
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-6114.9	-6137.2	-5771.0	-6496.6	-6279.4	-5140.3
McFadden Pseudo R ²	0.2871	0.2845	0.3160	0.2364	0.2495	0.3908

Note: Significance on a 99%***, 95%** and 90%* level

¹ - RP=random, Fix=fixed

The perceived consumer effectiveness (PCE) is an important explanatory factor for pro-ecological behaviour. It is an indicator for individuals' believe that their efforts make a difference in the solution of a problem (Ellen Scholder et al. 1991; Grothmann and Patt 2005; Whitmarsh 2009). The results of our estimations of the interaction terms between the covariate 'PCE' and the three attributes indicating climate-friendliness proof this point (see Table 10). All coefficients of the three calculated interaction terms had a positive value and were significant. This shows that the stronger consumers believed that their efforts make a difference in the mitigation of climate change the more they were willing to buy climate-friendly products.

Table 10: Results for the ML II with the covariate perceived consumer effectiveness 'PCE' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	-1.9038***	-0.6970***	-0.7726**	-0.6312***	-0.8910***	0.7827***
Local (RP)	0.2128	-0.1233	0.7083***	0.4878**	0.4080	1.5362***
CO ₂ Claim (RP)	-0.8979***	-0.3018	-0.9122***	-0.6953***	-1.3874***	-1.2347***
CO ₂ Scale(RP)	-1.3149***	-0.5090*	-0.8858***	-0.5649**	-0.5245*	-1.6001***
CO ₂ Energy (RP)	-1.0724***	-0.2397	-0.9461***	-0.8127***	-0.1204	-1.2331***
Price (Fix)	-3.9690***	-3.5014***	-3.6637***	-4.3870***	-2.2836***	-2.8128***
Interaction terms						
CO ₂ Claim X PCE	0.2623***	0.2510***	0.2777***	0.2088***	0.3897***	0.3683***
CO ₂ ScaleX PCE	0.4917***	0.3396***	0.3532***	0.3109***	0.3346***	0.4796***
CO ₂ Energy X PCE	0.3575***	0.2552***	0.2957***	0.3233***	0.1889***	0.3178***
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-5996.9	-6073.6	-5725.4	-6434.5	-6204.5	-5077.9
McFadden Pseudo R ²	0.3009	0.2919	0.3214	0.24368	0.2585	0.3982

Note: Significance on a 99%***, 95%** and 90%* level

¹ - RP=random, Fix=fixed

People's purchase behaviour is influenced by their knowledge. Based on three statements we measured participants' subjective knowledge of the climate effect of products. Our results show that subjective knowledge (SubjKnow) enhances the probability of purchasing climate-friendly labelled products in most cases. Only in Spain and Norway subjective knowledge had no significant effect on the preference for products with a claim and on products labelled with the CO₂Scale-label in Norway.

Table 11: Results for the ML II with the covariate subjective knowledge 'Subjknow' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP) ¹	0.7153***	1.0802***	0.1642	0.0889	0.2427	0.7538***
Local (RP)	1.5519***	1.0011***	1.8043***	1.2719***	1.3934***	1.5168***
CO ₂ Claim (RP)	0.0081	0.9973***	-0.1532	0.0024	0.3353**	0.4993***
CO ₂ Scale (RP)	0.2327	0.6937***	0.4021*	0.5891***	0.7525***	0.7247***
CO ₂ Energy (RP)	-0.2713*	0.6752***	0.1830	0.2985**	0.2464	-0.0239
Price (Fix)	-3.9268***	-3.4962***	-3.6776***	-4.3781***	-2.2757***	-2.7858***
Interaction terms						
CO ₂ Claim X Subjknow	0.1057***	-	0.1589***	0.0721**	0.0779**	-
CO ₂ Scale X Subjknow	0.2315***	0.1416***	0.1224**	0.0801*	0.1167**	-
CO ₂ Energy X Subjknow	0.2603***	0.1038**	0.0878**	0.1045***	0.1504***	0.0946**
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-6094.5	-6134.4	-5764.6	-6481.8	-6267.4	-5149.4
McFadden Pseudo R ²	0.2895	0.2849	0.3168	0.2381	0.2509	0.3897

Note: Significance on a 99%***, 95%** and 90%* level

¹ - RP=random, Fix=fixed

Attitudes towards an issue are another aspect which is linked to environmental behaviour (Kollmuss and Aygeman 2002). Our results show that the attitudes towards climate change had a significant effect on the preference for climate-friendly products in all study countries (see Table 12). Interestingly the factor 'Concern' about climate change as well as the factor 'Ignorance' which indicates a tendency to ignore climate change increased the probability to purchase a climate-friendly product. One important factor in this respect is the concern for future generations and society overall. While people might have a tendency to ignore climate change and its potential outcomes for their personal life or even considering the potential benefits of climate change for themselves, the perspective changes with respect to the social good (e.g., Lorenzoni and Pidgeon 2006). Since people perceive the risks resulting from climate change to society and future generations as higher and more relevant, they might buy climate-friendly products despite their own ignorance of climate change.

Table 12: Results for the ML II with the covariates attitudes concerned about climate change 'CC_Concerned' and ignorant about climate change 'CC_Ignorant' for all study countries

	Coefficients					
Parameters	Germany	Spain	France	UK	Italy	Norway
Organic (RP)	0.7195***	1.0896***	0.8569***	0.5430***	0.9991***	0.7699***
Local (RP)	1.5426***	1.0076***	1.4223***	1.0440***	1.2335***	1.5323***
CO2Claim (RP)	0.3785***	1.0113***	0.4396***	0.2670***	0.6587***	0.5233***
CO ₂ Scale (RP)	1.0631***	1.2665***	0.8813***	0.8673***	1.2532***	0.6897***
CO ₂ Energy (RP)	0.6697***	1.0961***	0.5150***	0.6671***	0.8642***	0.2739***
Price (Fix)	-3.9362***	-3.5084***	-3.6905***	-4.3791***	-2.2875***	-2.7835***
Interaction terms						
CO2Claim X CC_Ignorant	0.1730***	0.1583***	0.0993*	0.0937*	0.1858***	0.2595***
CO2Claim X CC_Concerned	0.1582***	0.1778***	0.1895***	0.2355***	0.3349***	0.3017***
CO2Scale X CC_Ignorant	0.1648***	0.1425**	0.2583***	0.1399**	-	0.1909***
CO2Scale X CC_Concerned	0.4154***	0.2265***	0.2195***	0.2266***	0.1708***	0.3005***
CO ₂ Energy X CC_Ignorant	-	0.1709***	0.2466***	0.1489***	-	-
CO ₂ Energy X CC_Concerned	0.2563***	0.1583***	0.1238**	0.2347***	0.1309**	0.2659***
Model specifications						
N (choices)	7808	7808	7680	7744	7616	7680
Log likelihood	-6087.7	-6117.5	-5749.3	-6466.4	-6250.3	-5107.3
McFadden Pseudo R ²	0.2903	0.2868	0.3186	0.2399	0.2529	0.3947

Note: Significance on a 95%** level

¹ - RP=random, Fix=fixed

5 Results of the qualitative interviews

The results of the choice experiments and the questionnaire showed that participants had a preference for climate-friendly indications on food and that they are willing to pay higher prices. The carbon label with a horizontal scale was preferred. This stated preference is in contrast to the low market relevance of carbon labels in Europe.

Against this background, the aim of the semi-structured interviews in three of the six previous study countries was to better understand consumers' motivations and barriers to behave climate-friendly at the point of sale. Additionally, consumers' information interests and needs regarding climate-friendly food were elicited. On this basis recommendations can

be given on how to address consumers in a way that motivates them to act in a more climate-friendly manner when doing food shopping.

5.1 Sample characteristics

In total 23 women and 9 men participated in the interviews of which 50% had a university degree. Persons between the age of 18 and 30 and between 41 and 50 were the most prevalent in the sample. A summary of the sample characteristics is shown in Table 13.

Table 13: Sociodemographic characteristics of the sample (per country) (face-to-face interviews)

	<i>Germany</i>	<i>Scotland</i>	<i>France</i>
Female	64%	82%	70%
Male	36%	18%	30%
18-30	36%	9%	50%
31-40	9%	9%	20%
41-50	27%	55%	20%
>60	27%	27%	10%
About 10 years of school visit	18%	0%	0%
12/13 years of school visit	36%	0%	30%
College or university degree	45%	100%	70%
<i>N</i>	11	11	10

5.2 Understanding of climate change

All participants had at least a generic understanding of climate change: "The planet warming up" (UK 05.25-11.58, line 2). They perceived climate change as a process which alters the living conditions for humankind and wildlife. Associations with climate change were mostly negative such as an increase in weather fluctuations and extreme weather leading to floods and droughts. Climate change was also related to changes of ecosystems implying loss or downsizing of habitats and leading to migration and concentration of the global human population. Two very prominent examples for ecosystem changes mentioned by participants were the melting of the polar caps and the rise of the water level. Another topic has been harvest losses induced by climate change resulting in higher food prices, malnutrition and famines. Other associated health risks were for example dehydration caused by heat waves and an increased spread of diseases. Climate change was falsely associated with the ozone depletion by some participants which is a common misconception reported already in the literature (e.g., Dunlap 1998; Lorenzoni and Pidgeon 2006).

