Linda Schollenberg

Essays on the Economics of Environmental and Sustainability Labelling

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LindaSchollenberg
Hanken School of Economics
Department of Economics
P.O.Box 479, 00101 Helsinki, Finland

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PREFACE

Shortly after I had started my doctoral studies and was still trying to cope with this new period of my life in a foreign country, a friend of mine listening to my complaints pointed out "Well, I guess doing a PhD is not a walk in the park". Had I had any idea of how right he would be proven at times, maybe I would have abandoned the whole project straight away. But sometimes ignorance is bliss and looking back now, I am glad I went through with all this. And like many others before me, I grew to see that even the darkest and most difficult moments often become funny anecdotes as time passes.

Fortunately, I enjoyed dealing with the topic of my dissertation all along. Even though my final thesis and the issues covered by the papers included in it are very different from my initial research ideas, the guiding topics of sustainability, environmental policies and consumer behaviour are things that caught my interest early on. I feel fortunate that I was given the chance and the freedom to focus my academic work on these aspects.

In the course of completing my dissertation, I have received support and guidance from many different people over the years. First and foremost, I am indebted to the two pre-examiners of my thesis, Prof. Chung L. Huang and Prof. Kjell Arne Brekke. Their insightful feedback and constructive criticism helped to improve this manuscript considerably in terms of focus, coherence and econometric analysis; the current version indeed is very different from the one they had to evaluate initially. I feel honoured that they took the time for such a thorough assessment of my work and am thankful for their patience when things took longer than expected. A special thank you goes to Kjell Arne Brekke who kindly agreed to come to Hanken and act as my official opponent.

Moreover, I am more than grateful for all the help, patience and encouragement I was given by my two supervisors at Hanken, Prof. Tom Berglund and Prof. H.C. Blomqvist.

Furthermore, there is a range of people who inspired my academic work during my stay at the Economics Department of the University of Gothenburg. Above all, I would like to thank Prof. Jesper Stage for intensive discussions of research ideas. It was also him who established valuable contacts with the Swedish Retail Institute for me. In this respect, I am further indebted to Sven-Olov Daunfeldt and Niklas Rudholm for all their help and the good cooperation we had. Additionally, I would like to stress how much the great teaching by (among others) Prof. Fredrik Carlsson, Prof. Thomas Sterner and Prof. Arne Bigsten influenced me and in many instances introduced me to fields of economic research and thinking which I hardly knew anything about before. Finally, I have to thank Oskar Broberg for interesting discussions and for helping me to learn more about labelling schemes in Sweden.

I also would like to express my thankfulness towards all administrative staff. To name just a few, Helen Malmsten, Barbara Cavonius, Eva-Lena Neth Johansson, Elizabeth Földi, Johan Lönnroth and Jenni Rytkönen have helped me uncountable times with minor and major issues. You really keep it all going!

I gratefully acknowledge generous funding that I have received from Hanken's Commerce and Industry Funds, The Hanken Foundation's Funds for Young Doctoral Students, as well as from Handelns Utvecklingsråd during my studies.

I feel very blessed that I had the opportunity to get to know, work and laugh with people from all over the world during my doctoral studies. This was a truly life-enriching and lasting experience. In particular, I would like to mention Emmi, Sourav,

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List of abbreviations

BIC	Bayesian information criterion
DEFRA	Department for the Environment, Food and Rural Affairs
EU	European Union
GCSE	General Certificate of Secondary Education
ISO	International Organization for Standardization
NGO	Non-governmental Organisation
ROC curve	Receiver operating characteristic curve
UKROFS	UK Register of Organic Food Standards
VIF	Variance inflation factor
WTP	willingness to pay

1   THESIS SUMMARY

1.1.   Introductory remarks

This thesis consists of three self-contained essays which are organized around the role of food labelling as tool in environmental and sustainability policy. It studies various aspects of the potential impact of labelling on the market for food products with a sustainability or ethical background. The motivation for this work rests on the notion that environmental protection, sustainability, and the combat against climate change are central topics for today's societies. In particular, there is growing pressure to evolve towards more sustainable patterns of consumption and production of food (Tzilivakis et al., 2012). For a successful environmental policy aimed at reaching targets in any of the areas named, it will be crucial to achieve far-ranging behaviour change in many respects. Given that a substantial part of environmental problems can be traced back to consumption patterns, involving citizens and impacting on consumer behaviour are of key importance. There is a growing need to design policy programmes which have the potential to succeed in setting the right incentives. Environmental and sustainability labelling is one of the policy instruments increasingly employed to meet this objective (Loureiro and Lotade 2005).

The increasing use of labelling policies in the field of food products is an international phenomenon. Still, the market shares of products with environmental or sustainability labels remain low. For instance, the organic sector corresponded to only 1.9% of household food expenses in the EU-15 in 2006/2007 (European Commission, 2010). A particularly puzzling finding in this respect is the fact that stated positive consumer attitudes towards organic products do not consistently translate into buying behaviour (Pelsmacker et al., 2005; Starr, 2009). As Tzilivakis et al. (2012) point out, the science and practice of using labels to drive changes in behaviour is complex and considerable knowledge gaps remain. A central question is to identify the main obstacles preventing efficient labelling and the factors impacting negatively on the demand side. To contribute to this undertaking is one of the main objectives of this thesis, as will be lined out further below. This thesis is hence dedicated mostly to consumer aspects of environmental and sustainability labelling. However, this is not to ignore that the producer side and the factors impacting on firms' decision whether to engage in labelling schemes are a wide and interesting field for further research with many issues not being thoroughly analyzed yet.

The structure of this thesis is as follows. The introductory first part is dedicated to an introduction to the topic of environmental and sustainability labelling and starts with a presentation of the concept of (eco-)labelling as such and a short review of the issue of (eco-) labelling in the literature. Afterwards, harmonization of labelling standards is discussed as a potential remedy for existing problems in the presence of a multiplicity of labels used. This is an issue of high relevance from a policy-perspective and further closely related to the third paper included in this dissertation. The last section of this part then summarizes the papers included in this thesis and their contribution to existing research. The second part then comprises the three papers as individual chapters.

1.2.   A short presentation of environmental and sustainability labelling

In recent years, consumer interest in issues related to ethical or ecological considerations has grown considerably. An increasing number of consumers express

their will to base choices of products and producers on values concerning matters of justice, fairness, the environment, well-being, and ethical and political assessment (Micheletti et al., 2003). There are many instances when consumers care about, and are willing to pay more for, an attribute of a product that is unobservable to them even after consumption. Such products are called credence goods (Baksi and Bose, 2007). An example for this is organic agriculture, where the consumer cannot judge actual production process and supposed greenness of a product even after purchase and consumption without reliable quality signalling, e.g. in the form of labelling policies (Schumacher, 2010). "Dolphin-safe" tuna is another example. Here, consumer concern for the environment manifests itself in the willingness to pay a premium for the "greener" product. This willingness of consumers to pay more for environment-friendly goods amounts to their voluntary contribution to a public good, and is what has been called "impure altruism" by Andreoni (1990) (Baksi and Bose, 2007).

However, even when a positive willingness to pay for, e.g., a public environmental attribute exists, problems of adverse selection can occur in case this attribute is credence in nature. Focusing on the example of a given product's environmental friendliness, it is obvious that consumers are not able to identify the true environmental characteristics of this product in the absence of credible and reliable information disclosure mechanisms. However, the information about this fixed attribute of the product is available to sellers. In this situation, even non-green[1] producers can attempt to market their product variant untruthfully as green to benefit from high consumer willingness to pay. Rational consumers will anticipate this and accordingly lower their willingness to pay (Kuhn, 1999). Assuming that green production entails higher cost for the producer, this further implies that green producers may not be able to recover these higher costs of production and may be forced to exit the market or have less incentive to enter. In consequence, there will be an underprovision of the green variant and a distortion of the market structure towards the non-green variant (Kuhn, 1999).

The use of labelling is one possible remedy for the market dysfunctions lined out above. In recent years, there has been a considerable increase in third-party labelling of consumer products with an environmental, sustainability or social responsibility background and many countries have introduced labelling programmes in order to promote the creation and/or growth of green markets (Mason, 2009). The majority of existing studies of this phenomenon has concentrated on so-called eco-labels, i.e. labels referring to environmental friendliness of the underlying production process (Ibanez and Grolleau, 2008). It should be noted that the term eco-label is frequently used without clearly indicating to the readers the definition used by the author (Ibanez and Grolleau, 2008), which adds to the complexity of the situation characterized by an abundance of labels used in practice. There are various forms of eco-labels, including both voluntary and mandatory labels. While the majority of labelling schemes is operated on a voluntary basis, there are also mandatory labelling schemes in use, e.g. the EU energy label (Rex and Baumann, 2007).

Voluntary eco-labels are classified according to the ISO into three groups as follows (Gallestegui, 2002):

- *Type I* labels refer to the environmental quality of a product compared with the rest of products and are the products of third-party-certification and usually are supported by

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[1] In the following, the term "green" will be used to refer to relatively more environmental friendly product variants and producing firms, while the term "non-green" is employed for relatively less environmental friendly or even harmful variant throughout the text.

the government. They are voluntary labels aimed at certifying both products and production processes according to different criteria relating to the life cycle of the product in question. This type of label is meant to encourage consumers to switch to more environmentally friendly consumption habits. Examples: EU eco-label, Nordic Swan, Blue Angel (Germany).

- *Type II* labels comprise self-labelling initiated by manufacturers, importers or distributors. They provide one-sided informative environmental claims and refer to specific attributes of products, such as "CFC free" products.

- *Type III* labels use pre-set indices and provide quantified information about products based on independent verification.

This dissertation focuses on *Type I* labels which are most often referred to as eco-labels. I extend the environmental focus to comprise the additional aspects of sustainability and social responsibility.

Using *Type I* labels on products is a costly process. Ibanez and Grolleau (2008) point out that this fact is inherent to employing an independent and competent party at each stage of the certification process. Relevant producer costs include labelling fees, meeting scheme requirements and certification costs. Additional costs may e.g. be related to transaction costs that are part of the standard setting process, or to changing suppliers. For instance, it was estimated that compliance with the Flower Labelling Programme scheme in Germany would cost the producer at least US$2,500 annually. Certification costs for timber eco-labels are similarly considerable, at between 5 and 10 percent of existing logging costs, though some estimates are higher (Ibanez and Grolleau, 2008). But also the use of misleading claims can be costly, as there can be likely expenses related to possible prosecution or reputation loss (Ibanez and Grolleau, 2008).

According to Schumacher (2010), eco-labels serve three main purposes, namely (1) raising consumers awareness about environmental effects of products, (2) informing consumers about environmental characteristics of products, and (3) promoting the adoption of more environmentally sound production practices. Labels hence serve as a means of product differentiation and reducing informational asymmetries. In theory, producers can use labelling strategies for vertical product differentiation and to provide specific information about environmental advantages of a product. The tougher the labelling criteria, the more characteristics of a labelled good will be known to the consumer (Schumacher, 2010). Many eco-labels currently in use consider aspects related to the production process itself in the assessment of firms seeking to participate in the labelling scheme, which is in line with the apparently growing consumer interest in production-related matters (Mason, 2006).

1.3. Eco-labelling in the literature

There is a considerable amount of literature concerned with the analysis of (eco-) labelling from different perspectives. One strand of literature comprises contributions devoted to the willingness to pay of consumers or to the determinants of green purchases (Ibanez and Grolleau, 2008). However, most studies analyzing the effect of quality labelling are concerned with the producer market (Schumacher, 2010).

In an early but comprehensive contribution, Kuhn (1999) presents an economic model analyzing the effects of a centrally administered labelling scheme on the market entry of green producers in a one period, perfect competition setting of a vertically differentiated industry under asymmetric information with an imperfect labelling procedure. Kuhn's (1999) findings show that in the absence of a labelling scheme, there is no market for the green variant if the green product is produced at a cost disadvantage. The green producer will not enter the market as it is impossible to recover the higher cost of production. As long as there is a lack of a credible information disclosure mechanism, consumers cannot reliably distinguish the green variant from its brown counterpart simply based on potential claims by firms marketing themselves as green. Producers have a clear incentive to (mis-)use this kind of claims in order to try to benefit from consumer willingness to pay for greener products. This in turn is anticipated by the consumers who lower their willingness to pay for the supposedly green variant accordingly, so that green producers operating at a cost disadvantage are driven or kept out of the market. Kuhn (1999) then shows that the introduction of a labelling scheme can help to overcome the problem of adverse selection at least partly. Still, even when a firm can voluntarily undergo costly eco-auditing to communicate its type, it appears a reasonable assumption that this assessment can be manipulated. The certification procedure is hence imperfect and it is possible for producers to conceal their true type to some degree.

To put matters into perspective at this point, it is instructive to point out how these central findings stemming from Kuhn's (1999) work are linked to the main issues dealt with in this dissertation. First, there is the impact of information asymmetry in the absence of a proper information disclosure mechanism that can preclude market formation as was discussed above. This is the underlying feature of all labelling regimes discussed in this thesis. Second, there are the imperfections inherent to the certification process and the difficulty of designing and implementing labelling schemes appropriately which may arise under any given labelling scheme. There is further reason to believe that consumers are aware of the imperfect certification procedure, e.g. because of exposure to media citing labelling violations or simply because of obvious incentives for producers to try to make consumers and certifying institutions believe that they use greener production methods than they actually do. This in turn will reduce consumers' willingness to pay for labelled products and potentially make them question the reliability and meaningfulness of a given labelling scheme. These aspects, as well as the growing number of labels used, and their potential impact on the demand for labelled products are guiding large parts of the analysis undertaken in the papers included in this dissertation.

More recently, Ibanez and Grolleau (2008) identify several research fronts, ranging from the analysis of the public dimension of green products by Kotchen (2005; 2006) to investigation of the linkages between eco-certification policies and equilibrium fraud by Hamilton and Zilberman (2006). Additionally, several studies examine the circumstances under which eco-labelling may generate adverse results (Mattoo and Singh, 1994; Bougherara et al., 2005), or deal with questions related to increasing returns to scale and complexities in production (Bruce and Laroiya, 2007).

A common analytical approach in the related literature has been to treat labels as a form of vertical production differentiation that makes quality competition among firms possible and is modelled as another stage prior to price or output competition in a multi-stage game (Baksi and Bose, 2007). Amacher et al. (2004) study a duopoly model with vertical product differentiation and eco-labelling. They show that incentives for firms depend on relative cost structure; eco-labelling may reduce excessive investment

and improve environmental quality. Mason (2006; 2009) studies a market that is characterized by asymmetric information in which firms decide under which conditions to opt for an eco-label. In the study by Roe and Sheldon (2007), a model of vertical product differentiation is used to analyze how quality communication is achieved in the case of credence good labelling. Moreover, Baksi and Bose (2007) focus on which type of firm should label its products and the difference between self-labelling and third-party labelling.