Some participants mentioned explicitly that climate change was influenced by humans while others were uncertain to which degree and even if at all human activities impact climate

change. They assumed that climate change was to a certain degree a natural process (see also Lorenzoni et al. 2007; Whitmarsh et al. 2011). Also a part of those participants were sceptical about and confused by the available information about climate change. They stated that their uncertainty about climate change resulted from the contrasting information they received in particular from scientists through the media.

5.3 Concern about climate change, influence of direct experience and risk perception

Against the background of the survey results we aimed to gain a deeper understanding in which manner people's concern/ignorance of climate change influences their preference for climate-friendly products.

Participants were in general concerned about the impacts of climate change which is in line with our survey findings and research by for example Guenther et al. (2012), O'Neill and Hulme (2009) and Semenza et al. (2008). We found that people differentiated between personal risks resulting from climate change and risks to society and future generations. Some participants tended to underestimate or even deny risks resulting from climate change for their own life while simultaneously acknowledging the negative impacts of climate change on society and on future generations (see e.g., Grothmann and Patt 2005; Lorenzoni et al. 2007; Semenza et al. 2008). The low perception of the risks associated with climate change rooted in the low direct experience of the participants with effects of climate change. A part of the participants placed the risks resulting from climate change in particular in other locations such as island states or developing countries. Direct experiences with climate change were mostly limited to weather fluctuations and to issues where some immediate demonstration of impact existed (e.g. flooding, soil drought). For people are used to weather and temperature variations, they underestimate the impacts of an increase in global temperature: "Because you can't grab it. Scientists speak about an increase in temperature of a few degrees, but this is not tangible" (DE 05.02_13.00, line 64). People felt that direct experience is needed in order to act decisively against climate change. As long as direct experiences/impacts are missing, individuals stated to care more for more immediate factors affecting their lives such as terrorism or everyday challenges such as work (see also Lorenzoni and Pidgeon 2006; Whitmarsh et al. 2011).

Some participants were rather fatalistic about climate change since they believed that it was too late to combat climate change and/or that the economic system prevents significant change - an argumentation scheme which was also observed by Grothmann and Patt (2005). Additionally, participants sometimes argued that their own actions would have no real impact since so many others do not act against climate change and thus referred to the 'free rider effect'). They questioned the effect of their actions and perceived it not worth doing something (e.g., FR 05.09_15.06, line 45) which underlines the influence of perceived consumer effectiveness on climate-friendly behaviour found in the choice experiments. The

denial of any capability to act against climate change might be a way to cope with cognitive dissonances on a personal level arising between the social demand to engage with climate change and actual personal behaviour (Whitmarsh 2011).

A part of the participants showed a tendency of ignoring negative effects of climate change on their personal lives while simultaneously stating an interest in and sometimes also a willingness to buy climate-friendly products. Some participants stated that they felt a moral obligation towards society and future generations (see also Lorenzoni and Pidgeon 2006; Whitmarsh 2009). Other participants mentioned that they would engage against climate change in order to feel better by contributing to the welfare of others, which is in accordance with the concept of impure altruism proposed by Andreoni (1990). Some participants argued that acting against climate change independently from one's personal benefit is in line with moral righteousness as defined by Sörqvist et al. (2015). Altruistic motives were therefore a strong motive for the interest in climate-friendly products.

5.4 Knowledge about the impact of food production and consumption on climate change

Based on our findings in the survey and previous research (e.g., Hartikainen et al. 2014; Vanhonacker et al. 2013) we hypothesised that the participants in the interviews had some but not a very detailed knowledge about the impact of food consumption and production on climate change. Our interview results confirm this assumption: participants had only a vague idea of how food production and consumption might enhance climate change.

Predominant associations with the impact of food production and consumption on climate change were the emissions resulting from global food trade and from the production process itself. The climate effect of food production was sometimes deduced from the degree to which a product was processed. In this logic the amount of processing determined the exact impact on climate change due to the energy and other resources needed during the production process. Some participants also believed that the degree of production intensity and the application of drugs and pesticides had an impact on climate change. Land use changes induced by agriculture were also pointed out as having an effect on climate change. A few participants mentioned quite specifically that animal husbandry had an impact on climate change. Thus, some participants said that the reduction of meat consumption would be beneficial for the climate. Other mentioned the reduction of food waste and in this context the avoidance of overproduction. In particular German and Scottish participants highlighted the relevance of food waste. German consumers might have been in particular responsive to this issue due to a governmental campaign, called 'Zu gut für die Tonne' running since 2012 which aims to reduce food waste by informing consumers and giving practical advices for reducing food waste. During the interviews in Edinburgh some retailers were also running campaigns against food waste.

Obviously, participants tended to subsume climate change and related issues under an umbrella of environmental and ethical issues. They often talked about protection of the environment, improving animal welfare and fair trade when asked for the actions to be taken to combat climate change. One common topic in this respect was the engagement in activities for an efficient use of resources (e.g., wearing second hand clothes, preferring electrical devices with a low energy demand, saving water). Especially, in France and UK recycling emerged as a solution for climate change while it was not brought up in Germany. This might be due to a longer tradition of household recycling in Germany in comparison to France and UK. One reason for the observed mixing-up and merging might be lack of knowledge.

5.5 Understanding of climate-friendly food

Since we found in the choice experiments that the attribute 'locally produced' was preferred over the attributes 'organic' and those indicating explicitly a climate-friendly production we further explored consumers' understanding of climate-friendly food in the interviews. We hypothesised that participants would associate with climate-friendly food in particular locally produced and seasonal products.

The interviews showed that people often miss a concrete idea what climate-friendly food means. Frequently, participants started to develop an idea about the term when asked if they bought climate-friendly food: "Probably if the product is grown naturally – meaning not in a greenhouse. Is this correct?" (DE 05.03_09.31, line 10). Some participants stated that they did thus far not actively look for climate-friendly food. Thus, the climate-friendliness of the indicated food products was often a side-effect. Nonetheless, some participants stated explicitly that climate-friendliness was one reason amongst others for preferring those products over others.

Climate-friendly food was often associated with local production and sometimes also with seasonal produce supporting our hypothesis. Local production was mostly associated with a more climate-friendly production due to shorter transport distances. Although, some participants argued that local products would not be particularly climate-friendly as long as they are produced conventionally. Other associations with climate-friendly food were self-grown and naturally produced food. Naturally produced referred to as less processed as possible as well as animal husbandry and plant production in their natural environments. Some participants also related organic to climate-friendly and argued that the renunciation to the use of artificial pesticides and fertilizers would make organic products more climate-friendly. Others stated that they had no clear idea if organic would be more climate-friendly than conventional products. A part of the participants doubted the climate-friendliness of organic food due to potentially long transport distances and production on big scales. Some participants argued that organic production would be eco-friendly but not particularly climate-friendly.

5.6 Reduction of meat and/or dairy consumption

In the survey we found that the preparedness to reduce the meat and dairy consumption in order to tackle climate change was low. We thus aimed in the interviews to understand the reasoning behind this reluctance. A part of the participants were not aware of the impact of meat and dairy production on climate change. Some participants perceived the reduction of meat and dairy consumption even as an ineffective measure and therefore were not willing to reduce their consumption for the mitigation of climate change: "It is rather the production modes of meat and dairy products and not so much the consumption that has to change. Industrial farming and big farms are a disaster – it is not the little farmer who pollutes the most" (FR 05.10_12.29, line 60). This attitude shows the tendency of some participants to align the causes of climate change with more 'distant' activities such as intensive farming rather than with their own behaviour (see also Whitmarsh et al. 2011).