Focusing on the demand side, the fact that market shares of labelled food products have remained low has triggered intensive debate in the literature. A body of research on the use and effectiveness of environmental and sustainability labels has emerged, mostly dealing with consumer recognition and use of these labels (Rex and Baumann, 2007). The gap between stated positive attitudes and actual behaviour continues to be an important topic in the field of consumer psychology. Factors identified as having an impact on the process of whether or not an environmental friendly attitude will result in actual behaviour comprise perceptions of purchases as high- vs. low-cost, association of the product with previous behaviours and habits, perceptions of alternative products, and trust in the environmental information provided (Rex and Baumann, 2007). However, the focus and findings of this strand of literature have remained largely limited to trying to characterize and categorize types of green consumers without reaching broader conclusions or shedding light on non-consumers of this kind of product (Rex and Baumann, 2007).

Moreover, the quality and reliability of labelling schemes have been the subject of intensive discussion. It has been found that the recent increase in labels with different criteria and requirements make it difficult for consumers to rely on labelling as a meaningful standard (Schumacher, 2010). Asymmetric information remains partly unresolved in the presence of a multiplicity of labels, consumers are not able to distinguish between different labels and their informational content (Ben Youssef and Abderrazak, 2009). A lack of labelling credibility or a lack of understanding of the information conveyed by the labels can cause consumer confusion or even negative reactions towards eco-labels (Mason, 2006; Ibanez and Grolleau, 2008). These issues will be taken up again and discussed further in later parts of this dissertation.

1.4. The issue of harmonization of standards as potential remedy for existing problems

The issues raised in the preceding section lead to the question of what potential remedies there are to overcome existing shortcomings of labelling schemes from the consumers' perspective. In the following, I will focus on the aspect of the increasing multiplicity of labels and the potential impact a harmonization of (minimum) standards for certification could have. This issue is also closely related to the third essay included in this dissertation, as will become obvious below.

In the economic literature, the need for standardization or harmonization of standards is generally explained in the framework of the so-called compatibility or networks externality approach. Economic gains from standardization may result from positive network effects owing to the fact that a good becomes more valuable to the user the more other users adopt the same good or compatible ones (Becker, 1999). An example for this are telecommunications products; e.g. the more people are using a telephone, the more useful is a telephone for an individual user.

In addition to these direct network effects, indirect network effects can arise as "market-mediated effects". This could for instance concern the compatibility of computer hard- and software which are complementary goods, so that a standard for the hardware will induce a larger variety of software available for use with operating systems that confirm to the defined standard (Becker, 1999). However, while the issues of network effects and compatibility are of high importance in some fields, e.g. telecommunication, they can hardly explain the existence of food quality labelling standards. As was mentioned above, these are above all related to the credence quality nature of the environmental and sustainability attributes in question.

Labels can be seen as minimal admissible attributes in terms of product quality and work as signals in consumers' evaluation of the quality of a product about which they are at an informational disadvantage compared to the firm (Hudson and Hudson, 2008). Standardization can be used as a means of reducing variation in product (label) quality by imposing common minimum standards for all labels in use. This could e.g. be achieved by government legislation or voluntary agreements (Hudson and Hudson, 2008).

1.4.1. *Potential benefits of a harmonization of labelling standards*

As Harbaugh et al. (2011) point out, labels and underlying standards in the field of environmental and sustainability labelling are currently set and issued by a number of organizations. The majority is run by NGOs, but there is also a considerable number of labels which are government- or industry-run, or issued by pro-profit firms. For the consumer, uncertainty as far as the origin of a label or certificate is concerned appears to be one of the key drivers of label confusion (Harbaugh et al., 2011). As Hudson and Hudson (2008) point out, any gains from standardization are reduced if there is doubt about the ability of the enforcing agency to maintain the promised standard. The less faith consumers have in the agency the less will be the benefits.

In the presence of an increasing number of food labels with an environmental or sustainability background, consumers are often unsure of the exact standards a given labels implies. In other words, the consumer does not know whether a label represents a standard that is relatively easily obtained or a very demanding one which is difficult to obtain for the producer (Harbaugh et al., 2011). This joint estimation problem reduces the power of labels to reduce information asymmetries as far as product quality is concerned. A label then only proves that a product has met the easiest of available standards, even if the firm had to meet a higher standard to achieve the label in question. Label informativeness is hence reduced considerably, as is the incentive to obtain certification as a firm cannot be certain that it can recover higher production costs implied by demanding label standards (Harbaugh et al., 2011).

If standardization truncates the lower regions of product quality variance, consumers are safe from extreme risk in the sense of very low or no demands imposed for obtaining a given label (Jones and Hudson, 1996). If thoroughly implemented, minimum quality standards reduce the transaction costs of consumer evaluation and ensure more efficient signalling of product quality (David and Greenstein, 1990). Standardization then implies consumers can spend less time and effort on evaluation of those products (labels) still available on the market. By imposing complete standardization, i.e. the simultaneous imposition of identical upper and lower bounds, product quality variance can be reduced to zero (Jones and Hudson, 1996).

Investments in clarifying labelling standards can enhance both the informativeness and likelihood of labelling, while at the same time allowing consumers to make more informed choices (Harbaugh et al., 2011). As Harbaugh et al. (2011) point out, attempts to make a certain standard or label focal in the sense of publicizing it and making it more known to consumers can be a means of reducing or eliminating information losses caused by a proliferation of labels. Another way of reaching this goal is for governments and industry to reduce the number of labels and hence standards used, or to harmonize/standardize various voluntary labels used (Harbaugh et al., 2011).

1.4.2. *Potential negative effects of a harmonization of standards*

The issue of a harmonization of standards in relation to labelling has received most attention in the literature focusing on the effect of differing standards on international trade. It often is an explicit goal of regional trade agreements and its expected benefits are based on the presumption that the removal of trade barriers (here: differing standards and regulations which work as obstacles to trade) will result in gains from trade (Kerr, 2006).

However, as Sawyer et al. (2008) point out, harmonization of standards does not necessarily lead to an increase in society's welfare. The net welfare effect is an empirical question and depends on the structure of consumer preferences and on the strength of attachment consumers feel towards their domestic standards. If the initial domestic standard represented the configuration that provided the average consumer greatest possible utility, imposing a harmonized standard that fully replaces the initial standard implies that the average consumer can no longer buy his optimum product and will in consequence receive less utility than what was the case initially. If this aggregate utility loss is larger than the positive trade benefit, then harmonization should not have been pursued (Kerr, 2006). Moreover, if consumers are strongly attached to their national standard, the decline in utility caused by harmonization will be relatively large. If the attachment to the national standard is relatively low, there will be no significant utility loss from imposing a harmonized standard (Kerr, 2006).

As far as labels with an environmental or sustainability background are concerned, there is little to no harmonization of the standards to be met in order to obtain a label in a given category among countries (Sawyer et al., 2008). Some exceptions apply with regard to EU-mandated and EU-wide enforced labelling schemes. For instance, while still allowing for different national standards and labels to exist in parallel, the EU recently introduced a mandatory label for organic food[2]. Regulation (EC) No. 834/2007 determined that from July 2010 onwards, all prepacked organic products produced within the EU must carry a new mandatory EU organic label (Janssen and Hamm, 2012). The new label replaced the old voluntary EU organic label and was introduced to make the identification of organic products easier for the final consumer (Janssen and Hamm, 2012).

Janssen and Hamm (2012) use both qualitative and quantitative measures to gain a comprehensive picture of consumer perception of the new mandatory EU label for organic products in five EU countries (Czech Republic, Denmark, Germany, Italy, UK). According to their main findings, consumers display differing degrees of scepticism with regard to the introduction of the new label across the different countries included in the analysis. In general, Janssen and Hamm (2012) find a considerable lack of

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[2] Another good example is the EU energy label for household appliances.

knowledge as far as organic agriculture, labelling, and certification requirements are concerned. Respondents were mostly welcoming an EU-wide label, but especially in countries with a strong national label, people indicated they would continue relying mostly on the domestic label. Trust in EU-set standards and the related inspection mechanism was not very high; people assumed the new EU label would have to embrace lower standards in order to accommodate all EU countries (which is not the case as the old regulations introduced for the former voluntary label will still apply). While people mostly agreed with the statement that in the absence of an EU-wide label some products were difficult to identify as organic, the view that there were already more than enough organic labels on the market was met mostly with indifference or slight rejection.

It should be noted that the new EU mandatory label was launched without any further supportive communicative measures (Janssen and Hamm, 2012), a fact that clearly undermines its potential to lower search and evaluation costs for the consumers interested in purchasing organic products. Janssen and Hamm (2012) conclude that communication and education campaigns should be raised to strengthen consumer trust and awareness of the new label; without public support, it will be hard for the new label to be successful in supporting organic consumption and to have a positive effect on required consumer search effort.

The example of the new mandatory EU organic label serves to illustrate that setting a common minimum standard does not automatically generate gains from harmonization in terms of lower evaluation costs as was discussed in the preceding section. The potential importance of making certain labels focal as advanced by Harbaugh et al. (2011) has to be emphasized at this point, else having yet another label on the market is more likely to actually increase evaluation costs. Additionally, it might be advisable to reconsider the number of labels in use at a national level. There are considerable differences between the EU countries with regard to how many labels are employed (Janssen and Hamm, 2012), so that in some countries consumers could benefit considerably from reducing this number.

To conclude this section's discussion of a harmonization of labelling standards, it can be noted that the effects of this procedure are not guaranteed to be positive per se. While it is true that well-communicated harmonization and a reduced number of labels actually reduce evaluation costs and make it more likely that consumers engage in making informed purchases of related products, there are some negative aspects to consider. Mandated labelling standards provide very little true choice to the consumers. A single, government-defined standard offers the consumers only the choice between buying the labelled or the non-labelled alternative, disregarding the consumer's true preferences for which standard he would choose in an ideal setting (Bruce and Laroya, 2007).

Returning to the issue of an international harmonization of standards and transferring the example to a single national market, gains from harmonization similarly depend on consumer preferences and the strength of these preferences. If, e.g., very concerned consumers have strong preferences for some label with a lot stricter requirements than the harmonized label, this group of consumers clearly will face a utility loss from harmonization of standards for labels as their preferred product is no longer available (Hudson and Hudson, 2008).

1.5. The papers included in the dissertation

1.5.1. *Main objective*

As was stressed repeatedly in the preceding sections, the decisive aspect environmental or sustainability labelling schemes attempt to target is the issue of information provision. The fact that environmental and social attributes are not experienced first hand by the consumer (the credence good aspect) poses adverse selection and moral hazard problems that act as impediment to a fully functional market. As mentioned above, a considerable number of labels have been introduced in recent years, and general public interest in products marked with environmental or social responsibility labels has grown considerably over the past decades (Wilkinson, 2007). In line with this development, the study of sustainability and sustainable consumer behaviour has become increasingly important in recent years. Despite this fact, a lot remains to be understood about the development and functioning of the market for labelled products from a demand-oriented perspective. Judging from stated opinions and attitudes, consumers appear to be increasingly concerned about related topics. For instance, Brécard et al. (2009) note that 27 percent of consumers in the OECD countries can be classified as "green consumers" due to their high (expressed) willingness to pay and strong environmental activism. Contrary to this trend, products with an ethical or sustainability background continue to have a relatively low market share. It remains a central question what drives consumers in their purchasing decisions and what are the reasons keeping them from putting stated positive attitudes and willingness to pay into action.

1.5.2. *Contribution and findings*

As noted, the major share of the work undertaken in the frame of this dissertation is centred on the attempt to identify the major explanatory factors behind the attitude-behaviour gap described above, i.e. the discrepancy between positive stated attitudes and actual action taken. Additionally, this thesis focuses on the impact of a growing multiplicity of labels used for marking products with an environmental, sustainability, or ethical background. In this respect, this thesis contributes to the existing body of research in several respects.

The first paper included in this thesis takes up the topic of the pricing of labelled products and applies a hedonic pricing framework to the case of Fair Trade labelled coffee in Sweden. This revealed preference approach contrasts with the majority of studies in the area of demand analysis for labelled products and consumers' willingness to pay (WTP), as there is a clear focus on the usage of stated preference methods and their survey techniques to reveal consumers' valuation for certain product features (Arnot et al., 2006). The analysis of previously unavailable data material has to be seen as the main contribution of this paper. The use of the hedonic pricing technique leads back to the discussion about the credence good character of certain quality attributes. In the Fair Trade case, the Fair Trade/ethical aspect is an attribute that cannot be verified by the consumer without the presence of (a credible and reliable) signal which is in this case provided by the employed labelling scheme. Quality differentiation would not be possible without it. The hedonic estimate identifies the value that consumers are assumed to attach to this credence attribute. The price premium stemming from the hedonic analysis can be seen as an indicator not only of the additional cost involved in the production and labelling process for products with this attribute, but also of how

much the producers and retailers (setting the eventual retail price) appear to expect the consumer to be willing to pay extra for this attribute. The estimate obtained in the analysis provides a tool for further policy-relevant analysis of the market in Sweden, but is also useful from an EU-wide point of view. The current situation is characterized by a considerable lack of comparable data-based results, so findings will add to enriching the ongoing analysis and debate. Results show the existence of considerable price premia for labelled coffee in Sweden, underlining high public awareness reflected in the retailers' pricing policy.

Moreover, this thesis summarizes and combines previous research findings to arrive at a more comprehensive picture of the main factors driving consumer demand and market development. Existing price premia are but one factor with a potentially decisive impact. Consumers may gain private benefits from consuming green products, e.g. in the form of social approval or feelings of satisfaction with oneself because of behaving in a way that one considers morally superior to other kinds of behaviour (Bruvoll and Nyborg, 2004; Kuhn, 1999; Nyborg and Rege, 2003). On the contrary, these private benefits may be reduced if consumers doubt the reliability of the labelling scheme, or if high additional costs are involved in consuming the green alternative (Starr, 2009; Schumacher, 2010). The second paper included in this thesis is concerned with the attitude-behaviour gap with regard to purchasing organic food and focuses explicitly on various determinants of demand for products with an organic label. It presents a model of demand for labelled goods which takes into account that the organic claim is of credence nature to the consumer who faces uncertainty with regard to the true adherence to organic production. The impacts of consumer consciousness, quality of the labelling scheme, as well as availability of organic products are analyzed. Findings show that demand increases with more aware consumers, improved label credibility, and a wider distribution of organic products. Furthermore, UK micro-level data on public attitudes and behaviour toward the environment from 2007 are used in the framework of logistic regression analysis to add an empirical perspective. It is analyzed which factors have a significant impact on respondents' buying organic products on a regular basis. Though country-specific, the reported findings facilitate comparative (international) analysis in further research.

A third contribution of this thesis concerns the analysis of consumer choice in the presence of a growing multitude of environmental and ethical labels used for marking products with a respective background. The array of labels used today does not only lead to a higher degree of diversification but potentially causes consumer confusion and increases evaluation or search costs. The third paper included in this thesis focuses on consumer search costs related to the evaluation of labelled products and discusses a theoretical model of consumer search behaviour in a horizontal differentiation setting with costly evaluation of alternatives. Results stress the importance of consumer valuations, search costs, and the number of label alternatives present in the market. Despite the importance of this topic, it has not been widely analyzed in the literature. Findings will hence enrich the ongoing debate. This is also true with regard to the empirical part where a generalized ordered logit model with a partial proportional odds specification is fitted to Eurobarometer micro-level data. Results confirm a significant negative impact of a large number of labels on the perceived helpfulness of existing labelling schemes in identifying genuinely environmentally friendly products.

Below follows a more detailed description and summary of the three papers included in this thesis. The findings of the individual chapters taken together serve to illustrate certain characteristic features of the markets for labelled products. We are facing a situation with an increasing degree of environmental/sustainability product

differentiation and consumers expressing their will to engage in "more conscious" consumption. At the same time, the relatively low market share of the products involved seems to imply that existing labelling schemes do not function properly as information disclosure and signalling mechanisms. The papers included in this thesis discuss several factors with a potentially crucial impact on this matter. The first paper suggests that high price premia could at least partly explain relatively low consumer demand for products labelled for social attributes (Fair Trade in this case). This being said, it has to be acknowledged that price premia are an important means to additionally signal sustainability quality, and may be crucial for the market to function (Mahenc, 2007).

The second paper sheds light on additional factors that potentially explain the attitude-behaviour gap in ethical consumption. Based on the employed model, three areas for possible action with regard to fostering organic consumption can be identified. Improvements in labelling quality and availability of labelled products, as well as an increase in consumer consciousness can all be shown to positively impact on demand for the labelled good. However, the empirical analysis clearly emphasizes the importance of achieving high levels of consumer awareness and consciousness. The third paper included in this dissertation then discusses a related issue in showing that only consumers with a sufficient valuation of labelled products will engage in the costly evaluation of the various labels available and finally make an informed choice. Enabling consumers to make informed choices in line with their true preferences is the very core of labelling policies, so that the topic of a multitude of labels being used and its apparently negative impact on consumers is an important issue for current policy-making. As stated above, this topic has not been widely explored in the literature yet, so that the findings obtained in the third paper are of high relevance in stimulating the debate.

Taken together, in particular the second and third paper point to a need to modify the current set-up in the field of environmental, sustainability, and ethical labelling. Both papers stress the need for public sector involvement in educating consumers, initiating information campaigns, as well as defining reliable standards, communicating them, and ensuring credible certification and monitoring. There appears to be a strong role for social marketing to be taken on.

Serious consideration should be given to the question of how a reduction of consumer evaluation costs can be achieved. The issue of a harmonization of labelling standards as discussed above could play a key role in this respect. Harmonizing minimum standards for specific groups of labels covering the same topic would lower consumer search and evaluation costs considerably and make informed consumer choice more likely. Reducing the number of labels in use or making certain labels focal with the help of "look for the label" campaigns would serve the same purpose. However, as Janssen and Hamm (2012) stress in their analysis of the new EU mandatory label for organic products, harmonization requires a clear and sophisticated communication strategy and is not a solution that runs by itself.

There may be cases where certain groups of consumers are very attached to the standards represented by specific labels. One example for this is organic labelling in Germany, a country with both a national organic label and a considerable number of labels issued by farmers' associations with generally more demanding standards (Janssen and Hamm, 2012). While having all these labels on the market imposes higher evaluation costs on consumers, abandoning all labels with more demanding standards than the minimum standard defined by the national or the EU-logo would imply high

utility losses to some consumers. As a solution to this problem, Harbaugh et al. (2011) suggest that information and education campaigns could be employed to provide clear rankings of different labels, even if the exact standards remain difficult to communicate to consumers. This approach is further in line with the findings in Bleda and Valente (2009) who suggest the introduction of graded eco-labels to provide consumers with adequate information. Either way, this thesis serves to underscore that focusing on consumers needs in trying to make labelling schemes work efficiently, as well as lowering consumer evaluation costs as much as possible should be given high priority in the design of policy measures.

1.5.3. *Detailed summary of the included papers*

Paper 1: Estimating the hedonic price for Fair Trade coffee in Sweden

This paper focuses on the pricing of Fair Trade-labelled coffee in Sweden as one of the countries where public awareness of development and labelling issues is particularly high (Broberg, 2007). According to European Social Survey data, Sweden ranks first in Europe as far as boycotting and deliberately purchasing products ("buycotting") are concerned (Stolle et al., 2005).

This paper is the result of a cooperation with the Swedish Retail Institute (HUI) in Stockholm and appeared in similar form as a working paper in late 2009 (HUI WP No 31). It was further accepted for publication in the British Food Journal in 2010 and published in this journal in Vol. 114, No. 3, 2012. For the analysis, the method of hedonic pricing was employed. This was made possible by a rich dataset containing scanner sales data for Fair Trade-labelled coffee for a representative sample of grocery stores all over Sweden for the period from March 2005 - March 2008. Data limitations in terms of availability and detailedness often prevent the usage of revealed preference methods in the field of demand analysis for labelled products and consumer willingness to pay (WTP). This is one of the reasons why the majority of studies in this area so far have focused on the usage of stated preference methods and their survey techniques to reveal consumers' valuation for certain product features (Arnot et al., 2006).

In the course of the analysis, hedonic estimates were obtained for what consumers paid for different characteristics as accessible from the package. This allows for a closer investigation of the existing price differences between labelled and conventional coffee, and for estimating the impact of the Fair Trade-label on the market for coffee in Sweden. Obtaining this estimate is interesting with regard to how clearly the market for labelled goods has been growing in recent years. It illustrates the premium that Swedish consumers have to pay for ethical consumption, i.e. for the presence of the label on the coffee package. The estimated coefficient for the Fair Trade variable was strongly significant and positive, showing that consumers in Sweden paid a considerable premium for this label. *Ceteris paribus*, the presence of the Fair Trade label on the package increased the price of an "average grade" of coffee by 38 percent. The calculations provide a useful tool for further policy-relevant analysis of the market in Sweden. The results obtained for the Swedish case allow for a comparison with the premia paid in other countries, and for an investigation of stated WTP and actual pricing. Based on this, it would be possible to hypothesize about achieving further market growth by lowering prices. An interesting additional aspect to note in this respect concerns the number of Fair Trade labelled coffee varieties marketed in Sweden. This number has increased notably over the period covered in this study. There has been extensive coverage of related issues in the media and a "Fair Trade Fokus" campaign in 2007. At the same time, market leading brands became more and

more active in launching labelled varieties. This suggests a link between increased marketing and image building campaigns and the high premium that has to be paid for labelled coffee.

Paper 2: Is it all about attitudes after all? Empirical evidence on the factors motivating organic consumption in the UK

This paper shifts the focus to organic labelling. The use of labelling to identify organically produced food has a relatively long tradition compared to other labels (Vogt, 2001). Still, similar to the case of the Fair Trade label, there is a notable discrepancy between stated positive consumer attitudes and actual purchasing behaviour when it comes to organically marked food items. This is often referred to as attitude-behaviour gap in the economic literature on ethical consumption (Pelsmacker et al., 2005). In the paper, I seek to add to explaining and closing this behaviour gap. The focus is on the determinants for the demand side for organic products, an approach that follows Schumacher's (2010) work on eco-labelled goods. Contrary to this, there has been a clear focus on consumer acceptance and perception of organic food in recent years as far as research in the field of organic agriculture and food is concerned (Leire and Thidell 2005; Köhler 2008). Studies mostly rely on stated preferences to elicit willingness to pay for organic food (Krystallis and Chryssohoidis 2005; Didier and Lucie 2008; Griffith and Nesheim 2008; Cicia et al. 2009; Kalogeras et al. 2009).

Based on the role of labelling as policy tool to overcome information asymmetries, a model attempting to capture various determinants of the demand side for (labelled) organic products is presented, making use of findings from the field of environmental psychology in defining determinants of demand for organic food. The impact of consumer consciousness and quality of the labelling scheme are analyzed. This paper further extends Schumacher's (2010) work by explicitly taking availability of organic products and marketing activities related to an increasing involvement of the retail and conventional food producing sector into account. Findings show that demand for the labelled organic product increases with more aware consumers, improved label credibility, and a wider availability of organic products.

This paper then uses the example of the UK to test the model results empirically. The UK is one of the four largest organic markets in the EU and in this respect serves as a representative example here. UK micro-level data on public attitudes and behaviour toward the environment from 2007 are used in the framework of logistic regression analysis. It is analyzed which factors have a significant impact on respondents' buying organic products on a regular basis.

The empirical findings support the model predictions as far as the role of consumer awareness is concerned. It appears that consumer consciousness and interest in where and how goods were produced have an impact on organic purchasing behaviour. This effect is more accentuated the stronger, or more extreme, expressed attitudes are. Being indifferent towards organic and environmental-friendly food seems to be one of the strongest explanatory factors in the UK survey at hand for why people do not buy this kind of product. However, the data at hand do not show evidence of an unwillingness to pay more for environmentally-friendly food. Only 13 percent of the survey respondents claimed they were not willing to pay more for this type of food. Still, it is interesting to note that stating a positive willingness to pay more for environmentally-friendly products was not of statistical significance in the analysis. This suggests that a genuine interest in specific matters of food and production is more important than

acknowledging that related products have to be more expensive because of the difference in production methods.

Availability and other contextual barriers to consuming organic products do not seem to have been playing a crucial role for the respondents at the time of the survey used for analysis. Neither the opinion that buying organic was too time-consuming, too much of an effort, nor that it was too inconvenient had a significant impact. It can be hypothesized that the early involvement of the conventional retail sector was an important building stone for the organic market in the UK. The effect of a limited availability of organic products is to some extent mirrored in the regional effect dummies' significance. Living in parts of Great Britain other than London or the South clearly makes it less likely to buy organic food. The data at hand did not allow for a direct evaluation of the issues of labelling quality and credibility. The only variable related to the question of whether a lack of labelling and information kept respondents from purchasing organic ceased to be of significance in the empirical investigation.

In sum, a number of conclusions can be drawn from the analysis in this paper. The model at hand is a useful tool in identifying potential areas to be tackled in order to boost organic consumption. Especially a focus on consumer education and awareness raising seems to suggest itself, as does an objective assessment of existing labelling schemes and potential shortcomings in terms of reliability and credibility. The generalisability of the empirical findings obtained in the frame of this paper is arguably somewhat limited because of the exclusive use of UK data. Still, findings could be of interest for comparative purposes and useful for countries following similar policy approaches and having a similar retail set-up. British governments' engagement with the organic market traditionally rested on the notion that state intervention should be based on consumer demand and not on creating it (Daugbjerg and Søderskov, 2012). This could imply a comparatively limited role for public sector involvement and social marketing aimed at raising consumer awareness, while these factors could be important in creating the necessary level of consumer consciousness. As there are no commercial interests involved, public sector social marketing is likely to be regarded as more trustworthy than commercial marketing by consumers. It is crucial to communicate the additional value of organic products and the reasons for reasonable price premiums to the consumer in an accessible way (Pearson and Henrycks, 2008).

Paper 3: Consumer choice in the presence of a multitude of environmental and ethical labels

As mentioned in previous sections of this dissertation, this paper concerns itself with the fact that an array of environmental, sustainability, and ethical labels has emerged over the years. To date, the impact of this multiplicity of labels on market forces has not been widely studied in the literature (for rather recent contributions see Ben Youssef and Abderrazak, 2009; Brécard et al., 2012; Harbaugh et al., 2011; Onozaka and McFadden, 2011).

This paper relates to the (eco-) labelling literature and additionally makes use of results stemming from the literature on consumer search and shares certain aspects with works on product differentiation. It attempts to add to the existing literature on environmental and ethical labelling. It investigates potential sources for consumer confusion and discusses how current labelling schemes are at the source for search or evaluation costs. The more different labels there are, the more likely a consumer is to find an alternative that matches his ideal characteristics defined for a certain product

class. At the same, it is likely to become more difficult for consumers to be informed about the different labels' meanings and the distinction between them, which in turn can cause consumer confusion and makes an informed choice more burdensome. Consumers understand that a label certifies that a product's production process meets some quality standard, but in many cases are unsure of the exact standards involved (Harbaugh et al., 2011). Search or evaluation costs then become an important issue for consumers wanting to make a choice according to their actual preferences, which is at the centre of a functioning, efficient and effective labelling scheme.

 Furthermore, this paper illustrates consumer search behaviour in the presence of search costs with the help of a sequential search model featuring horizontal differentiation. Although an ideal labelling scheme with perfectly informed consumers would allow for a market featuring both vertical and horizontal differentiation in terms of quality and issues covered, from the consumers' perspective the market is likely to be horizontally differentiated. This is due to confusion and a lack of understanding and information (Lohr, 1998). Making use of a model introduced by Kuksov and Villas-Boas (2010), it is shown that if the valuations consumers hold with regard to the issues covered by labelling schemes are too low, they will not engage in the costly evaluation process required to make an informed choice that would be in line with their preferences. Similarly, if the search costs a consumer has to incur for choosing among the existing label alternatives are too high, these costs make evaluation prohibitively expensive for the consumer in question and he stays out of the market. Given the complexity of evaluating the issues covered by labels, even relatively few alternatives (in comparison to conventional product markets and the quantity of different choice options provided there) could imply prohibitively high evaluation costs with regard to making a conscious and informed choice. This can question the usefulness of labelling schemes with respect to their goal of enabling consumers to adjust their purchasing behaviour with their preferences.

Finally, an empirical investigation of the issues discussed in this paper is undertaken using Eurobarometer micro-level data on the perceived helpfulness of existing labelling schemes in identifying genuinely environmental friendly products. A generalized ordered logit model is fitted to the data at hand. The econometric analysis undertaken confirms the notion that label fragmentation appears to play an important role in making consumers feel less certain about the usefulness of existing labelling schemes. The effect was strong and significant, revealing a considerable negative impact of label fragmentation on the likelihood of rating current labels as helpful.

The findings based on the model and econometric analysis in this paper emphasize the importance of consumer valuations and search costs and point to the need of using policy tools aimed at lowering search costs in the field of environmental and ethical labelling. Lower search costs could be achieved by several means, such as continued consumer education and information campaigns, as well as a reduction of label fragmentation. Easing access to information for consumers and a potential re-design of labels are other important policy approaches to consider. Though potentially difficult to implement, a re-design of labels could ensure that these provide not only a relatively simple sign, but more detailed information on issues covered and certifying requirements (Harbaugh et al., 2011).