Another barrier for the reduction of meat and dairy products were habits. Some participants stated for example that they would need to adjust their cooking habits. Health was mentioned as reason to reduce meat consumption as well as to renounce a reduction of meat and dairy products. Participants stated that they did not want to give up the pleasure of eating meat and dairy products. Some said that they would need adequate alternatives in order to reduce meat and dairy consumption. Adequacy referred in this case to taste, nutritional value as well as convenience aspects such as preparation options. A part of the participants stated that they would be willing to consider a reduction depending on the expected amount in reduction and finally how easy the recommended reduction would be to integrate in their everyday life. Participants who were ready to reduce their dairy and/or milk consumption often stated that they would be fine with it as long as a reduction would be consistent with a balanced diet. Some also argued that eating less meat and dairy products would benefit one's own health as well as the climate and as such would be more appealing. In general, climate-friendliness was rather seen as a positive side-effect of reduced meat and dairy consumption due to health reasons. Some also mentioned that animal welfare considerations would be a more important reason for them to reduce meat and/or dairy consumption, reflecting the higher relevance of animal welfare compared to climate-friendliness found in the present survey.

5.7 Time preference and uncertainty

The choice experiments showed that time preference had an impact on the preference for climate-friendly products. Thus, we aimed in the interviews to elicit the role of time preference on climate-friendly behaviour in more detail. We hypothesized that today's certain benefits (e.g., lower costs) would be valued higher by the participants than uncertain future benefits even if future benefits were higher.

Indeed we found that some participants tended to focus on more immediate priorities (e.g., personal current financial situation) than on a long-term and global issue like climate change: "Current challenges are more immanent than such a long process such as climate change" (UK 05.25_13.58, line 78). Many participants thought that climate change poses a temporally remote risk which might even be removed in the future (see also O'Neill and Hulme 2009; Whitmarsh et al. 2011; Lorenzoni et al. 2007). Some of the participants argued that climate change will only affect future generations while they will see no tangible effects in their lifetime: "I think there's the potential to, but I don't think there's a will to because we all live for a relatively short period of time, so I don't think we're capable of looking ahead of our lives into the next generation, so we just think they'll deal with the problems as they arise" (UK 05.25_13.58, line 12). A part of the participants stated that they would engage more strongly in measures to combat climate change if the effects of their doing would be already visible in the present or near future.

Many participants also said that they would still act against climate change even though the benefits laid in the future and were less certain. These people's motivations were personal principles and their concern for future generations (also own children). Some consumers reasoned that it did not matter to them that the consequences of climate change were to a certain degree uncertain since the consequences were already visible so that the necessity to engage was already given. Furthermore, some participants were convinced that actions against climate change will be beneficial independent of their exact effects: "I don't think anything is certain. I think if there are things that help or you think will help then it's worth trying" (UK 26.05._12.00).

Another reason why the uncertainty of the outcomes of climate change was not so important for most of the participants was that the measures taken did immediately benefit their health or their well-being or at least their conscience.: "I don't think my behaviour is influenced by the fact that, I don't think I do things just because I think of climate change. For example, using a bike for example it's not because I think it's going to help climate change. It's because it's quicker and healthier and better for you. I feel saner doing that than sitting in a traffic jam or walking along pavement on busy roads. It helps, it's for selfish reasons as well as thinking okay generally it's better for the planet" (UK 05.25_13:58, line 28).

5.8 Further barriers for purchasing climate-friendly food

The survey revealed an interest in indications for climate-friendly food. But the success of such indications in the market is still low and in our interviews it turned out that consumers were mostly unaware of this kind of indications. Participants frequently stated that climate change considerations had no explicit influence on their purchase decisions for food.

Climate-friendly products were expected to correspond with consumers' habits regarding eating and preferred brands. Lack of knowledge about climate-friendly food was identified as

an important barrier. Many participants said that information about climate-friendly food was scarce or even not present and that they would need more information in order to consider buying climate-friendly food (see also Beattie and Sale 2009; Gadema and Oglethorpe 2011; Upham et al. 2011).

Participants said that climate-friendly products needed to be sold at reasonable prices in order to be taken into account. Some participants stated that they would not be willing to pay a price premium for climate-friendly food.

Time constraints were another relevant barrier for some participants to purchase climate-friendly food. They said that the purchase of climate-friendly food had to fit with their time restrictions for grocery shopping. Time and availability were connected since participants argued that they would like to find climate-friendly products in their usual shopping locations in order to avoid spending more time by having to change shopping locations. Climate-friendly food had to be easy to find in order to limit search efforts. In this context, some participants suggested a concentrated display of climate-friendly food in the shopping location.

5.9 Information needs and carbon labels

Our findings show that a lack of knowledge about the impact of food on climate change is a main barrier for purchasing climate-friendly food. Informing consumers by labels and other communication means is often seen as a remedy for this problem by consumers themselves as well as by research (e.g., Burger et al. 2010; Laureati et al. 2013; O'Neill and Hulme 2009; Rööß and Tjärnemo 2011; White et al. 2009). Therefore, we explored in the choice experiments the influence of an educational message on the purchase decision and tested two carbon labels. We found that the message before the experiments had little impact on the purchase preferences while the interest in the two carbon labels was substantial. Against this background we further investigated the information needs of consumers in order to gain a better understanding how consumer communication had to be designed for engaging consumers.

Most of the participants wished for more information about climate-friendly food and climate change. The general attitude was the more information the better: "Yes, getting more information is always better. Without information I have no idea if the vegetables are climate-friendly or not" (DE 05.03_12.30, line 146). Some participants stated that they wished for more practical, enabling information such as tips as how to integrate climate-friendly behaviour in their everyday life. The information should be concise, comprehensible, reliable and readily available (see also Berry et al. 2008; Burger et al. 2010; Hartikainen et al. 2014; Lüth et al. 2009). Relevant information sources were campaigns and publicities, media (TV, radio, newspapers), the internet (e.g., online news, social media), stores and product packages.

In accordance with our survey results, the participants in the interviews were in favour of a carbon label on products. They perceived it as a welcomed information source about climate-friendly food. However, some participants added that they were not sure if they would use such a label. It was argued that climate-friendliness is not one of the major topics when grocery shopping (see also Gadema and Oglethorpe 2011). Nonetheless, some imagined that the presence of a carbon label might raise their awareness for climate-friendly food and for the relation between climate change and food in time supporting a suggestion by Robinson et al. (2002). A carbon label was welcomed but not perceived as absolutely needed.

In France (the retailer Casino has a label on own products) and in the UK (Tesco had a label until 2012) indications for climate-friendly products existed but were mostly unknown. One reason for not considering information about climate-friendly products in the purchase situation was for example that some participants did not see any personal benefit from buying climate-friendly products. Some participants felt overwhelmed by the information already offered and thus were not inclined to consider another label in their purchase decision. The participants of the interviews were undecided if there was too much or too few information about climate-friendly behaviour and climate-friendly food consumption in particular. This reflects the omnipresence of information we find today in our society which leads to an overload for some people and which makes it hard to spot even information you are actively looking for. Climate-friendly information can be around and at the same time not be perceived. A typical statement in this regard was: "I think it's there, I think it's there. I think if you looked through it you would find it but I think if you're lazier, you're not that way inclined, you're not going to go and look for it until it really starts to affect you" (UK 05.26_12.00, line 20). A few participants were sceptical about the information offered and perceived it as greenwashing. Some participants also pled for the introduction of only one carbon label or even the inclusion of climate change considerations in an eco-label comprising various environmental issues. Similar results have been reported by Burger et al. (2010), Hartikainen et al. (2014) and Upham et al. (2011).

Our results suggest that only a small part of consumers will actively use carbon labels. Generally, the participants preferred to have more information about climate-friendly food but just to have the information around in case they wanted to take a look and not always in order to consider this information in their everyday choices. Other issues were frequently more important in the purchase situation. Therefore, participants did frequently not long for more information in general but rather for more awareness: "[...] if the issue would be more present in the public, everyone would surely consider it" (DE 05.03_08.03, line 132). They wished to have a better understanding of the impact on climate change on their own life in order to connect the abstract issue to their individual reality.

The participants themselves offered ways to make consumers more aware of climate change in the context of food consumption. Some participants favoured to be nudged in the 'right' direction instead of having to make an effort for making the 'right' choices: "There's a bigger supermarket chain that the suppliers have to dance to their tune and do what they say and I

know that has a whole effect on pricing and farmers not necessarily in a good way. So they should take a bit of responsibility and educate us. Push us in the right direction" (UK 05.26_10.30, line 183). In this context some participants supported a dedicated space for climate-friendly and eco-friendly food in supermarkets (see also Berry et al. 2008). Others favoured governmental campaigns for a climate-friendly lifestyle. Additionally, some participants suggested the inclusion of climate-friendly behaviour in formal education. It was argued that this might be the best way to foster behaviour change as it directly influences the development of values and beliefs. A part of the participants said that another social attitude is needed in order to combat climate change successfully (UK 05.25_13.58, line 163).

5.10 Knowledge of the EU organic logo

The results of the choice experiments showed that organic production was often equally important to participants than explicit indications of climate-friendliness. We argued that this result might have been affected by showing only the EU organic logo in the experiments instead of country specific organic logos (e.g., Biosiegel in Germany and AB in France). The EU organic logo is often less known by consumers than the respective national logos (Agence Bio 2012; Meyer-Höfer and Spiller 2013; Zander and Zanolli 2013). In this context, we explored in the interviews if the EU organic logo was less known and/or less trusted by the participants than other logos for organic production.

The interview results did not confirm our expectations. Nearly half of the participants (44%) were aware of the European organic logo and 66% of the participants said that they would trust the European organic logo even though some of them had not seen it before. Some participants mentioned to know other logos for organic products but sometimes they did not trust those logos more than the EU organic logo. The EU organic logo was also frequently correctly identified as indicating organic production. Some participants even connected the logo with the European Union due to the shown stars. In France as well as in Scotland participants stated frequently that they would mainly identify organic products by the term 'organic' and by the green colours present on the package than by a logo. This result is not surprising for the Scottish participants since retailers in the UK often only show the term 'organic' prominently while presenting the organic labels only less obvious on the backside of the package (Janssen and Hamm 2011). Additionally, some French participants stated that they would either shop for organic products in explicit organic shopping locations or go directly to the dedicated spaces for organic products in conventional supermarkets.

5.11 Responsibility for the mitigation of climate change

According to the results of the online survey, the government and the industry were perceived as highly responsible for tackling climate change while only a medium responsibility was aligned to consumers and to citizens in general. In the interviews we aimed

to explore the reasoning behind the allocated responsibilities to tackle climate change established by the survey.

The analysis of the interviews showed that indeed participants perceived the government as one of the primary responsible agents for acting against climate change. Reasons were the organisational as well as financial capacities of the government. Participants reasoned that the government would be able to initiate collective actions which would be more effective than individually undertaken measures (see also Lorenzoni et al. 2007). Also participants said that the government as representative of the people has an obligation to act. They argued that the government has the obligation to protect its' people.

In contrast to the results of the online survey, participants in the interviews mainly did not perceive the industry as being responsible for tackling climate change. Some participants said that the industry had to do their bit and even take a pioneering role. In general participants tended to focus more on the responsibility of the society as a whole. A typical statement was: "Everyone is responsible, everyone without exception" (DE 05.03_13.54, line 25). Therefore, our results show that people feel a social responsibility to take action against climate change (see also Lorenzoni et al. 2007; Whitmarsh et al. 2011). In addition to our findings China and the USA were seen as having a responsibility since they were described as high emitters. Also scientists were mentioned as responsible party by delivering reliable information and advising the government. Participants in the interviews did not mention NGOs as responsible agents for tackling climate change.

6 Conclusions

Our results show that most consumers are generally concerned and dispose of a generic knowledge about climate change. Also we found a general interest in carbon labels and in climate-friendly products.

With respect to the two tested carbon labels we found that the label with a horizontal scale was preferred. It was more comprehensible and more credible to the participants. The results of the choice experiments mirror the interest in carbon labels and in climate-friendly products found in the questionnaire since products with CO₂-labels as well as with the claim climate-friendly were preferred over products without such an indication. But our results also reveal that local production was frequently favoured over an explicit indication of climate-friendliness (CO₂Claim and/or CO₂-label) stressing the growing popularity of locally sourced food. Organic production was in some countries of similar importance than the carbon labels and in other countries of more importance. Consumers might assume local and organic together with a climate-friendly production under the umbrella term eco-friendly diet.

All of the participants of the face-to-face interviews were unaware of existing carbon labels. Nevertheless, participants were in general in favour of such a label. But it became also obvious that participants felt no urgent need for the introduction of such an indication. It was

more seen as a helpful addition to already existing labelling schemes. The results also underline that climate change has a low salience with respect to consumption behaviour and that other issues such as animal welfare are more in the focus of consumers. Some participants also stated explicitly that their priority laid on other food attributes and that climate-friendliness would only rise in their own priority if they would be more aware of the reasoning for allocating more importance to this attribute.

Consumers often associated climate-friendly food with local and seasonal produces. The preparedness to consume less meat and dairy products in order to tackle climate change was low. Also the majority of the participants have not been willing to pay a price premium for climate-friendly products. In general, participants seemed to be more inclined to engage in climate-friendly activities that easily comply with their everyday life and did not demand additional resources such as time and money. Participants perceived climate-friendliness rather as a positive side-effect. The strongest motive for purchasing climate-friendly products was the feeling of responsibility for future generations underlining the importance of moral considerations in particular towards future generations.

People frequently stated an information deficit about climate-friendly products. But – having in mind the frequently cited information overload - information provision can only be one piece of a broader concept to promote lifestyle changes and public acceptance. Participants are not "[...] 'empty vessels' waiting to be filled with information which will propel them into rational action" (Whitmarsh et al. 2011: 59). That is, the education of the public should be part of a wider structural change for mitigating climate change. Climate change needs to be linked to personal actions and lifestyle choices and to be embedded in supportive institutional conditions (see also Whitmarsh et al. 2011). Information needs to be convenient. In line with people's time preference the information needs to be reliable, comprehensible, easy to spot and informative.

Having in mind the limited knowledge of consumers about ways to reduce their personal carbon footprint and the multitude of possible actions, the power to change things is not with consumers. Major actors for reducing the negative climate effect of consumption are the authorities and the industry. Governments should make the industry adapt their products and production processes in order to reduce climate effects by developing respective laws. Additional efforts can and should be undertaken by the industry. By making use of modern communication channels climate-friendly enterprise policy can well be communicated to consumers and might support further activities to mitigate climate change.