As Harbaugh et al. (2011) point out, introducing "look for the label" campaigns have had some success in reducing consumer confusion by making consumers focus on a particular label among the multiplicity of possible labels. Similarly, harmonizing the standards required to obtain labels can potentially be helpful if this harmonization is

communicated appropriately. However, while harmonization lowers search costs, welfare gains are not guaranteed if the existence of different standards reflects the existence of different consumer preferences across society. If consumer preferences for certain standards are very strong, harmonizing standards may actually reduce consumer utility (Sawyer et al., 2008). Summing up the aspects discussed, this paper underscores the difficulty of achieving comprehensible, credible, and consumer-oriented labelling schemes and the need to revise related policy measures.

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2   PAPER 1: ESTIMATING THE HEDONIC PRICE FOR FAIR TRADE COFFEE IN SWEDEN

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2.1.   Introduction

Over the past decades, general public interest in products marked with environmental or social responsibility labels has grown considerably. One of the most widespread labels in this respect is the Fair Trade label, the main focus of this paper. In recent years, the sale of labelled products in regular supermarkets has increased significantly in Europe (FTIE, 2005; Wilkinson, 2007). This is interesting given that the original idea behind the Fair Trade movement, which emerged in the 1950s, was to try to counteract structural disproportions in trade between developed and developing nations by means of creating alternative distribution channels (Steinrücken and Jaenichen, 2007). Products with a Fair Trade certificate were traditionally sold almost exclusively in specialised retail outlets promoting the Fair Trade idea; so the increasing usage of conventional marketing and retailing structures for marketing these products is noteworthy (Steinrücken and Jaenichen, 2007).

However, despite growing acceptance and interest in labelled products, a lot remains to be understood about the functioning of this market. The issue is closely related to the concept of political consumerism (Boström et al., 2005), i.e. consumer choice of products and producers based on values concerning matters of justice, fairness, well-being, and ethical and political assessment (Micheletti et al., 2003). This paper focuses on the example of the market for labelled coffee in Sweden, a country that has experienced growing awareness concerning development, poverty and climate issues in recent years (Broberg, 2007). According to European Social Survey data, Sweden ranks first in Europe as far as boycotting and deliberately purchasing products ("buycotting") are concerned (Stolle et al., 2005). Accordingly, the usage and impact of food labels on purchasing behaviour should be of increasing importance. In their study based on a representative national postal survey, Micheletti and Stolle (2005) found that political consumers in Sweden commonly belong to the higher income groups and are most likely to be middle-aged citizens with a relatively high level of education. They are among the most resourceful citizens in the country and are engaged in several forms of political participation.

In this paper, the method of hedonic pricing is used to study the pricing of labelled coffee in Sweden. This allows for a closer investigation of the existing price differences between labelled and conventional coffee. Coffee was the first product to be traded fairly (Steinrücken and Jaenichen, 2007) and it has since retained a position as symbol and product leader of the Fair Trade movement (Wilkinson, 2007). As Wilkinson (2007) points out, there are a number of studies on the issue of labelled coffee (De Pelsmaker et al., 2005; Loureiro and Lotade, 2005; Lyon, 2007).

As far as the market for Fair Trade products in Sweden is concerned, the major share of this market is made up of products sold under the Rättvisemärkt label. According to Rättvisemärkt/Fair Trade Sweden, roughly 3 percent of the coffee in Sweden is Fair Trade-labelled (FTIE, 2005). In recent years, Rättvisemärkt/Fair Trade Sweden has

made considerable effort to increase product availability and supply of Fair Trade products in regular supermarkets. In 2007, the first "Fair Trade Fokus" campaign attempted to also involve conventional retailers by providing marketing material, outdoor posters and in-store product demonstrations (Jaukkuri, 2009). Awareness of the Rättvisemärkt label is high, as it was known to 47 percent of the Swedish consumers in 2004 (FTIE, 2005). The European Coffee Federation in its 2007 report on the European Coffee market (ECF, 2008) even estimates a market share of roughly 9 percent for coffee with a responsibility or sustainability label (Fair Trade, Utz certified, Rainforest Alliance), and a market share of 7 percent for ecological coffee. The report found considerable growth for this segment with an increase of 44 percent from 2006-07. Double certification is common in the Swedish market. In 2007 about half of the coffee varieties with a responsibility or sustainability label also had an eco-label. Table 1 presents more detailed data on the market for roasted coffee in Sweden in 2007. Market shares are given in terms of volume by supplying brand, roasting/importing company, as well as for KRAV-labelled coffee. KRAV is a key player in the organic market in Sweden; it develops organic standards and is responsible for the KRAV organic label.

Table 1   The market for coffee in Sweden (2007)

Volume by brand	Market share (%)	Volume by roaster/importer	Market share (%)	KRAV-labelled (volume/brand)	Market share (%)
Gevalia	42%	Kraft Foods	45%	Gevalia	49%
Zoégas	19%	Zoégas	19%	Löfbergs Lila	19%
Löfbergs Lila	16%	Löfbergs Lila	16%	Zoégas	13%
Classic	9%	Arvid Nordquist	9%	Coop	7%
ICA	4%	ICA	5%	ICA	7%
Signum	2%	Coop	5%	Classic	5%
Blå Mocca	2%	Others	2%	Other brands	1%
Other brands	6%				

Source: The Swedish National Coffee Association (2009).

With regard to the existing body of literature, many studies in the field of consumer preferences for Fair Trade or eco-labelled goods have addressed questions related to the issues of credibility of labelling, or the potential impact of labels on consumers' perceptions of certain goods and their buying behaviour (Grankvist et al., 2007; Langer et al., 2008; Leire and Thidell 2005; Poelman et al., 2008; Tagbata and Sirieix, 2008). In their analysis of the situation in the Nordic countries, Leire and Thidell (2005) pointed out that consumers in these countries generally hold a positive attitude towards green products and eco-labels, and that there is a high degree of trust concerning the main eco-labels. Several segmentation studies found that 20-50 percent of the consumers claimed to give priority to environmentally related properties of products. Still, there appears to be a discrepancy between intentions and buying behaviour (Leire and Thidell, 2005). Consumers appear to overestimate their use of product-related environmental information and instead prioritise other aspects, such as price and quality. Additionally, purchases can be guided by habits (Leire and Thidell, 2005). Price-sensivity and income-dependence of purchasing decisions have been another research focus (Arnot et al., 2006; Bunte et al., 2007; Mahenc 2007; Smith et al., 2009).

This paper contributes to the existing literature in several ways. The majority of studies in the area of demand analysis for labelled products and consumers' willingness to pay (WTP) so far have focused on the usage of stated preference methods and their survey

techniques to reveal consumers' valuation for certain product features (Arnot et al., 2006). In many instances, data limitations in terms of availability and detailedness have prevented the usage of revealed preference methods. Based on detailed scanner panel data now made available by Nielsen and the Swedish Retail Institute (HUI), it is possible to identify several relevant attributes and to elicit that the premium consumers are actually paying for the Fair Trade label and other coffee attributes. Obtaining this estimate is interesting with regard to how clearly the market for labelled goods has been growing in recent years. It allows for an illustration of the premium that Swedish consumers have to pay for ethical consumerism, i.e. for the presence of the label on the coffee package. A second contribution of this paper is the focus on the example of Sweden. To the best of my knowledge, there is to date no study that has explicitly analysed demand for labelled coffee in Sweden using a hedonic pricing approach on such an extended data set. Given the importance of political consumerism in this country, it is a particularly interesting case for further investigation.

The approach taken in this paper is in line with works on the hedonic price of Fair Trade and eco-labelled coffee in Italy and the UK (Galarraga Gallastegui, 2001; Galarraga and Markandya, 2004; Maietta, 2003). In the current situation characterised by a considerable lack of comparable data-based results, this study will enrich the ongoing analysis and debate. The results obtained for the Swedish case will allow for intra-country comparisons particularly within the EU.

The rest of this paper is organised as follows: Section 2 is concerned with the employed model and methodology. Empirical results from the estimations are presented and discussed in Section 3, while Section 4 summarises findings and concludes the paper

2.2. Model and methodology

As mentioned above, the major body of existing literature on what is referred to as socially or environmentally responsible purchasing behaviour relies on stated preference methods, with a few exceptions making use of revealed consumer behaviour (Arnot et al., 2006). In the field of revealed approaches, there is a tendency to employ experiments to elicit consumers' responsiveness to certain product characteristics and relative price changes (Arnot et al., 2006; Basu and Hicks, 2008; Bunte et al., 2007; Cicia et al. 2009; Griffith and Nesheim 2008; Kalogeras et al. 2009; Krystallis and Chryssohoidis 2005; Tagbata and Sirieix 2008). However, the detailedness of the data available in our case allowed for employing hedonic pricing. This method is popular for analysing the pricing of various product categories, such as wine, beef, and cars (Andersson, 2005; Hahn and Mathews, 2007; Schamel and Anderson, 2003).

Data collection

The data used for analysis were weekly scanner panel data collected and provided by Nielsen. A period of three years from March 2005 - March 2008 was covered and the data comprised observed sales in a representative sample of supermarkets all over Sweden. Included in the sample were shops ranging from so-called superettes (101-400m^2) to megastores (>2500m^2). The exact number of shops in the sample is not general knowledge and handled confidentially by Nielsen. In a personal communication with Nielsen, it was confirmed that sample size was around 3000. Nielsen's sampling technique does not include shops on a random basis but is designed to ensure that a representative picture in terms of area, retail chain, demographics and turnover is

achieved. Nielsen stresses that high scanning standards are a particular requirement for a shop to be included in the sample, as this ensures correct codification in the dataset. The data contained information on all brands supplying roasted coffee to the supermarkets included in the sample. Information was available on brands, sales volumes, prices per kg, and package sizes. In case a certain reference was not bought in a given week, the observation for average price was zero. Unfortunately, these observations had to be treated as missing because this price data could not be recovered from Nielsen.

There was usually more than one variety for each brand in the dataset. Each variety, here referred to as reference, possessed different characteristics as indicated on the package. 214 different references were included in the final dataset used for analysis after deletion of duplicates. Included package sizes were 200, 250, and 500 g. Numerous coffee attributes, such as organic, Fair Trade, roast, decaffeinated, and flavoured were accessible from the data and guided the analysis. Relevant information was processed for each reference and the following variables derived for empirical analysis (see Table 2 below).

Table 2   List of variables.

Variables	Description		Mean	St. dev.
Price	Price per kg (SEK)		55.58	26.43
Fair	Fair Trade dummy	If Fair Trade-label=1, otherwise=0	0.1	0.3
Krav	Krav dummy	If Krav-label=1, otherwise=0	0.06	0.24
Eco	(other) eco dummy	If eco-label=1, otherwise=0	0.11	0.31
Cook	Cook dummy	If cook coffee=1, otherwise=0	0.13	0.34
Various brand dummies	See Appendix	If brand=1, otherwise=0		
Orig	Origin dummy	If origin marked=1, otherwise=0	0.11	0.31
Flav	Flavouring dummy	If flavoured=1, otherwise=0	0.28	0.16
Decaf	Decaffeinated dummy	If decaffeinated=1, otherwise=0	0.02	0.15
W1-w157	week dummies for weeks covered by dataset	If respective week=1, otherwise=0		
Mell	Mellan-roast label dummy	If mellan label=1, otherwise=0	0.35	0.48
Mork	Mörk-roast label dummy	If mörk label=1, otherwise=0	0.14	0.35
Emork	Extra-mörk-roast label	If extra-mörk label=1, otherwise=0	0.05	0.22

The variables presented in Table 2 can be further grouped as follows:

Fair Trade Characteristics: 2 dummies (<u>Normal</u>, and Fair Trade label).

KRAV Characteristics: 2 dummies (<u>Normal</u>, and KRAV label).

Organic Characteristics: 2 dummies (<u>Normal</u>, and Organic label).

Intrinsic Characteristics – Roast Quality/Degree: 3 dummies (<u>mellan</u> (medium), mörk (dark), and extra-mörk (extra dark).

Coffee characteristics: 2 dummies (<u>brygg</u>, and kok).

Production Region label: 2 dummies (<u>Normal</u>, and Origin-marked).

Decaffeinated: 2 dummies (<u>caffeinated</u>, and decaffeinated coffees).

Flavouring: 2 dummies (<u>Normal</u>, and flavoured coffee).

Brands: 41 dummies (Gevalia, Blå Mocca, Maxwell, Zoégas, Löfbergs Lila, Classic Coffee, ICA, Euroshopper, Signum, X-tra, Änglamark, Blå Vit, ODEF, Eldorado, Willy's, Hemköp, Godegården, Spar, Lindvalls, Bosnia Malt, Maraba Burbun Roasters, Svenskt Kyrkkaffe, Kettler, Corsini, Oxfam, Fair Trade, BKI, Drie Mollen, Folke Bergman, Najjar, Lyxkaffe, Kaffebönans, Minas, Colcafe, Servtrade, Idee, Urtekram, Kung Markatta, Coop, Café Organico, and <u>other</u> brands).

Week: 157 dummies (w1-w157).

The dummy variables underlined in the above listing represent the excluded base case that is standard for the estimation of regressions with dummy variables.

Hedonic pricing

The approach taken in this paper for the analysis of the pooled cross-section data at hand resembled the one adopted by Galarraga Gallastegui (2001) and Galarraga and Markandya (2004) in their case study on willingness to pay for Fair Trade and organic coffee in the UK. In addition to this case study, hedonic pricing has been employed in the analysis of the ethical content in coffee consumption in the Italian market (Maietta, 2003). To the best of my knowledge, these are the only studies making use of this method in the field of Fair Trade labelling. Contrary to the UK study that had to treat Fair Trade and organic labelling together as a "green characteristic" because of a lack of more detailed data, this study concerned with the Swedish market treated these aspects separately. It also covered a longer time period than the UK case and comprised considerably more detailed information than the Italian study.

The theoretical foundations for the standard hedonic price model were provided by Rosen in his 1974 seminal paper (Schamel and Anderson, 2003). Classic empirical applications of the theory focused on property prices and cars (Thrane, 2004). The central idea behind hedonic pricing rests on the hypothesis that goods are valued for their utility-generating attributes (Schamel and Anderson, 2003), so that any product's price is a function of its immanent utility-bearing attributes as assessed by the individual consumer (Thrane, 2004). It is further assumed that competitive implicit markets exist that define implicit prices for embodied product attributes. The observed market price then is the sum of implicit prices paid for each quality attribute (Rosen, 1974). This is hence a way of addressing quality issues in a seemingly homogenous product by examining the value of the characteristics it embodies (Hahn and Mathews, 2007). Each consumer chooses a bundle of product characteristics to maximise utility

subject to a budget constraint. The implicit price essentially indicates the marginal willingness to pay to for a change in a certain attribute (Lutzeyer, 2008). In other words, hedonic pricing analyses prices that result from the demand side and supply side equilibria while adjusting for variations in quality and allows for estimating, *ceteris paribus,* a proxy of what consumers actually pay for a certain characteristic of a good (Galarraga and Markandya, 2004).