References

- ACCENTURE, 2007. CO₂-BILANZ BEI LEBENSMITTELN? JA, BITTE!. RETRIEVED FROM: [HTTP://WWW.ACCENTURE.COM/DE-DE/COMPANY/NEWSROOM-GERMANY/PAGES/VERBRAUCHER-SUSTAINABILITY-STUDIE.ASPX](http://www.accenture.com/de-de/company/newsroom-germany/pages/verbraucher-sustainability-studie.aspx).
- AGENCEBIO/CSA 2012. 10^E BAROMÈTRE AGENCEBIO/CSA 2012. PRESS RELEASE. RETRIEVED FROM: [HTTP://WWW.VIGNERONS BIOAQUITAINE.ORG/INCLUDES/DOCUMENTS/DOSSIER_PRESSE_AGENCEBIO_06022013.PDF](http://www.vigneronsbioaquitaine.org/includes/documents/dossier_presse_agencebio_06022013.pdf).
- ALVES, E., EDWARDS, M., 2008. THE CASE OF GREEN FOOD LABELS. SUSTAINABLE DEVELOPMENT LAW & POLICY. 9, 51-57.
- ANDREONI, J., 1990. IMPURE ALTRUISM AND DONATIONS TO PUBLIC GOODS: A THEORY OF WARM-GLOW GIVING. THE ECONOMIC JOURNAL. 100, 464-477.
- BALDO, G., MARINO, M., MONTANI, M., RYDING, S.-O., 2009. THE CARBON FOOTPRINT MEASUREMENT TOOLKIT FOR THE EU ECOLABEL. THE INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT. 14, 591-596.
- BEATTIE, G., SALE, L., 2009. EXPLICIT AND IMPLICIT ATTITUDES TO LOW AND HIGH CARBON FOOTPRINT PRODUCTS. THE INTERNATIONAL JOURNAL OF ENVIRONMENTAL, CULTURAL, ECONOMIC AND SOCIAL SUSTAINABILITY. 5, 191-206.
- BERNÉ-MANERO, C., PEDRAJA-IGLESIAS, M., RAMO-SÁEZ, P., 2014. A MEASUREMENT MODEL FOR THE SOCIALLY RESPONSIBLE CONSUMER. INT REV PUBLIC NONPROFIT MARK. 11, 31-46.
- BERRY, T., CROSSLEY, D., JEWELL, J., 2008. CHECK-OUT CARBON: THE ROLE OF CARBON LABELLING IN DELIVERING A LOW-CARBON SHOPPING BASKET. RETRIEVED FROM: [HTTP://WWW.FORUMFORTHEFUTURE.ORG/SITES/DEFAULT/FILES/PROJECT/DOWNLOADS/CHECK-OUT-CARBON-FINAL300608.PDF](http://www.forumforthefuture.org/sites/default/files/project/downloads/check-out-carbon-final300608.pdf)
- BHAT, C.R., 2001. QUASI-RANDOM MAXIMUM SIMULATED LIKELIHOOD ESTIMATION OF THE MIXED MULTINOMIAL LOGIT MODEL. TRANSPORTATION RESEARCH PART B. 35, 677-693.
- BIROL, E., KAROUSAKIS, K., KOUNDOURI, P., 2006. USING A CHOICE EXPERIMENT TO ACCOUNT FOR PREFERENCE HETEROGENEITY IN WETLAND ATTRIBUTES: THE CASE OF CHEIMADITIDA WETLAND IN GREECE. ECOLOGICAL ECONOMICS. 60, 145-156.
- BOARDMAN, B., 2008. CARBON LABELLING: TOO COMPLEX OR WILL IT TRANSFORM OUR BUYING? SIGNIFICANCE. 5, 168-171.
- BOLWIG, S., GIBBON, P., 2009. COUNTING CARBON IN THE MARKETPLACE: PART 1 - OVERVIEW PAPER. IN: OECD (ED.), GLOBAL FORUM ON TRADE - TRADE AND CLIMATE CHANGE. RETRIEVED FROM: [HTTP://WWW.OECD.ORG/TRADE/ENVTRADE/42886201.PDF](http://www.oecd.org/trade/envtrade/42886201.pdf).
- BONNEDAHL, K.J., ERIKSSON, J., 2011. THE ROLE OF DISCOURSE IN THE QUEST FOR LOW-CARBON ECONOMIC PRACTICES: A CASE OF STANDARD DEVELOPMENT IN THE FOOD SECTOR. EUROPEAN MANAGEMENT JOURNAL. 29, 165-180.
- BORD, R.J., FISHER, A., O'CONNOR, R.E., 1998. PUBLIC PERCEPTIONS OF GLOBAL WARMING: UNITED STATES AND INTERNATIONAL PERSPECTIVES. CLIMATE RESEARCH. 11, 75-84.
- BRÉCARD, D., LUCAS, S., PICHOT, N., SALLADARRÉ, F., 2012. CONSUMER PREFERENCES FOR ECO, HEALTH AND FAIR TRADE LABELS. AN APPLICATION TO SEAFOOD PRODUCT IN FRANCE. JOURNAL OF AGRICULTURAL & FOOD INDUSTRIAL ORGANIZATION. 10, 1-32.
- BRUCKS, M., 1985. THE EFFECTS OF PRODUCT CLASS KNOWLEDGE ON INFORMATION SEARCH BEHAVIOR. JOURNAL OF CONSUMER RESEARCH. 12, -16.
- BURGER, E., MEIXNER, O., PÖCHTRAGER, S., 2010. CARBON FOOTPRINT BEI LEBENSMITTELN. INHALTSANALYTISCHE ERMITTLUNG RELEVANTER BERECHNUNGSKRITERIEN. . SCHRIFTENREIHE DES INSTITUTS FÜR MARKETING UND INNOVATION, BD. 5, WIEN.
- CARLSSON-KANYAMA, A., GONZÁLEZ, A.D., 2009. POTENTIAL CONTRIBUTIONS OF FOOD CONSUMPTION PATTERNS TO CLIMATE CHANGE. THE AMERICAN JOURNAL OF CLINICAL NUTRITION. 89, 1704S-1709S.
- CASINO, 2015. INDICE CARBONE. RETRIEVED FROM: [HTTP://WWW.PRODUITS-CASINO.FR/DEVELOPPEMENT-DURABLE/DD_INDICE-CARBONE-INDICE.HTML](http://www.produits-casino.fr/developpement-durable/dd_indice-carbone-indice.html).

- CHUANMIN, S., XIAOMIN, Y., YUKUN, Z., CHUANXI, S., PENGHUI, D., 2014. CONSUMER BEHAVIOUR ON LOW-CARBON AGRI-FOOD PURCHASE: A CARBON LABELLING EXPERIMENTAL STUDY IN CHINA. *AGRICULTURAL ECONOMICS (AGRICECON)*. 60, 133-146.
- CLIMATOP, 2014. CLIMATOP HOME. RETRIEVED FROM: CLIMATOP.CH.
- EUROPEAN COMMISSION, 2009. EUROPEANS' ATTITUDES TOWARDS THE ISSUE OF SUSTAINABLE CONSUMPTION AND PRODUCTION. ANALYTICAL REPORT. FLASH EB SERIES, 256. RETRIEVED FROM: [HTTP://EC.EUROPA.EU/ENVIRONMENT/EUSSD/PDF/FL256_ANALYTICAL%20REPORT_FINAL.PDF](http://ec.europa.eu/environment/eussd/pdf/FL256_ANALYTICAL%20REPORT_FINAL.PDF).
- CORNELISSEN, G., PANDELAERE, M., WARLOP, L., DEWITTE, S., 2008. POSITIVE CUEING: PROMOTING SUSTAINABLE CONSUMER BEHAVIOR BY CUEING COMMON ENVIRONMENTAL BEHAVIORS AS ENVIRONMENTAL. *INTERNATIONAL JOURNAL OF RESEARCH IN MARKETING*. 25, 46-55.
- CROUCH, G.I., LOUVIERE, J.J., 2004. THE DETERMINANTS OF CONVENTION SITE SELECTION: A LOGISTIC CHOICE MODEL FROM EXPERIMENTAL DATA. *JOURNAL OF TRAVEL RESEARCH*. 43, 118-130.
- DAGEVOS, H., VOORDOUW, J., 2013. SUSTAINABILITY AND MEAT CONSUMPTION: IS REDUCTION REALISTIC?. *SUSTAINABILITY: SCIENCE, PRACTICE AND POLICY*. 9, 60-69.
- DARBY, K., BATTE, M. T., ERNST, S., ROE, B., 2008. DECOMPOSING LOCAL: A CONJOINT ANALYSIS OF LOCALLY PRODUCED FOODS. *AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS*. 90, 476-486.
- DAVIES, I.A., LEE, Z., AHONKHAI, I., 2012. DO CONSUMERS CARE ABOUT ETHICAL-LUXURY?. *JOURNAL OF BUSINESS ETHICS*. 106, 37-51.
- DUNLAP, R.E., 1998. LAY PERCEPTIONS OF GLOBAL RISK. *INTERNATIONAL SOCIOLOGY*. 13, 473-498.
- EUROBAROMETER, 2009. EUROPEANS' ATTITUDES TOWARDS CLIMATE CHANGE, SPECIAL EUROBAROMETER 313, BRUSSELS.
- FELDMANN, C., HAMM, U., 2015. CONSUMERS' PERCEPTIONS AND PREFERENCES FOR LOCAL FOOD: A REVIEW. *FOOD QUALITY AND PREFERENCE*. 40, 152-164.
- FEUCHT, Y., ZANDER, K., 2015. OF EARTH PONDS, FLOW-THROUGH AND CLOSED RECIRCULATION SYSTEMS — GERMAN CONSUMERS' UNDERSTANDING OF SUSTAINABLE AQUACULTURE AND ITS COMMUNICATION. *AQUACULTURE*. 438, 151-158.
- FINKBEINER, M., 2009. CARBON FOOTPRINTING-OPPORTUNITIES AND THREATS. *INTERNATIONAL JOURNAL OF LIFE CYCLE ASSESSMENT*. 14, 91-94.
- FLYNN, L.R., GOLDSMITH, R.E., 1999. A SHORT, RELIABLE MEASURE OF SUBJECTIVE KNOWLEDGE. *JOURNAL OF BUSINESS RESEARCH*. 46, 57-66.
- FRITSCH, U.R., EBERLE, U., WIEGMANN, K., SCHMIDT, K., 2007. TREIBHAUSGASEMISSIONEN DURCH ERZEUGUNG UND VERARBEITUNG VON LEBENSMITTELN. ÖKO-INSTITUT E.V., DARMSTADT, HAMBURG.
- GADAMA, Z., OGLETHORPE, D., 2011. THE USE AND USEFULNESS OF CARBON LABELLING FOOD: A POLICY PERSPECTIVE FROM A SURVEY OF UK SUPERMARKET SHOPPERS. *FOOD POLICY*. 36, 815-822.
- GOLAN, E., KUCHLER, F., MITCHELL, L., GREENE, C., JESSUP, A., 2001. ECONOMICS OF FOOD LABELING. *JOURNAL OF CONSUMER POLICY*. 24, 117-184.
- GREBITUS, C., STEINER, B., VEEMAN, M., 2012. PERSONAL VALUES AND DECISION MAKING: EVIDENCE FROM ENVIRONMENTAL FOOTPRINT LABELING IN CANADA. *AM. J. AGR. ECON.* 95, 397-403.
- GROB, A., 1995. ARTICLE: A STRUCTURAL MODEL OF ENVIRONMENTAL ATTITUDES AND BEHAVIOUR. *JOURNAL OF ENVIRONMENTAL PSYCHOLOGY*. 15, 209-220.
- GROTHMANN, T., PATT, A., 2005. ADAPTIVE CAPACITY AND HUMAN COGNITION: THE PROCESS OF INDIVIDUAL ADAPTATION TO CLIMATE CHANGE. *GLOBAL ENVIRONMENTAL CHANGE*. 15, 199-213.
- GRUNERT, K.G., HIEKE, S., WILLS, J., 2014. SUSTAINABILITY LABELS ON FOOD PRODUCTS: CONSUMER MOTIVATION, UNDERSTANDING AND USE. *FOOD POLICY*. 44, 177-189.
- GUENTHER, M., SAUNDERS, C.M., TAIT, P., 2012. CARBON LABELING AND CONSUMER ATTITUDES. *CARBON MANAGEMENT*. 3, 445-455.
- HAGEN, B., PIJAWKA, D., 2015. PUBLIC PERCEPTIONS AND SUPPORT OF RENEWABLE ENERGY IN NORTH AMERICA IN THE CONTEXT OF GLOBAL CLIMATE CHANGE. *INTERNATIONAL JOURNAL OF DISASTER RISK SCIENCE*. 6, 385-398.
- HARTIKAINEN, H., ROININEN, T., KATAJAJUURI, J.-M., PULKKINEN, H., 2014. FINNISH CONSUMER PERCEPTIONS OF CARBON FOOTPRINTS AND CARBON LABELLING OF FOOD PRODUCTS. *JOURNAL OF CLEANER PRODUCTION*. 73, 285-293.

- HAUBACH, C., HELD, B., 2015. IST ÖKOLOGISCHER KONSUM TEURER? EIN WARENKORB-BASIERTER VERGLEICH. *WISTA*. 1, 41-55.
- HENSHER, D.A., ROSE, J.M., GREENE, W.H., 2005. *APPLIED CHOICE ANALYSIS - A PRIMER*. CAMBRIDGE, NEW YORK, MELBOURNE, MADRID, CAPE TOWN, SINGAPORE, SAO PAULO: CAMBRIDGE UNIVERSITY PRESS.
- HOFFER 2016. DER NACHHALTIGKEITSFUßABDRUCK. RETRIEVED FROM: [HTTP://WWW.ZURUECKZUMURSPRUNG.AT/FUSSABDRUCK/](http://www.zurueckzumursprung.at/fussabdruck/).
- HUSTON, S. J., FINKE, M. S., 2003. DIET CHOICE AND THE ROLE OF TIME PREFERENCE. *JOURNAL OF CONSUMER AFFAIRS*. 37, 143-160.
- JANSSEN, M., HAMM, U., 2011. CONSUMER PERCEPTION OF DIFFERENT ORGANIC CERTIFICATION SCHEMES IN FIVE EUROPEAN COUNTRIES. *ORGANIC AGRICULTURE*. 1, 31-43.
- KAHNEMAN, D., TVERSKY, A., 1979. PROSPECT THEORY: AN ANALYSIS OF DECISION UNDER RISK. *ECONOMETRICA*, 47, 263-291.
- KIM, Y., SEJUNG MARINA, C., 2005. ANTECEDENTS OF GREEN PURCHASE BEHAVIOR: AN EXAMINATION OF COLLECTIVISM, ENVIRONMENTAL CONCERN, AND PCE. *ADVANCES IN CONSUMER RESEARCH*. 32, 592-599.
- KLIMATMARKNINGEN, 2012. STATUS REPORT: CLIMATE CERTIFICATION FOR FOOD 2012-02-08. RETRIEVED FROM: [HTTP://WWW.KLIMATMARKNINGEN.SE/WP-CONTENT/UPLOADS/2012/02/STATUS-REPORT-CLIMATE-CERTIFICATION-SWEDEN-FEB-2012.PDF](http://www.klimatmarkningen.se/wp-content/uploads/2012/02/status-report-climate-certification-sweden-feb-2012.pdf).
- KOLLMUSS, A., AGYEMAN, J., 2002. MIND THE GAP: WHY DO PEOPLE ACT ENVIRONMENTALLY AND WHAT ARE THE BARRIERS TO PRO-ENVIRONMENTAL BEHAVIOR? *ENVIRONMENTAL EDUCATION RESEARCH*. 8, 239-260.
- KUCKARTZ, U., RHEINGANS-HEINTZE, A., RÄDIKER, S. 2007. DETERMINANTEN DES UMWELTVERHALTENS - ZWISCHEN RHETORIK UND ENGAGEMENT. VERTIEFUNGSSTUDIE IM RAHMEN DES PROJEKTES "REPRÄSENTATIVUMFRAGE ZU UMWELTBEWUSSTSEIN UND UMWELTVERHALTEN IM JAHR 2006". MARBURG.
- LANCSAR, E., LOUVIERE, J., FLYNN, T., 2007. SEVERAL METHODS TO INVESTIGATE RELATIVE ATTRIBUTE IMPACT IN STATED PREFERENCE EXPERIMENTS. *SOCIAL SCIENCE & MEDICINE*. 64, 1738-1753.
- LAUREATI, M., JABES, D., RUSSO, V., PAGLIARINI, E., 2013. SUSTAINABILITY AND ORGANIC PRODUCTION: HOW INFORMATION INFLUENCES CONSUMER'S EXPECTATION AND PREFERENCE FOR YOGURT. *FOOD QUALITY AND PREFERENCE*. 30, 1-8.
- LEIRE, C., THIDELL, Å., 2005. PRODUCT-RELATED ENVIRONMENTAL INFORMATION TO GUIDE CONSUMER PURCHASES – A REVIEW AND ANALYSIS OF RESEARCH ON PERCEPTIONS, UNDERSTANDING AND USE AMONG NORDIC CONSUMERS. *JOURNAL OF CLEANER PRODUCTION*. 13, 1061-1070.
- LORENZONI, I., NICHOLSON-COLE, S., WHITMARSH, L., 2007. BARRIERS PERCEIVED TO ENGAGING WITH CLIMATE CHANGE AMONG THE UK PUBLIC AND THEIR POLICY IMPLICATIONS. *GLOBAL ENVIRONMENTAL CHANGE*. 17, 445-459.
- LORENZONI, I., PIDGEON, N.F., 2006. PUBLIC VIEWS ON CLIMATE CHANGE: EUROPEAN AND USA PERSPECTIVES. *CLIMATIC CHANGE*. 77, 73-95.
- LOUVIERE, J.J., ISLAM, T., 2008. A COMPARISON OF IMPORTANCE WEIGHTS AND WILLINGNESS-TO-PAY MEASURES DERIVED FROM CHOICE-BASED CONJOINT, CONSTANT SUM SCALES AND BEST–WORST SCALING. *JOURNAL OF BUSINESS RESEARCH*. 61, 903-911.
- LOUVIERE, J.J., HENSHER, D.A., SWAIT, J.D., ADAMOWICZ, W., 2007. *STATED CHOICE METHODS: ANALYSIS AND APPLICATIONS*. CAMBRIDGE [U.A.] CAMBRIDGE UNIV. PRESS. 5TH ED.
- LÜTH, A., VON WINNING, A., FEIGS, F., KÖLSCH, A., STRÖBEL, M., 2009. KLIMASCHUTZ FÜR ALLE! KLIMAFREUNDLICHER KONSUM ALS NEUE SÄULE FÜR DEN KLIMASCHUTZ. RETRIEVED FROM [HTTPS://WWW.ALLIANZ.COM/V_1339507806000/MEDIA/CURRENT/DE/PRESSE/NEWS/STUDIEN/ARCHIV/DOWNLOADS/STRATEGIEBERICHT_KLIMASCHUTZ.PDF](https://www.allianz.com/v_1339507806000/MEDIA/CURRENT/DE/PRESSE/NEWS/STUDIEN/ARCHIV/DOWNLOADS/STRATEGIEBERICHT_KLIMASCHUTZ.PDF).
- LUSK, J.L., NORWOOD, F.B., PRUITT, J.R., 2006. CONSUMER DEMAND FOR A BAN ON ANTIBIOTIC DRUG USE IN PORK PRODUCTION. *AMERICAN AGRICULTURAL ECONOMICS ASSOCIATION*. 88, 1015-1033.
- MAURACHER, C., TEMPESTA, T., VECCHIATO, D., 2013. CONSUMER PREFERENCES REGARDING THE INTRODUCTION OF NEW ORGANIC PRODUCTS. THE CASE OF THE MEDITERRANEAN SEA BASS (*DICENTRARCHUS LABRAX*) IN ITALY. *APPETITE*. 63, 84-91.