In the case of coffee, consumers' WTP arguably depends on several determinants. Crucial aspects considered in this paper followed the availability of data and the structure of the coffee market in Sweden, which has a market structure similar to most European countries with an accentuated concentration of market power to a small number of large companies (Durevall, 2007). In this respect, we assumed that consumers with the intention of making responsible or sustainable purchases base their valuation on the presence of the Fair Trade label on the packaging in the first place. They might also regard the presence of an organic label to be of importance, a point further discussed below. Further aspects included in the analysis were brands, origin-marking, degree of roasting (either "mellan", "mörk", or "extra mörk", i.e. ranging from standard (medium) roast to dark and very dark), brew (ground finely for filter coffee and regular coffee brewers) vs. cook (coarsely ground coffee that is cooked in a coffeepot on a stove – the traditional way of making coffee at home in Sweden), decaffeinated coffee, and special flavouring.

Modelling specification

In general, the empirical specification to be chosen in hedonic pricing is subject to constant debate since no specification is prescribed by theory to start with (Haab and McConnell, 2002; Thunström, 2007). It is often pointed out that the choice of functional form should be driven by the data at hand (Carew and Florkowski, 2010; Costanigro et al., 2007; Thrane, 2004). A variety of different functional forms have been employed in the literature, including log-linear, log-log, and Box-Cox transformations of the data (Schamel and Anderson, 2003).

The general empirical specification estimated using ordinary least squares (OLS) for our case with pooled cross-section data reads as follows:

$$P_l = \alpha + \sum_{j=1}^{m} \sum_{i=1}^{t} \beta_j^i X_j^i + u \tag{1}$$

The dependent variable in the equation above, *P*, is price per kilo (this is the case in all sets of regressions). The vector of the *j* explanatory variables, *X*, comprises the dummy variables presented in Table 2 and discussed above, for each of the *t* time periods. *u* is the random error term.

As argued above, the uncertainty concerning the correct specification favours a flexible approach considering various possible transformations of the dependent variable as a prudent strategy in hedonic pricing analysis (Carew, 2000; Carew and Florkowski, 2010; Costanigro et al., 2007). The final model specification is then selected on the basis of diagnostic tests, goodness of fit, and the ease of interpretation of coefficients. Models making use of the natural logarithm of the dependent variable are the prevalent choice in hedonic pricing studies (Thrane, 2004); hence, adopting this approach allows for almost direct comparison of results. Furthermore, this data transformation potentially improves model fit considerably and was suggested by Rosen in his original

work (Rosen, 1974). Therefore, the following specification was run as a second step in the analysis:

$$LP_l = \alpha + \sum_{j=1}^{m} \sum_{i=1}^{t} \beta_j^i X_j^i + u \qquad (2)$$

where $LP_l = \log(P_l)$ and u is again the random error term.

In the frame of this study, further comparisons were made concerning two alternative transformations of the price data (the only non-binary variable allowing for transformation in our analysis). Following suggestions in the relevant literature (Carew, 2000; Costanigro et al., 2007), a model using the ¼ power of the price as dependent variable, i.e. $P^{1/4}$ or $\sqrt[4]{P}$, as well as a model using the inverse square root were estimated in order to optimise model fit.

Data analysis

Following the stepwise procedure suggested in the relevant literature on hedonic analysis (particularly the works by Carew (2000), Galarraga Gallastegui (2001), Galarraga and Markandya (2004), and Lutzeyer (2008)), the linear OLS model given in (1) was estimated as the first step of the analysis before other specifications were tested.

R^2 in the case of the linear model, as well as in later estimations for the ¼ power transformation model, amounted to 0.59, while it was somewhat lower (0.53) for the model with the inverse square root transformation. Table 3 below illustrates the test diagnostics for the different transformations of the price variable. The table shows that we have a problem of functional form, i.e. some important nonlinearities are not accounted for by the model, and heteroscedasticity, i.e. differing variances. The same holds true with regard to serial correlation, as obtained by an application of the Wooldridge test. Given that the Breusch-Pagan/Cook-Weisberg procedure pointed to problems with heteroscedasticity in all specifications, robust standard errors were used in all estimations.

Table 3   Diagnostic test for the linear OLS and inverse square root of price model.

Test statistics	Test procedure	Linear model	Quarter power of price	Inverse square root of price
Serial correlation	Wooldridge test for autocorrelation in panel data	$F_{(1, 192)}$ = 20.498 [0.000]	$F_{(1, 192)}$ = 20.498 [0.000]	$F_{(1, 192)}$ = 6.806 [0.0098]
Functional form	Ramsey's RESET test	$F_{(3, 21398)}$ = 79.20 [0.000]	$F_{(3, 21398)}$ = 79.20 [0.000]	$F_{(3, 21398)}$ = 16.95 [0.000]
Heteroscedasticity	Breusch-Pagan/Cook-Weisberg	$Chi2(1)$ = 2895.46 [0.000]	$Chi2(1)$ = 2895.46 [0.000]	$Chi2(1)$ = 740.67 [0.000]

In attempting to further improve model fit and to address the problems pointed out above, equation (2) using the natural logarithm of the dependent variable (average price per kg) was estimated. Model fit in the semi-log case with robust standard errors was improved markedly compared to the previous estimations, indicated by a higher R^2 of 0.64. Applying Ramsey's RESET test for functional form misspecification to the semi-log model showed a statistically significant *F*-value of $F_{(3, 21550)}$ = 20.86 [0.000]. Hence, none of the estimated models is perfectly specified but the semi-log

model is relatively satisfactory in this respect, showing the second-lowest magnitude *F*-value. Based on the tests just described and for the sake of comparability of results with regard to existing studies, the semi-log was eventually selected as the preferred specification.

However, applying the Wooldridge xtserial test still pointed to problems with autocorrelation in the data ($F(1, 192) = 12.120$ [0.0006]), so that in order to address these issues a regression with Newey-West standard errors corrected for both heteroscedasticity and autocorrelation was estimated. Estimated coefficients of the semi-log model with Newey-West standard errors are reported in Section 3 in Table 4. With the modified standard errors, three coefficients were no longer statistically significant and hence removed from the estimation. This concerned the brand dummies for Coop and Cafe Organico that were merged with the group of "other brands", as well as the dummy for flavoured coffee. The dummy for extra dark coffee was insignificant under all specifications and was excluded from the estimations.

Given that multicollinearity, i.e. high correlation between two or more explanatory variables, is a problem with the data that often occurs in the hedonic pricing literature (Galarraga Gallastegui, 2001; Lutzeyer, 2008), the mean variance inflation factor (VIF) was calculated. Mean VIF for the specification illustrated in Table 4 amounted to 2.13, with all individual VIFs clearly below 10. It was therefore concluded that multicollinearity was not a serious problem in this case.

Despite the large sample size, both the Shapiro-Francia and the Shapiro-Wilk test were conducted to inspect for a potential lack of normality in the distribution of residuals. The latter test rejected the assumption of normality (Shapiro-Wilk *W* test for normal data: $P = 0.000$), whereas the former could not reject the assumption of normality (Shapiro-Francia *W'* test for normal data: $P = 0.423$). As outlined by Galarraga Gallastegui (2001), numerical tests for residual normality are quite weak, which is why the histogram of residuals and the normal density graphic were analysed. This led to the conclusion that residuals under this specification are roughly normally distributed.

2.3.   Results and discussion

Table 4 illustrates the estimates obtained from the semi-log model chosen as the preferred specification. Turning to the interpretation of the results, it has to be born in mind that the included regressors are dummy variables. This has the implication that the intercept (constant) here represents the mean log coffee price of the base case coffee (the product(s) described when all of the included dummies = 0), while the slope coefficients of the regressors give the difference in the mean log coffee price of the respective dummy categories (Lutzeyer, 2008).

Table 4   Parameter estimates for the log-linear model (dependent variable log(price)).

Variable	Est.	Newey-West SE	
Const.	4,157	0,06	**
Fair	0,323	3,40E-02	**
Krav	-0,151	2,90E-02	**
Eco	0,090	2,40E-02	**
Cook	-0,050	0,02	*
D_geva	-0,215	0,06	**
D_blaa	-0,131	0,06	*
D_max	-0,213	0,08	**
D_zoe	-0,206	0,06	**
D_loef	-0,162	0,06	**
D_class	-0,269	0,06	**
D_ica	-0,385	0,054	**
D_euro	-0,985	0,063	**
D_signum	-0,44	0,054	**
D_xtra	-0,651	0,054	**
D_aengl	-0,173	0,059	**
D_blvi	-0,713	0,059	**
D_odef	-0,45	0,058	**
D_eldo	-0,565	0,059	**
D_will	-0,29	0,061	**
D_hem	-0,162	0,064	*
D_gode	-0,904	0,060	**
D_spar	-0,608	0,095	**
D_lind	-0,337	0,066	**
D_bos	0,37	0,057	**
D_mara	0,943	0,074	**
D_kyrk	0,338	0,057	**
D_kett	0,334	0,079	**
D_cors	0,84	0,12	**
D_oxf	0,529	0,064	**
D_ft	0,429	0,074	**
D_bki	-0,631	0,083	**
D_drie	-0,922	0,061	**
D_folk	-0,441	0,068	**
D_najj	0,348	0,059	**
D_lyx	-0,493	0,055	**
D_kabo	-0,238	0,054	**
D_mina	0,359	0,065	**
D_colc	0,721	0,078	**
D_serv	-0,985	0,06	**
D_idee	0,21	0,105	**
D_urte	0,135	0,07	**
D_kung	0,218	0,06	**
Orig	0,088	0,019	**
Decaf	0,336	0,051	**
Mork	0,101	0,018	**
W1-w157	most week dummies insignificant		
Obs.	21 606		

* statistically significant at the 5% level, ** statistically significant at the 1% level.

As far as our main variable of interest, Fair Trade labelling, is concerned, the estimated coefficient (0.323) is highly statistically significant and of the expected positive sign. The positive price premium was anticipated given the fact that the Fair Trade label guarantees a good minimum price to the producers disregarding world market price developments (Galarraga Gallastegui, 2001). At the market equilibrium price, the presence of the Fair Trade label will increase the log of the coffee price by 0.324, or the coffee price per kg by exp(0.323)=1.381. This is considerably higher than the findings from previous studies that stated premia of 9 percent in the Italian, and 11.26 percent in the UK case (Maietta, 2003; Galarraga and Markandya, 2004).

It is an interesting question to ask why the price premium is so much higher in the case of Sweden. At this point no final conclusion can be reached concerning this issue, but it should be taken into account that the impact of organic and Fair Trade labelling were analysed jointly in the UK study, so that the actual premium for Fair Trade as such might have been higher (Galarraga and Markandya, 2004). In the Italian case, the premium for organic coffee was found to be roughly 25 percent, i.e. much higher than for the Fair Trade label. This was not further discussed, but one explanation for the comparatively low Fair Trade premium could be its niche existence in the Italian market during the time span covered (Maietta, 2003).

As far as Sweden is concerned, it is noteworthy that the number of Fair Trade-labelled varieties has increased considerably over the time span covered by the data. Only four brands were supplying at least one labelled variety in 2005, two of which were market leading brands. In early 2008 the number of labelled coffee varieties had increased to 21. The market leaders are becoming more and more involved in the Fair Trade sector, potentially in order not to miss out on a growing market segment. Anselmsson and Johansson (2007) studied the significance Swedish consumers place on different aspects of corporate social responsibility when evaluating and purchasing grocery brands and products. They found that the human responsibility dimension had by far the biggest influence on overall perceived corporate social responsibility of a given brand. Assuming this also applies to the case of coffee and accounting for likely positive impacts in terms of awareness and sales of the 2007 "Fair Trade Fokus" campaign mentioned above, it appears likely that these trends are to some extent mirrored in the Swedish retailers' pricing policy.

In addition to the Fair Trade label, the presence of eco-labels may play an important role for ethical consumers. As pointed out by Grankvist et al. (2007), the group of ethical consumers usually is concerned about environmental issues but adds the dimension of human rights. In this view, ethical consumerism encompasses green consumerism and is sort of a second step in the field of political consumerism as discussed above. Assuming that this applies to at least part of the Swedish ethical consumers, it is instructive to investigate the results for the KRAV and general eco-labels more in detail. A line of argument similar to the Fair Trade case would lead one to expect a positive price premium also for these labels. However, Table 4 shows the estimates for the KRAV label and other eco-labels to be of the opposite sign, with a negative premium for the KRAV label. The general eco-label was only statistically significant under one of the tested specifications, so that any interpretation of this coefficient should be handled with caution. Problems with multicollinearity appear likely here. As far as the KRAV label is concerned, it can only be speculated about the price-setting policy for this segment in the frame of this paper. In our data, the only KRAV-labelled varieties were issued by the market leading coffee brands. These brands all have a statistically significant negative coefficient, e.g. being a Gevalia variety lowers the log coffee price by 0.215 or the coffee price per kg by exp(0.215)=1.24. One possible

explanation for this fact is that the market leaders can benefit from better wholesale conditions due to larger quantities bought, an advantage that is then passed on to the final consumer. Contrary to the Fair Trade case, KRAV-labelled varieties are regularly covered by special offer campaigns in retail stores.

Yet another important point concerns the purchase motives for the different labels. In their investigation of the attitudes towards organic foods among Swedish consumers, Magnusson et al. (2001) emphasised the importance of health considerations for the purchase of this class of food. Even though concern for the environment is usually quoted as a reason for buying eco-labelled food, this motive appears to be less important than the more egoistic health motive (Magnusson et al., 2003). It could well be that health-related considerations are of minor relevance in the case of coffee, as this product is not normally associated with a strong health attribute and the environmental benefits brought about by organic production are rather abstract (Loureiro and Lotade, 2005). Hence, the perceived subjective additional utility the individual consumer can obtain from the presence of an organic label in the case of coffee is limited and price comparisons with conventional varieties arguably play a larger role (Magnusson et al. 2001).

As can be seen from Table 4, all eventually included variables were highly statistically significant. The signs of most coefficients were in accordance with expectations held previously to the actual estimations: coffee varieties supplied by "regular" brands, such as the market leaders, had a price lower than the average, *ceteris paribus*, whereas consumers had to pay a higher price for more "specialised" brands. Given the fact that the four largest brands in the market have a combined market share of close to 90 percent (Durevall, 2007), the majority of brands can be classified as small or "specialised" in the sense that they supply small quantities or specialty coffees to segments not usually covered by the market leaders. Origin-marked coffee, decaffeinated coffee, and darker roast coffee were all priced above the average, which is in line with the additional effort required for production and the smaller market share or even niche-existence. However, since the year dummies remained highly significant, closer attention should be paid to year-based developments within the coffee sector.