- MAYRING, P., 2010. QUALITATIVE INHALTSANALYSE - GRUNDLAGEN UND TECHNIK. WEINHEIM AND BASEL: BELTZ. 11TH ED.
- McFADDEN, D., 1974. CONDITIONAL LOGIT ANALYSIS OF QUALITATIVE CHOICE BEHAVIOR. FRONTIERS IN ECONOMETRICS, 105-142.
- MEAS, T., HU, W., BATTE, M. T., WOODS, T. A., ERNST, S., 2014. SUBSTITUTES OR COMPLEMENTS? CONSUMER PREFERENCE FOR LOCAL AND ORGANIC FOOD ATTRIBUTES. AM. J. AGR. ECON.. 97, 1-28.
- MEYER-HÖFER M.V., SPILLER A., 2013. ANFORDERUNGEN AN EINE NACHHALTIGE LAND- UND ERNÄHRUNGSWIRTSCHAFT: DIE ROLLE DES KONSUMENTEN. KTBL-SCHRIFT 500. RETRIEVED FROM: WWW.UNI-GOETTINGEN.DE/DE/STUDIE-ZU-BEKANNTHEIT-UND.../430840.HTML.
- METI, 2010. CARBON FOOTPRINT OF PRODUCTS IN JAPAN. RETRIEVED FROM: [HTTP://WWW.METI.GO.JP/ENGLISH/POLICY/ENERGY_ENVIRONMENT/CFP/PDF/CFP_PRODUCTS.PDF](http://WWW.METI.GO.JP/ENGLISH/POLICY/ENERGY_ENVIRONMENT/CFP/PDF/CFP_PRODUCTS.PDF).
- O'NEILL, S.J., HULME, M., 2009. AN ICONIC APPROACH FOR REPRESENTING CLIMATE CHANGE. GLOBAL ENVIRONMENTAL CHANGE. 19, 402-410.
- ONOZAKA, Y., HU, W., THILMANY, D.D., 2015. CAN ECO-LABELS REDUCE CARBON EMISSIONS? MARKET-WIDE ANALYSIS OF CARBON LABELING AND LOCALLY GROWN FRESH APPLES. RENEWABLE AGRICULTURE AND FOOD SYSTEMS. 31, 122-138.
- ONOZAKA, Y., McFADDEN, D.T., 2011. DOES LOCAL LABELING COMPLEMENT OR COMPETE WITH OTHER SUSTAINABLE LABELS? A CONJOINT ANALYSIS OF DIRECT AND JOINT VALUES FOR FRESH PRODUCE CLAIM. AM. J. AGR. ECON. 93, 693-706.
- ONOZAKA, Y., UCHIDA, HIRO, MORITA, TAMAKI, MANAGE, SHUNSUKE, 2010. UNINFORMED OR UNINTERESTED? SURVEYS EXAMINE JAPANESE CONSUMERS' INTEREST IN SUSTAINABLE SEAFOOD, GLOBAL AQUACULTURE ADVOCATE, PP. 58-60.
- PARK, C., MOTHERSBAUGH, D., FEICK, L., 1994. CONSUMER KNOWLEDGE ASSESSMENT. JOURNAL OF CONSUMER RESEARCH. 21, 71-82.
- PARKER, J., SCHRIFT, R.Y., 2011. REJECTABLE CHOICE SETS: HOW SEEMINGLY IRRELEVANT NO-CHOICE OPTIONS AFFECT CONSUMER DECISION PROCESSES. AMERICAN MARKETING ASSOCIATION. 48, 840-854.
- POORTINGA, W., PIDGEON, N.F., 2003. PUBLIC PERCEPTIONS OF RISK, SCIENCE AND GOVERNANCE – MAIN FINDINGS OF A BRITISH SURVEY ON FIVE RISK CASES. TECHNICAL REPORT, CENTRE FOR ENVIRONMENTAL RISK, UNIVERSITY OF EAST ANGLIA, NORWICH, UK.
- QUINN, I., 2012. 'FRUSTRATED' TESCO DITCHES ECO-LABELS. THE GROCER. RETRIEVED FROM: [HTTP://WWW.THEGROCER.CO.UK/COMPANIES/SUPERMARKETS/TESCO/FRUSTRATED-TESCO-DITCHES-ECO-LABELS/225502.ARTICLE](http://WWW.THEGROCER.CO.UK/COMPANIES/SUPERMARKETS/TESCO/FRUSTRATED-TESCO-DITCHES-ECO-LABELS/225502.ARTICLE).
- RAJU, P.S., LONIAL, S.C., GLYNN MANGOLD, W., 1995. DIFFERENTIAL EFFECTS OF SUBJECTIVE KNOWLEDGE, OBJECTIVE KNOWLEDGE, AND USAGE EXPERIENCE ON DECISION MAKING: AN EXPLORATORY INVESTIGATION. JOURNAL OF CONSUMER PSYCHOLOGY. 4, 153-180.
- REVELT, D., TRAIN, K., 1998. MIXED LOGIT WITH REPEATED CHOICES: HOUSEHOLDS' CHOICES OF APPLIANCE EFFICIENCY LEVEL. MIT PRESS, PP. 647.
- ROBERTS, J.A., 1996. GREEN CONSUMERS IN THE 1990s: PROFILE AND IMPLICATIONS FOR ADVERTISING. JOURNAL OF BUSINESS RESEARCH. 36, 217-231.
- ROBINSON, R., SMITH, C., 2002. PSYCHOSOCIAL AND DEMOGRAPHIC VARIABLES ASSOCIATED WITH CONSUMER INTENTION TO PURCHASE SUSTAINABLY PRODUCED FOODS AS DEFINED BY THE MIDWEST FOOD ALLIANCE. JOURNAL OF NUTRITION EDUCATION & BEHAVIOR. 34, 316-325.
- RÖÖS, E., TJÄRNEMO, H., 2011. CHALLENGES OF CARBON LABELLING OF FOOD PRODUCTS: A CONSUMER RESEARCH PERSPECTIVE. BRITISH FOOD JOURNAL. 113, 982-996.
- RÜCKERT-JOHN, J., BORMANN, I., JOHN, R. . (2012). UMWELTBEWUSSTSEIN IN DEUTSCHLAND 2012. RETRIEVED FROM [HTTP://WWW.UMWELTBUNDESAMT.DE/SITES/DEFAULT/FILES/MEDIEN/PUBLIKATION/LONG/4396.PDF](http://WWW.UMWELTBUNDESAMT.DE/SITES/DEFAULT/FILES/MEDIEN/PUBLIKATION/LONG/4396.PDF).
- SALLADARRÈ, F., GUILLOTREAU, P., PERRAUDEAU, Y., MONFORT, M.-C., 2010. THE DEMAND FOR SEAFOOD ECO-LABELS IN FRANCE. JOURNAL OF AGRICULTURAL & FOOD INDUSTRIAL ORGANIZATION. 8, 1-24.
- SCHAEFER, F., BLANKE, M., 2014. OPPORTUNITIES AND CHALLENGES OF CARBON FOOTPRINT, CLIMATE OR CO2 LABELLING FOR HORTICULTURAL PRODUCTS. ERWERBS-OBSTBAU. 56, 73-80.