In an attempt to capture the impact of double-labelling, i.e. the presence of both the Fair Trade and either the KRAV- or some other organic label, an additional specification comprising interaction terms (Fair*Krav, Fair*Eco, respectively) was estimated. However, including these interaction terms caused serious problems with multicollinearity. Neither interaction term was statistically significant when included individually but both turned highly significant once the other was added. Further inspection revealed that both interaction variables had individual VIFs clearly above 6, so that it was decided to leave this aspect out of the analysis. The presence of relatively few varieties with both a Fair Trade- and eco-label might further justify this decision.

For further comparison, Table 6 in the Appendix presents the results for the main variables of interest for three of the estimated models discussed above. As can be seen from this table, the Fair Trade variable was highly statistically significant under all specifications, which was also true for the KRAV variable. The semi-log model yielded the discussed high price premium for Fair Trade coffee and the negative sign for KRAV-labelled coffee. The simple linear model confirmed both these aspects, even though the Fair Trade price premium was smaller in this model with roughly 22 percent. Still all models confirmed the counteracting signs of the premia for Fair Trade and KRAV and the considerable premium for Fair Trade labelled varieties. However, we found that the variable capturing other eco-labels was only significant under the final semi-log

specification. These difficulties could be due to multicollinearity, or related to identification or measurement problems, all of which cannot be solved in the frame of this paper.

As far as the remaining variables are concerned, most of them maintained the same level of statistical significance under all three estimated models. This finding concerned brands, as well as variables classified in other categories. Additionally, estimated coefficients consistently were of the same sign under all models, a point that further strengthens the results obtained by the main specification.

2.4. Conclusion

The results of the empirical investigation undertaken in this study provide interesting evidence concerning the functioning of the market for responsibility and sustainability labelled products in a country where awareness of these issues is high. The study at hand has attempted to contribute to closing the existing knowledge gap as far as the market for ethical products is concerned. Of course, light has only been shed on supply factors here. Hedonic pricing allows for an investigation of what consumers actually have to pay for various coffee attributes. It does not provide information on the way consumers actually behave in the market or on their attitudes. Based on the estimations, it is possible to identify the relative impact of the different coffee attributes on the market price. The calculations provide a very useful tool for further policy-relevant analysis of the market in Sweden. They are also useful from an EU-wide point of view, despite the fact that Sweden may to some extent be a special case with political consumerism playing such a big role in the country as discussed. More specifically, the results obtained for the Swedish case will allow for a comparison with the premia paid in other countries, and for an investigation of stated WTP and actual pricing. Based on this, it would be possible to hypothesise about achieving further market growth by lowering prices.

As far as Fair Trade labelling as the main focus of this study is concerned, the estimated coefficient was strongly significant and positive, showing that consumers in Sweden paid a considerable premium for this label. *Ceteris paribus*, the presence of the Fair Trade label on the package increased the price of an "average grade" of coffee by 38 percent. This is an estimate much higher than those resulting from the case studies in Italy and the UK. The studies by Maietta (2003) and Galarraga and Markandya (2004) identified premia of 9 percent and 11.26 percent, respectively. However, the fact that the UK study did not distinguish between Fair Trade and organic labelling has to be accounted for, and hence the results are not directly comparable in this respect. Moreover, both the UK and the Italian study used data ranging from 1997-2002, while the Swedish data was a lot more recent. It is likely that the market for labelled coffee and the degree of consumer awareness have grown in the meantime, which probably has had an affect on the retail sector's pricing policy.

An interesting additional aspect to note in this respect concerns the number of Fair Trade labelled coffee varieties marketed in Sweden. This number has increased notably over the 2005-2008 period, i.e. the timeframe covered in this study. There has been extensive coverage of related issues in the media and a "Fair Trade Fokus" campaign in 2007, as pointed out above. At the same time, market leading brands were becoming more and more active in launching labelled varieties. This suggests a link between increased marketing and image building campaigns and the high premium that has to be paid for labelled coffee. Particularly in the case of Sweden where consumers are

arguably positive towards ethical consumption and active in the field of political consumerism, one may wonder how much market share is lost for Fair Trade coffee because of the high premium that has to be paid for it at the moment. However, a closer investigation of the retail sector's pricing strategies with regard to labelled products is beyond the scope of this paper but certainly warrants further future research.

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APPENDIX 1   FURTHER TABLES

Table 5   List of brand dummies included in the sample.

Brand dummies:	
D_geva	D_kyrk
D_blaa	D_ft
D_max	D_kett
D_zoe	D_cors
D_loef	D_oxf
D_class	D_bki
D_ica	D_drie
D_euro	D_folk
D_signum	D_naji
D_extra	D_lyx
D_aengl	D_kaba
D_blvi	D_mina
D_odef	D_colc
D_eldo	D_serv
D_will	D_idee
D_hem	D_urte
D_gode	D_kung
D_spar	D_mara
D_lind	D_bos

Table 6   Comparison of parameter estimates for main variables under three models (selected variables only).

Variable	Model 1 (log(pr))			Model 2 (linear)			Model 3 (4th root transf.)		
	Est.	St.err.		Est.	St.err.		Est.	St.err.	
Const.	4,157	0,060	**	67,992	4,187	**	16,998	1,047	**
Fair	0,323	0,040	**	21,712	4,292	**	5,428	1,073	**
Krav	-0,151	0,030	**	-7,675	2,422	**	-1,919	0,61	**
Eco	0,09	0,024	**	1,961	1,850		0,49	0,46	
Cook	-0,05	0,020	*	-4,054	1,188	**	-1,014	0,30	**
D_geva	-0,215	0,057	**	-13,342	3,718	**	-3,335	0,93	**
D_blaa	-0,131	0,055	*	-10,629	3,640	**	-2,657	0,91	**
D_max	-0,213	0,076	**	-13,932	4,130	**	-3,483	1,03	**
D_zoe	-0,206	0,055	**	-14,28	3,534	**	-3,57	0,88	**
D_loef	-162	0,057	**	-5,957	4,092		-1,489	1,02	
D_class	-0,269	0,057	**	-17,199	3,610	**	-4,3	0,90	**
D_ica	-0,385	0,054	**	-22,043	3,536	**	-5,511	0,88	**
Orig	0,088	0,019	**	3,548	1,212	**	0,887	0,30	**
Decaf	0,336	0,051	**	19,64	2,810	**	4,91	0,70	**
Mork	0,101	0,018	**	5,004	1,177	**	1,251	0,29	**

* statistically significant at the 5 percent significance level.

** statistically significant at the 1 percent significance level.

Standard errors are Newey-West standard errors

3 PAPER 2: IS IT ALL ABOUT ATTITUDES AFTER ALL? EMPIRICAL EVIDENCE ON THE FACTORS MOTIVATING ORGANIC CONSUMPTION IN THE UK

3.1. Introduction

After the turn of the century, the market for organic food in the EU has been growing at a fast pace, especially in the pre-crisis period up to 2008. But despite strong growth rates, the organic sector corresponded to only 1.9% of household food expenses in the EU-15 in 2006/2007 (European Commission, 2010). These figures underline the continued need to analyze which factors prevent demand from expanding further. Particularly puzzling in this respect is the fact that stated positive consumer attitudes towards organic products do not consistently translate into buying behaviour (Pelsmacker et al., 2005; Starr, 2009). This behaviour gap is often referred to as attitude-behaviour gap in economic studies on ethical purchasing behaviour (Pelsmacker et al., 2005). Several possible explanations for this phenomenon have been put forward, ranging from price-related factors (Mahenc, 2007; Plassmann and Hamm, 2009; Smith et al., 2009) to the research design in the field of stated preferences (Pelsmacker et al., 2005). Still, no comprehensive explanation has been formulated, and there is a lack of goal-oriented suggestions of how to address the issue from a policy point of view.

Closely linked to the issue of organic food is the use of labelling in environmental policy-making. Labelling plays an important role with regard to the market for organic products as a means to overcome market inefficiencies caused by dysfunctional information flows (Teisl and Roe, 1998). Consumers face a certain information environment available to them as far as the different intrinsic attributes of food products are concerned. The consumer can learn about the quality level of the attribute in question before purchasing it (search goods), after purchase (experience goods), or not at all (credence goods) (Grolleau and Caswell, 2006). Organic food is hence a credence good, the consumer is not able to ex-post verify the greenness of the good (Schumacher, 2010). Labelling schemes for organic food can help consumers to differentiate between products ("organic" and "conventional"), provide reliable information (in the case of independent third-party certification), and reduce informational asymmetries (Schumacher, 2010). An ideal scheme would transform the credence attribute into a search attribute (Grolleau and Caswell, 2006). Labelling may further be employed to deal with production externalities, i.e. when individual consumption decisions affect social welfare differently than they affect individual welfare (Golan et al., 2001). Consumers willing to pay for the positive externalities of organic production are theoretically enabled to do so by labelling schemes.

However, economic theory identifies a number of policy tools that may be more suited to redressing externalities and information asymmetries than information provision (Golan et al., 2001). These include bans, production regulations or standards, and taxes. All these policy tools may be more efficient in adjusting consumption and production to socially optimal levels than labelling schemes (Golan et al., 2001). Accordingly, the question when labelling is an appropriate policy tool has received considerable attention. This will not be further elaborated here, but a few aspects make labelling particularly appealing with regard to organic food. Labelling may be preferable to other policy tools when consumer preferences differ widely with regard to product characteristics. Consumers arguably have very different preferences

concerning organic food, some may care about organic production methods, others may not (Golan et al., 2001). With labelling, consumer choices can be more in line with preferences. Moreover, it is not a trivial task to design regulation that truly reflects widespread public interest. In many regulatory policy debates, there is little consensus on the appropriate regulatory response. Some groups may advocate production regulation, while others may favour no government intervention at all. Labelling may represent not only the best compromise solution but also the path of least resistance (Golan et al., 2001).

This paper attempts to add to explaining and closing the behaviour gap described above by focusing on the theoretical determinants for the demand side for organic products. Contrary to this approach, most studies concerned with the market impact of quality labelling have focused on analysing supply side factors (Schumacher, 2010). A common analytical approach in the related literature has been to treat labels as a form of vertical production differentiation that makes quality competition among firms possible and is modelled as another stage in prior to price or output competition in a multi-stage game (Baksi and Bose, 2007). As far as the consumer side is concerned, a lot of research has been conducted on consumer acceptance and perception of organic food in recent years (Leire and Thidell, 2005). Studies often rely on stated preferences to elicit willingness to pay (WTP) for organic food (Krystallis and Chryssohoidis, 2005; Didier and Lucie, 2008; Griffith and Nesheim, 2008; Cicia et al., 2009; Kalogeras et al., 2009), or attempt to explain purchasing behaviour (Verhoef, 2005; Gerlach et al., 2006; Bunte et al., 2007).

This paper presents a model of demand for labelled goods which takes into account that the product with the organic claim is of credence nature to the consumer who faces uncertainty with regard to the true adherence to organic production and the actual environmental impact of the product. The impact of consumer consciousness, availability of organic products, as well as quality of the labelling scheme are analyzed based on a framework developed by Schumacher (2010). Findings show that demand for the labelled organic product increases with more aware consumers, improved label credibility, and a wider distribution of organic products. To test these results empirically, UK micro-level data on public attitudes and behaviour toward the environment from 2007 are used in the framework of logistic regression analysis. It is analyzed which factors have a significant impact on respondents' buying organic products on a regular basis. The UK as one of the four largest organic markets in the EU serves as a representative example here, but findings have implications for other markets as well.

This paper is organized as follows. Section 2 discusses determinants of consumer demand for organic food and presents the theoretical model. Section 3 focuses on the empirical analysis, while Section 4 summarizes findings and concludes the paper.

3.2. Determinants of consumer demand for organic food

3.2.1. Contextual barriers to purchasing organic food

Research in environmental psychology stresses the existence of different channels impacting on consumer behaviour. Barriers to or facilitators of a given behaviour can be either personal or contextual (Tanner and Wölfing Kast, 2003; Steg and Vlek, 2009). In particular, existing contextual barriers embedded in the social, economic, or physical

environment within which the individual acts can prevent pro-environmental attitudes from translating into action (Tanner and Wölfing Kast, 2003). The actual availability of organic food can easily act as such a barrier, despite the fact that numerous organic products are sold in different kinds of retail outlets nowadays (Pearson and Henryks, 2008). Traditionally, the market for organic food was characterized by short supply chains, the major share of sales took place via direct selling activities (Pearson and Henryks, 2008). Limited availability of these products often still implies additional cost and effort for purchasing the desired items, despite a clear increase in corporate and retail sector marketing activities aimed at promoting this addition to the product range (Belz, 2003). With the trend of conscious consumerism spreading in society, vertical product differentiation to cover environmental aspects became more profitable for a wider range of actors in the food industry as they could expect growing demand for these products (Belz, 2003). Early movers in terms of product differentiation could further enjoy benefits form monopolistic competition because market entry for other firms would first require considerable product and process adjustments. Still, in many instances, more time has to be invested for collecting information about where to shop organic food (Starr, 2009).

High price premiums are often cited as another barrier to consuming organic food (Pelsmacker et al., 2005; Plassmann and Hamm, 2009). Organic products are generally more expensive than comparable conventional products. The price premium varies with organic food product and is inherent to the additional costs involved at all stages in the organic supply chain (Pearson and Henryks, 2008). However, this may partly be explained by firms using the market power gained by quality differentiation via the labelling scheme (Bottega et al., 2009). The link between price (perception) and its influence on consumer behaviour is complicated. For some consumers attaching luxury or status considerations to organic food, higher prices may signal higher quality and credibility as far as the organic claim is concerned (Pearson and Henryks, 2008). Mahenc (2007) shows that in cases where consumers cannot ascertain the actual environmental quality of the good, prices must be distorted upwards to signal quality.

Many consumers appear to be relatively insensitive to price premiums for low-priced and small-quantity items, while they are more sensitive to price changes for higher value and volume products (Pearson and Henryks, 2008). Food consumption mostly concerns relatively low-involvement goods, so that buying behaviour is often guided by habits (Pelsmacker et al., 2005; Steg and Vlek, 2009). This is in line with the findings from a study of WTP for Fair Trade labelled coffee in Belgium that found the brand attribute to be of highest relative importance to consumers in a multi-attribute choice situation (Pelsmacker et al., 2005).

3.2.2. *Consumer consciousness*

Many economic studies on ethical purchasing behaviour focus on attitudes as the motivating factor behind ethical purchasing behaviour. Contrary to this, research in the field of environmental psychology on the impact of attitudes on behaviour has shown rather disappointing results over the past decades. The direct empirical relationship between these variables appears to be moderate to low (Bamberg, 2003). General attitudes, such as environmental concern, do not influence specific behaviours directly. Moreover, the association between the attitude and the object representation has to be strong enough for the attitude to have at least an indirect effect on behaviour via its impact on situation-specific evaluation of individual behaviour (Bamberg, 2003). Attitude strength comprises several dimensions, e.g. attitude importance, attitude

accessibility and attitude extremity (Doorn et al., 2007). The dimension of attitude extremity generally plays a key role in conceptions of attitude strength and has proven to be a reliable predictor of behaviour (Doorn et al., 2007).