- SCHOLDER ELLEN, P., 1994. DO WE KNOW WHAT WE NEED TO KNOW? OBJECTIVE AND SUBJECTIVE KNOWLEDGE EFFECTS ON PRO-ECOLOGICAL BEHAVIORS. *JOURNAL OF BUSINESS RESEARCH*. 30, 43-52.
- SCHOLDER ELLEN, P., WIENER, J.L., COBB-WALGREN, C., 1991. THE ROLE OF PERCEIVED CONSUMER EFFECTIVENESS IN MOTIVATING ENVIRONMENTALLY CONSCIOUS BEHAVIORS. *AMERICAN MARKETING ASSOCIATION*, PP. 102.
- SEMENZA, J.C., HALL, D.E., WILSON, D.J., BONTEMPO, B.D., SAILOR, D.J., GEORGE, L.A., 2008. PUBLIC PERCEPTION OF CLIMATE CHANGE: VOLUNTARY MITIGATION AND BARRIERS TO BEHAVIOR CHANGE. *AMERICAN JOURNAL OF PREVENTIVE MEDICINE*. 35, 479-487.
- SEYFANG, G., 2005. SHOPPING FOR SUSTAINABILITY: CAN SUSTAINABLE CONSUMPTION PROMOTE ECOLOGICAL CITIZENSHIP? *ENVIRONMENTAL POLITICS*. 14, 290-306.
- SGS, 2014. SGS UNVEILS COMPREHENSIVE GLOBAL PRODUCT CARBON FOOTPRINT MARK PROGRAM. RETRIEVED FROM: [HTTP://WWW.SGS.COM/EN/OUR-COMPANY/NEWS-AND-MEDIA-CENTER/NEWS-AND-PRESS-RELEASES/2012/01/SGS-UNVEILS-COMPREHENSIVE-GLOBAL-PRODUCT-CARBON-FOOTPRINT-MARK-PROGRAM.ASPX](http://www.sgs.com/en/our-company/news-and-media-center/news-and-press-releases/2012/01/SGS-UNVEILS-COMPREHENSIVE-GLOBAL-PRODUCT-CARBON-FOOTPRINT-MARK-PROGRAM.ASPX).
- SÖRQVIST, P., HAGA, A., LANGEBOG, L., HOLMGREN, M., WALLINDER, M., NÖSTL, A., MARSH, J.E., 2015. THE GREEN HALO: MECHANISMS AND LIMITS OF THE ECO-LABEL EFFECT. *FOOD QUALITY AND PREFERENCE*. 43, 1-9.
- STOP CLIMATE CHANGE 2016. WARUM SCC UND BIO?. RETRIEVED FROM: [HTTP://WWW.STOP-CLIMATE-CHANGE.DE/SCC-BIO/WARUM-SCC-UND-BIO/](http://www.stop-climate-change.de/scc-bio/warum-scc-und-bio/).
- STRAUGHAN, R.D., ROBERTS, J.A., 1999. ENVIRONMENTAL SEGMENTATION ALTERNATIVES: A LOOK AT GREEN CONSUMER BEHAVIOR IN THE MILLENNIUM. *JOURNAL OF CONSUMER MARKETING*. 16, 558-575.
- TAIT, P., MILLER, S., ABELL, W., KAYE-BLAKE, W.H., GUENTHER, M., SAUNDERS, C., 2011. CONSUMER ATTITUDES TOWARDS SUSTAINABILITY ATTRIBUTES ON FOOD LABELS. PAPER PRESENTED AT THE 55TH ANNUAL AARES NATIONAL CONFERENCE, MELBOURNE.
- THØGERSEN, J., HAUSGAARD, P., OLESEN, A., 2010. CONSUMER RESPONSES TO ECOLABELS. *EUROPEAN JOURNAL OF MARKETING*. 44, 1787-1810.
- TOBLER, C., VISSCHERS, V.H.M., SIEGRIST, M., 2011. EATING GREEN. CONSUMERS' WILLINGNESS TO ADOPT ECOLOGICAL FOOD CONSUMPTION BEHAVIORS. *APPETITE*. 57, 674-682.
- TRUELOVE, H.B., PARKS, C., 2012. PERCEPTIONS OF BEHAVIORS THAT CAUSE AND MITIGATE GLOBAL WARMING AND INTENTIONS TO PERFORM THESE BEHAVIORS. *JOURNAL OF ENVIRONMENTAL PSYCHOLOGY*. 32, 246-259.
- UCHIDA, H., ONOZAKA, Y., MORITA, T., MANAGI, S., 2014. DEMAND FOR ECOLABELED SEAFOOD IN THE JAPANESE MARKET: A CONJOINT ANALYSIS OF THE IMPACT OF INFORMATION AND INTERACTION WITH OTHER LABELS. *FOOD POLICY*. 44, 68-76.
- UPHAM, P., BLEDA, M., 2009. CARBON LABELLING: PUBLIC PERCEPTIONS OF THE DEBATE. SUMMARY REPORT. RETRIEVED FROM: [HTTP://WWW.FCRN.ORG.UK/SITES/DEFAULT/FILES/TYNDALL%20CARBON%20LABEL%20REPORT.PDF](http://www.fcrn.org.uk/sites/default/files/Tyndall%20Carbon%20Label%20Report.pdf)
- UPHAM, P., DENDLER, L., BLEDA, M., 2011. CARBON LABELLING OF GROCERY PRODUCTS: PUBLIC PERCEPTIONS AND POTENTIAL EMISSIONS REDUCTIONS. *JOURNAL OF CLEANER PRODUCTION*. 19, 348-355.
- VANCLAY, J.K., SHORTISS, J., AULSEBROOK, S., GILLESPIE, A. M., HOWELL, B. C., 2011. CUSTOMER RESPONSE TO CARBON LABELLING OF GROCERIES. *JOURNAL OF CONSUMER POLICY: CONSUMER ISSUES IN LAW, ECONOMICS AND BEHAVIOURAL SCIENCES*. 34, 153-160.
- VANHONACKER, F., VAN LOO, E.J., GELLYNCK, X., VERBEKE, W., 2013. FLEMISH CONSUMER ATTITUDES TOWARDS MORE SUSTAINABLE FOOD CHOICES. *APPETITE*. 62, 7-16.
- VERMEIR, I., VERBEKE, W., 2006. SUSTAINABLE FOOD CONSUMPTION: EXPLORING THE CONSUMER "ATTITUDE - BEHAVIORAL INTENTION" GAP. *J. AGRIC. ENVIRON. ETHICS*. 19, 169-194.
- VERMEIR, I., VERBEKE, W., 2008. SUSTAINABLE FOOD CONSUMPTION AMONG YOUNG ADULTS IN BELGIUM: THEORY OF PLANNED BEHAVIOUR AND THE ROLE OF CONFIDENCE AND VALUES. *ECOLOGICAL ECONOMICS*. 64, 542-553.
- VOGET-KLESCHIN, L., 2015. REASONING CLAIMS FOR MORE SUSTAINABLE FOOD CONSUMPTION: A CAPABILITIES PERSPECTIVE. *JOURNAL OF AGRICULTURAL & ENVIRONMENTAL ETHICS*. 283, 455-477.
- WALTER, S., SCHMIDT, M., 2008. CARBON FOOTPRINTS UND CARBON LABEL – EINE ECHTE HILFE BEI DER KAUFENTSCHEIDUNG?. *UMWELT WIRTSCHAFTS FORUM (UWF)*. 16, 175-181.

- WHITE, P., SHARP, V., DARNTON, A., DOWNING, P., INMAN, A., STRANGE, K., GARNETT, T., 2009. FOOD SYNTHESIS REVIEW: A REPORT TO THE DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS. THE SOCIAL MARKETING PRACTICE ET AL. DEFRA, LONDON.
- WHITMARSH, L., 2009. BEHAVIOURAL RESPONSES TO CLIMATE CHANGE: ASYMMETRY OF INTENTIONS AND IMPACTS. JOURNAL OF ENVIRONMENTAL PSYCHOLOGY. 29, 13-23.
- WHITMARSH, L., 2011. SCEPTICISM AND UNCERTAINTY ABOUT CLIMATE CHANGE: DIMENSIONS, DETERMINANTS AND CHANGE OVER TIME. GLOBAL ENVIRONMENTAL CHANGE. 21, 690-700.
- WHITMARSH, L., SEYFANG, G., O'NEILL, S., 2011. PUBLIC ENGAGEMENT WITH CARBON AND CLIMATE CHANGE: TO WHAT EXTENT IS THE PUBLIC 'CARBON CAPABLE'? GLOBAL ENVIRONMENTAL CHANGE. 21, 56-65.
- YOUNG, W., HWANG, K., McDONALD, S., OATES, C.J., 2010. SUSTAINABLE CONSUMPTION: GREEN CONSUMER BEHAVIOUR WHEN PURCHASING PRODUCTS. SUSTAINABLE DEVELOPMENT. 18, 20-31.
- ZANDER, K., STOLZ, H., HAMM, U., 2013. PROMISING ETHICAL ARGUMENTS FOR PRODUCT DIFFERENTIATION IN THE ORGANIC FOOD SECTOR. A MIXED METHODS RESEARCH APPROACH. APPETITE. 62, 133-142.
- ZANDER, K., ZANOLI, R., 2013. CONSUMER PERCEPTION ON ORGANIC FARMING. IN: SANDERS, J. (ED.), EVALUATION OF THE EU—LEGISLATION ON ORGANIC FARMING. FINAL REPORT. THÜNEN INSTITUTE OF FARM ECONOMICS, BRAUNSCHWEIG.
- ZEPEDA, L., LI, J., 2006. WHO BUYS LOCAL FOOD?. JOURNAL OF FOOD DISTRIBUTION RESEARCH. 37, 1-11.
- ZWICK, M.M., RENN, O., 2002. PERCEPTION AND EVALUATION OF RISKS. FINDINGS OF THE BADEN-WÜRTTEMBERG RISK SURVEY 2001. JOINT WORKING REPORT BY THE CENTRE OF TECHNOLOGY AND ASSESSMENT IN BADEN-WÜRTTEMBERG AND THE UNIVERSITY OF STUTTGART, SOCIOLOGY OF TECHNOLOGIES AND ENVIRONMENT.

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