Attitude itself is not necessarily formed by the utility paradigm, but an explanation for attitude-related behaviour can still be based on behavioural theory. Not much utility is attached to compliance or non-compliance with weak or moderate attitudes, they are of minor importance in the decision-making process. In this "zone of indifference", behaviour is guided by costs and benefits not related to the attitude (Doorn et al., 2007). Only "extreme" attitudes will guide behaviour, the relationship between attitudes and attitude-related behaviour hence is non-linear (Doorn et al. 2007). Once a certain threshold is crossed, perceived costs are exceeded by perceived benefits and attitudes play a crucial role in the cost-benefit analysis of behavioural alternatives (Doorn et al., 2007).

3.2.3. Labelling quality and credibility

As mentioned above, consumers do not have the perception that existing organic and environmental labelling schemes are functioning perfectly or fully reliable. Repeated occurrences of scandals in the organic food industry have led to scepticism towards organic labelling among a considerable share of consumers (Hamilton and Zilberman, 2006). The difficulties consumers experience in case of insufficient, unreliable labelling can work as market barrier for organic products. Despite the rather recent introduction of a harmonized EU-wide organic label, there is still a multiplicity of labels used in most EU-countries, which complicates the situation for the consumers (Wier and Calverley, 2002). These facts may explain parts of the low market shares for organic products. Consumers may not be willing to pay the current price premiums for organic products because of their perception that the respective label is not trustworthy enough, or because of a lack of knowledge and understanding of the actual meaning and content of the label. Consumers are not convinced that additional expenses contribute to improving or maintaining environmental quality. This may be the case even if the consumer *in general* has a positive image of organically produced goods.

3.2.4. A theoretical model

Based on the points raised above, a model of demand for goods with an organic label taking is presented in the following, taking into account the impact of consumer consciousness, availability of organic products, as well as quality of the labelling scheme.

Consider a representative consumer who maximizes utility by choosing quantities of a commodity differentiated by its organic vs. conventional quality produced by M firms. The true quality type is private information to the firms and cannot be observed by consumers in the absence of labelling. To obtain a label signalling adherence to a defined minimum standard with regard to organic production, a firm may voluntarily undergo a costly auditing process. So consumer choice is between a labelled variety L and an unlabelled, conventional variety X. It is further assumed that this auditing process is imperfect and can be manipulated to some degree. Consumers know about this imperfection and that there is some probability that even a labelled product was not produced according to the respective label's standards. In the following, this uncertainty is captured by a probability function. The consumer believes that with a

probability q∈(0,1), a labelled product is fully adhering to the standards claimed, while he attaches a probability of (1-q) to the possibility that the product in question possesses some hidden characteristics.

Labelled and unlabelled products are assumed to differ only with regard to the organic production attribute. Thus, X and L are perfect substitutes with respect to the "pure" consumption value they provide. Consumer utility is additive in sub-utility from this "pure" consumption and the extra private benefits to be gained from consuming an organically produced product.

The representative consumer's utility is then given by

$$U(X+L)+qf(\alpha,\theta,\gamma)U(L)+(1-q)f(\alpha,\theta,\beta\gamma)U(L)\,, \tag{1}$$

where $f(\alpha,\theta,\gamma)\geq 1$ is a weighting function to capture the additional utility a consumer attaches to an organic product as introduced by Schumacher (2010). The private benefits are assumed to depend on the consumer's attitude towards organic food and agriculture, $\alpha\geq 0$, the availability of the labelled product, hence the ease with which the consumer can opt for the organic variety, $\theta\geq 0$, and the product's expected greenness, $\gamma\geq 0$. A higher γ is equivalent to a more environmental-friendly good. It is assumed that $f_\alpha>0$, $f_\theta>0$ and $f_\gamma>0$. As mentioned, the consumer attaches a probability of (1-q) to the possibility that the product is not being truthfully organic. In this case, the consumer weighs utility by $f(\alpha,\theta,\beta\gamma)$, with $\beta\in(0,1)$. For $\beta=0$, the consumer learns that the product has some important non-organic characteristics that make it equivalent to the conventional, unlabelled product. The closer β is to one, the less the consumer's welfare is affected by "dirty" traits in the product. For example, there could be a number of media reports informing consumers that hens employed in the production of organic eggs sometimes receive conventional food on larger farms that have a parallel production of non-organic eggs. The consumer may then doubt label reliability and has to evaluate how much his welfare is affected by this possibility. Furthermore, let the first and second partial derivatives of $U(X+L)$ be given by $U_1>0$ and $U_{11}<0$. Marginal utility of "pure" consumption of the differentiated good is independent of which variant is consumed. Let further the first and second derivative of $f(\cdot)U(L)$ w.r.t. L be given by $f(\cdot)U_L>0$ and $f(\cdot)U_{LL}<0$.

The representative consumer maximizes (1) by choosing quantities L and X subject to the budget constraint $p_xX+p_lL=Y$, where p_x and p_l are the respective prices of the unlabelled and the labelled variant, and $Y>0$ is consumer income. It is assumed that $p_l>p_x$ throughout.

Optimal consumer choice is characterized by the following first order condition:

$$-U_1\frac{p_l}{p_x}+U_1+qf(\theta,\alpha,\gamma)U_L+(1-q)f(\theta,\alpha,\beta\gamma)U_L=0 \tag{2}$$

The second order condition is:

$$\Psi = U_{11}(\frac{p_l}{p_x})^2 + U_{11} + qf(\theta,\alpha,\gamma)U_{LL} + (1-q)f(\theta,\alpha,\beta\gamma)U_{LL} < 0 \tag{3}$$

It can easily be shown that in the model above, increases in consumer consciousness, improved availability of credibly labelled alternatives (and a related increase in marketing activities aimed at their promotion), as well as improving the monitoring of labelling credibly all increase the amount of the organic product consumed and decrease consumption of X, the conventional alternative. To see this, take the total derivative of (2) and re-write for the respective changes:

$$\frac{dL}{d\alpha} = -\frac{qf_\alpha(\theta,\alpha,\gamma) + (1-q)f_\alpha(\theta,\alpha,\beta\gamma)}{\Psi} * U_L > 0 \tag{4}$$

$$\frac{dL}{d\theta} = -\frac{qf_\theta(\theta,\alpha,\gamma) + (1-q)f_\theta(\theta,\alpha,\beta\gamma)}{\Psi} * U_L > 0 \tag{5}$$

$$\frac{dL}{d\gamma} = -\frac{qf_\gamma(\theta,\alpha,\gamma) + (1-q)\beta f_\gamma(\theta,\alpha,\beta\gamma)}{\Psi} * U_L > 0 \tag{6}$$

$$\frac{dL}{d\beta} = -\frac{(1-q)\gamma f_\beta(\theta,\alpha,\beta\gamma)}{\Psi} * U_L > 0 \tag{7}$$

and

$$\frac{dL}{dq} = -\frac{f_\gamma(\theta,\alpha,\gamma) - f_\gamma(\theta,\alpha,\beta\gamma)}{\Psi} * U_L > 0, \tag{8}$$

because f(θ,α,γ) > f(θ,α,βγ).

In all cases, we get $p_l dL + p_x dX = 0$ from the budget constraint, so that

$$\frac{dX}{dL} = -\frac{p_l}{p_x} < 0. \tag{9}$$

Based on the reasoning in previous sections and the model discussed, one would hence expect that relatively highly aware consumers facing credible labelling and a satisfactory availability of organic products are likely organic consumers. In the following, the question which factors explain people's buying behaviour will be approached empirically.

3.3. Empirical investigion

3.3.1. The organic market in the UK

The UK is one of largest organic markets in the EU. In 2006, it was the third largest market after Germany and Italy, according to the Organic Market Report 2007 (Soil Association, 2007). Up to 2005, the UK had the most rapidly growing market for organic products, estimated at around £3.1 billion in 2007 (Michaelidou and Hassan, 2010). Traditionally, British governments' engagement with the organic market has rested on the notion that state intervention should be based on consumer demand and not on creating it (Daugbjerg and Søderskov, 2012). In contrast to many other European countries, organic agriculture in the UK therefore has received very little direct government support. The Organic Aid Scheme introduced in 1994 was the first of its kind and had only marginal impact during its first years (Lactasz-Lohmann and Foster, 1997). Because of a slow conversion rate of agricultural land to organic farming a new conversion scheme with more generous conversion subsidies was introduced to create an incentive for farmers to respond to growing demand for organic food. Permanent organic subsidies were introduced in 2003 (Daugbjerg and Søderskov, 2012).

As far as demand-side policies are concerned, in 1987 the UK government established the Register of Organic Food Standards (UKROFS) which would from then on be in charge of defining government baseline organic standards and of monitoring certification bodies (Daugbjerg and Søderskov, 2012). The basic aim was to ensure that various bodies which register and inspect organic farmers and processors properly apply regulation (Jones et al., 2001). These functions were later subsumed by the Department for the Environment, Food and Rural Affairs (DEFRA) in 2003 (Daugbjerg and Søderskov, 2012). The most important certifying institution in the UK is the Soil Association which certifies about 80 percent of all organic food being sold in the UK (Daugbjerg and Søderskov, 2012).

In the early 1990s the organic food sector was estimated to account for 0.11 percent of the total food and drinks retail market. Between 1990 and 1995, organic sales more than doubled but still only represented 0.3-0.4 percent of the total market (Lactasz-Lohmann and Foster, 1997). Limited availability and a lack of supply were among the major obstacles preventing further market development (Lactasz-Lohmann and Foster, 1997).

In early surveys, consumers cited concern about health and safety of food as primary reasons for purchasing organic food (Lactasz-Lohmann and Foster, 1997). UK consumers appeared rather unwilling to pay a premium for organic production methods. In a 1995 survey, more than 50 percent of the respondents were unwilling to pay more for organic food (Lactasz-Lohmann and Foster, 1997). Another survey conducted in 1993 even concluded that one of the major factors keeping consumers from purchasing organic food was a lack of "perceived value" (Lactasz-Lohmann and Foster, 1997).

The UK witnessed a strong growth in the demand for and sale of organic products in the later half of the 1990s. Estimates of retails growth suggest an increase of retail sales of organic food and non-alcoholic drinks from £121 million in 1994 to £770 million in 2000 (Jones et al., 2001). Padel and Foster (2005) identify three main factors that have driven growth of the organic sector in Great Britain after 1995, (i) growing consumer

interest, (ii) the key role of the retailers and especially the multiples, and (iii) the financial conversion support available to producers. Personal health has been found to be a continuous source of motivation for buying organic food in a number of surveys, but altruistic motives appear to become more important after the turn of the century. The absence of major food scares during the same period of time has led consumers to attach less importance to this driver of behaviour that used to be more influential in earlier decades (Padel and Foster, 2005).

While the market for organic food clearly was a niche market in earlier decades, it moved to a much more mainstream position in the later half of the 1990s. Initially, most retail activity in this sector took place in small, locally-based shops (Jones et al., 2001). However, larger supermarkets started engaging in the organic market early on. The first supermarket chain introduced organic food in 1981 and by 1989, all supermarket chains in the UK were stocking organic products (Lactasz-Lohmann and Foster, 1997). Small, specialist organic retailers continue to be of importance, but multiple grocery chains started dominating the market after 1995. Shortly after the turn of the century, the market share of the large grocery chains in the organic market already amounted to about 70 percent (Jones et al., 2001).

The highest availability of organic food is concentrated in southern England and tends to be more limited in other regions (Padel and Foster, 2005). Accordingly, the 2007 Organic Market Report found consumers living in London, the Southeast, the Southwest and Wales to be by far most likely to buy organic food and drink. On the other hand, consumers in the East Midlands and Scotland were least likely to purchase almost any type of organic food or drink (Soil Association, 2007).

Sales continued to grow in 2008 and 2009 even in the times of economic crisis (Soil Association, 2009), but the market was down by 3.7 percent in 2011 as the economic downturn continued (Soil Association, 2012). As this paper is restricted to the use of data dating from 2007, the effects of the economic crisis on the organic sector are not given more attention at this point. However, this is an interesting point for investigation in future research.

3.3.2. Data

To approach the question what motivates consumers to buy organic products in Great Britain, micro-level survey data collected in the frame of the UK's Department for Environment, Food and Rural Affair's (Defra) 2007 *Survey of Public Attitudes and Behaviours toward the Environment* provided by the Economic and Social Data Service/UK Data Archive (data-archive.ac.uk) were used for analysis. The survey contains data on a representative sample of 3,600 individuals in England aged 16+. It was administered on behalf of Defra by the British Market Research Bureau. The survey was conducted in 45-minute face-to-face interviews at the respondents' homes.

In the survey questionnaire, respondents were asked whether they/their household were buying organic products on a regular basis. The information is provided on a "yes/no" basis so that the resulting dependent variable *buyer* for the econometric analysis is binary, coded "1" if a respondent was buying organic products, and "0" if the respondent was not buying this kind of product regularly. As shown in Table 1 below, about a third of the respondents in the survey declared they were buying organic products regularly. This pattern is very similar across all age groups.

Table 1. Percentage of respondents buying organic products on a regular basis, by age group.

	N	%
All respondents (total N=2381)	804	33.77
By age group		
16-29	172	37.07
30-40	184	32.17
41-50	163	35.51
51-64	168	32.31
65+	117	31.97

The data at hand contain a number of variables that could potentially be used as explanatory variables in the analysis. After thorough inspection and attempting to be in line with the theoretical considerations lined out in this paper, variables focusing on various aspects of consumer consciousness, perceived contextual barriers to organic consumption, and labelling quality and credibility were chosen for the analysis. The last point, labelling quality, was hardest to assess based on the data at hand, as will be pointed out below. With regard to the two first points, data on individual attitudes towards environmental issues and purchasing behaviour, as well as the level of agreement with pre-formulated statements concerning reasons for not engaging in the consumption of organic products could be employed. Further, a range of personal and demographic factors was included as control variables.

To start with variables related to consumer consciousness, the survey comprised several questions related to individual agreement with statements to do with energy, recycling and food purchasing. These statements were checked for relevance to the issues under investigation and operationalized as follows. The variable *check_grow* is based on agreement with the statement "I make a point of checking where fruit and vegetables were grown before I buy them", with agreement being measured on a 5-point scale (1=totally disagree, 2=tend to disagree, 3=neither agree nor disagree, 4=tend to agree, 5=totally agree). This variable, as well as the following two, can be seen as a measure of awareness as far as matters of food production are concerned. One would expect that higher levels of agreement with the statements in question increase the likelihood of buying organic products. In line with this, the variable *local* is based on agreement with the statement "I make an effort to buy from local producers", and the variable *comp_ethics* on the statement "I try not to buy products from a company whose ethics I disagree with". Both are coded in the same way as *check_grow*. The same applies to the variable *pay_more* which is based on the statement "I would be prepared to pay more for environmentally friendly products", i.e. a general willingness to pay more statement.

Respondents' attitude towards the environment in general (*env_att*) was measured by a variable based on the statement "The environment is a low priority for me compared with a lot of other things in my life", with coding according to the 5-point scale

introduced above. The same coding applies to the variable *habits* which is based on agreement with the statement "I find it hard to change my habits to be environmentally friendly". The variable *veg* is a dummy variable coded "1" if a respondent was a vegetarian.

As far as variables related to potential contextual barriers to organic consumption are concerned, the survey contained a question on what stopped respondents from making more environmentally-friendly choices in the food and groceries they bought. Several factors were suggested one by one and had to be answered with "yes" or "no". The ones selected for this study and included as dummy variables are *too_expensive*, *bad_quality*, *not_available*, *too_much_effort*, *not_enough_time*, *dont_thinkabout*, *convenience, not_interested* (each coded "1" if the answer was "yes" and "0" if the answer was "no"). The last variable arguably is a border case and could be counted in the range of awareness variables.

The only information on perceived labelling quality and informativeness to be gained from the data at hand is also based on the question just discussed on the factors keeping people from making more environmentally-friendly food choices. The variable *not_enough_labelling*, also included as a dummy, captures respondents' feeling that a lack of labelling and information prevents them from changing their shopping behaviour accordingly. It would have been highly interesting to include information on the perception of label trustworthiness had the lack of data not prevented this.

Moreover, a range of control variables was included in the analysis. Gender is included as a dummy coded "1" for female. Furthermore, the level of education attained is part of the analysis. The levels used are higher education, General Certificate of Secondary Education (GCSE) to higher education, and education below GCSE level. A dummy variable coded "1" if the respondent was currently employed at the time of the survey captures working status. The age of the respondents is only available sorted by group from the data at hand. It is therefore entered as a set of dummy variables reflecting 5 age groups. Household income is available coded in 15 categories from the dataset. However, closer inspection of the data revealed a strong correlation between household income and social class. It was eventually decided to include a social class variable (*soc_gr*) in the final empirical specification. This was due to the fact that household income ceased to be statistically significant in any test specification, even in the absence of social class, and model fit analysis using Bayesian information criterion (BIC) comparison strongly supported an inclusion of social class instead of household income. Furthermore, social class, while mirroring household income, supposedly adds yet another perspective, as class position has been found to also be connected to a certain habitus and taste (Koos, 2011). The variable is built on 6 occupational categories entered as dummy variables. Additionally, ethnicity is accounted for by 4 dummy variables. Finally, region dummies (North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West) are included. Table 2 below summarizes the variables used.

Table 2. List of variables.

Variable		Mean (SD)
check_grow	" I make a point of checking where fruit and vegetables were grown before I buy them"; scale 1-5 (check_grow1-check-_grow5)	3.03 (1.23)
Local	"I make an effort to buy things from local producers"; scale 1-5 (local1-local5)	3.41 (1.13)
comp_ethics	"I try not to buy products from a company whose ethics I disagree with"; scale1-5 (comp_ethics1-comp_ethics5)	3.51 (1.15)
pay_more	"I would be prepared to pay more for environmentally friendly products"; scale 1-5 (pay_more1-pay_more5)	3.72 (1.06)
too_expensive	What stops you from making more environmentally-friendly choices in the food and groceries you buy?-"Too expensive"; 0=no 1=yes	0.5 (0.50)
bad_quality	What stops you from …-"Not such good quality"; 0=no 1=yes	0.05 (0.21)
not_available	What stops you from …-"Not available where I shop"; 0=no 1=yes	0.13 (0.34)
not_enough_labelling	What stops you from …-"Not enough labelling/information"; 0=no 1=yes	0.10 (0.29)
too_much_effort	What stops you from …-"Too much effort"; 0=no 1=yes	0.04 (0.19)
not_enough_time	What stops you from …-"Not enough time"; 0=no 1=yes	0.06 (0.23)
not_interested	What stops you from …-"Don't see the point/not interested"; 0=no 1=yes	0.02 (0.12)
don't_thinkabout	What stops you from…-"just don't think about it" ; 0=no 1=yes	0.12 (0.32)
convenience	What stops you from …-"Convenience"; 0=no 1=yes	0.01 (0.08)
Veg	Would you describe yourself as a vegetarian or a vegan?; 0=no, 1=yes	0.10 (0.30)
Habits	"I find it hard to change my habits to be more environmentally-friendly"; scale 1-5 (totally disagree-totally agree) (habits1-habits5)	2.86 (1.08)
env_att	"The environment is a low priority for me compared with a lot of other things in my life"; scale 1-5 (totally disagree-totally agree) (env_att1-env_att5)	2.68 (1.12)
Gender	0=male, 1=female	0.53 (0.50)
Education	below GCSE-level, GCSE to higher education, higher education	2.06 (0.74)
work_status	0=unemployed, 1=employed	0.60 (0.49)
age_group	Age of respondent; five groups: 16-29, 30-40, 41-50, 51-64, 65+ (age_group1-age_group5)	2.90 (1.36)
soc_gr	Social class of respondent according to six occupational classes (soc_gr1-soc_gr6)	3.40 (1.40)
Ethnic	Ethnicity of respondent; four groups: White, Mixed, Asian, Black (ethnic1-ethnic4)	1.20 (0.68)
regional dummies	1= London, 2=N East, 3=N West, 4=Yorkshire/the Humber, 5=East Midlands, 6=West Midlands, 7=East of England, 8=S East, 9=S West	5.17 (2.65)

3.3.3. *Model and analysis*

Owing to the binary nature of the dependent variable, logistic regression was employed to examine the probability of being a buyer of organic food as a function of the variables discussed in the previous section. The logistic regression model applies maximum likelihood estimation after the transformation of the dependent variable into a logit variable. A logit is the log of the odds ratio. All estimation procedures in the frame of this study were undertaken using STATA 10.

Using the logistic regression model, the probability of a certain event occurring (in our case the buying of organic food) is estimated. This probability is defined as:

$$P_i = P(Y_i = 1 \mid X_i) = E(Y = 1 \mid X_i) = \frac{1}{1 + e^{-(\alpha + \beta X_i)}} = \frac{1}{1 + e^{-Z_i}} \tag{12}$$

that denotes the impact of the independent variables on the probability of being a non-buyer. The logistic distribution function, $P_i = \dfrac{1}{1 + e^{-Z}}$, ranges between 0 and 1. This guarantees that P_i can be interpreted as a probability for every estimated X_i, i.e. it fulfils the requirement $0 \le E(Y_i \mid X_i) \le 1$ (Greene, 2008).

The logit model for estimation purposes is specified as follows, so that it is linear in X_i and β:

$$\ln\left(\frac{P_i}{1 - P_i}\right) = \alpha + \sum_j \beta_j X_{ji} + \varepsilon_i \tag{13}$$

where the dependent variable is the logarithm of the odds ratio of non-buying and ε_i is the stochastic disturbance term; α and β are regression coefficients, X_{ji} are explanatory variables. Estimated parameters β give the change in the log of the odds ratio per unit change in the respective explanatory variable.

The empirical model was estimated using all explanatory variables described above. After final cleaning of the data, 2,381 observations remained in the analysis. Model fit was assessed using both Pearson's Chi-Square statistic and the Hosmer and Lemeshow test; both tests indicated that the model appears to adequately fit the data. McFadden's Pseudo-R2 was 0.09, Cox and Snell's R2 amounted to 0.14, Nagelkerke's R2 was 0.20. Concentrating on the predictive power of the fitted model, calculating classification tables showed that the model correctly classified 71.23 percent of cases. Additionally, predictive power was evaluated by calculating the area under the receiver operating characteristic (ROC) curve. The ROC curve is a plot of sensivity versus (1-specifity)[3]. If this area reaches one, the model is perfectly specified. For the model at hand the area under the ROC curve was 0.727. Taken together, it can be stated that the model appears

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[3] Sensivity is defined as the proportion of observations correctly classified as an event (the true positive fraction). Specificity is defined as the proportion of observations correctly classified as a nonevent (i.e. (1-specificity) is the proportion of observations misclassified as an event or the false positive fraction) (Peng and So, 2002).

to fit the data well and is suited for the analysis. Moreover, multicollinearity was investigated and does not seem to pose any major problems for the model. Mean Variance Inflation Factor (VIF) was 1.4 and none of the variables reached any critical value in terms of individual VIF.

3.3.4. *Results*

The results obtained from the logistic regression model specified above are reported in Table 3 below. Coefficients, odds ratios and marginal effects, i.e. changes in the predicted probability of buying organic food corresponding to a one unit change in each independent variable, are reported. With logit regression, it has to be borne in mind that the regression coefficients cannot be interpreted directly, only their sign and significance The following discussion will therefore concentrate on changes in probability and the odds ratios, i.e. the exponentiated logistic regression coefficients. These are equal to one when there is no effect, larger than one in case of a positive effect and less than one if there is a negative effect.

Table 3. Results from the binary logit model.

Independent Variables	Coefficient	Odds Ratio	Marginal effects
Attitudes			
check_grow2[a]	-0.06 (0.19)	0.94 (0.18)	-0.013
check_grow3	-0.05 (0.20)	0.95 (0.19)	-0.010
check_grow4	0.51*** (0.20)	1.67*** (0.33)	0.115
check_grow5	0.82*** (0.22)	2.27*** (0.49)	0.191
local2[b]	0.29 (0.28)	1.34 (0.37)	0.065
local3	0.42 (0.27)	1.52 (0.41)	0.093
local4	0.75*** (0.27)	2.12*** (0.57)	0.167
local5	0.83*** (0.28)	2.29*** (0.64)	0.191
comp_ethics2[c]	-0.21 (0.26)	0.81 (0.21)	-0.043
comp_ethics3	-0.07 (0.23)	0.94 (0.21)	-0.015
comp_ethics4	0.01 (0.22)	1.01 (0.23)	0.002
comp_ethics5	0.36 (0.23)	1.43 (0.33)	0.079
pay_more2[d]	-0.13 (0.30)	0.88 (0.26)	-0.027
pay_more3	-0.22 (0.27)	0.80 (0.21)	-0.046
pay_more4	-0.21 (0.26)	0.82 (0.21)	-0.044
pay_more5	-0.19 (0.26)	0.82 (0.22)	-0.041
env_att2[e]	0.23 (0.16)	1.26 (0.19)	0.050
env_att3	-0.03 (0.17)	0.97 (0.16)	-0.006
env_att4	-0.13 (0.18)	0.88 (0.16)	-0.028
env_att5	-0.48* (0.29)	0.62* (0.17)	-0.094
habits2[f]	-0.25 (0.18)	0.78 (0.14)	-0.054
habits3	-0.26 (0.20)	0.77 (0.16)	-0.054
habits4	-0.21 (0.19)	0.81 (0.16)	-0.044
habits5	-0.26 (0.31)	0.77 (0.23)	-0.054
Veg	0.54*** (0.15)	1.72*** (0.26)	0.125
Contextual barriers			
too_expensive	-0.23** (0.11)	0.80** (0.08)	-0.048
bad_quality	-0.03 (0.23)	0.97 (0.23)	-0.006

not_available	0.24* (0.14)	1.27* (0.18)	0.053
too_much_effort	-0.01 (0.24)	0.99 (0.23)	-0.002
not_enough_time	0.10 (0.20)	1.11 (0.22)	0.022
dont_thinkabout	-0.30* (0.17)	0.74* (0.13)	-0.061
Convenience	0.53 (0.53)	1.70 (0.89)	0.123
not_interested	-1.65*** (0.54)	0.19*** (0.10)	-0.236
Labelling quality			
not_enough_labelling	-0.08 (0.17)	0.93 (0.16)	-0.016
Control variables			
Gender	0.01 (0.10)	1.01 (0.10)	0.003
soc_gr2[g]	-0.17 (0.21)	0.84 (0.18)	-0.036
soc_gr3	-0.05 (0.19)	0.96 (0.18)	-0.010
soc_gr4	0.22 (0.19)	1.24 (0.23)	0.047
soc_gr5	0.34* (0.20)	1.41* (0.28)	0.076
soc_gr6	0.60** (0.28)	1.83** (0.51)	0.140
gsce-higher[h]	0.40*** (0.14)	1.49*** (0.21)	0.086
higher_ed	0.57*** (0.16)	1.77*** (0.28)	0.127
work_status	0.04 (0.13)	1.04 (0.13)	0.009
age_group2[i]	-0.39*** (0.15)	0.68*** (0.10)	-0.079
age_group3	-0.41*** (0.16)	0.66*** (0.10)	-0.084
age_group4	-0.65*** (0.16)	0.52*** (0.08)	-0.129
age_group5	-0.53*** (0.19)	0.59*** (0.11)	-0.104
ethnic2[j]	0.26 (0.40)	1.30 (0.52)	0.058
ethnic3	0.12 (0.24)	1.12 (0.27)	0.025
ethnic4	-0.08 (0.28)	0.93 (0.26)	-0.016
north_east[k]	-0.43* (0.26)	0.65* (0.17)	-0.085
north_west	-0.52*** (0.20)	0.60*** (0.17)	-0.102
Yorkshire	-0.58*** (0.22)	0.56*** (0.12)	-0.113
east_mid	-0.53*** (0.21)	0.59** (0.13)	-0.104
west_mid	-0.47** (0.20)	0.62** (0.13)	-0.094
east_eng	-0.11 (0.20)	0.90 (0.18)	-0.023
south_east	-0.27 (0.18)	0.76 (0.14)	-0.056
south_west	-0.17 (0.20)	0.85 (0.17)	-0.035
Constant	-0.91** (0.45)	NA	NA

LL	-1340.855
Restricted LL	-1522.602
Mc Fadden Adj. R^2	0.119
Cox and Snell R^2	0.142
Nagelkerke R^2	0.196
N=2381	
% Correctly Predicted	71.23

Note: Standard errors in parentheses.* significant at 10%; ** significant at 5%; *** significant at 1%. [a] check_grow1 is reference group; [b] local1 is reference group; [c] comp_ethics1 is reference group; [d] pay_more is reference group; [e] env_att1 is reference group; [f] habits1 is reference group: [g] soc_gr1 is reference group; [h] below_gsce is reference group; [i] age_group1 is reference group; [j] ethnic1 is reference group; [k] london is reference group. [l] Change in the predicted probability of buying organic products for an increase of one unit in each independent variable, while holding all other independent variables constant at their means.

A first thing to note is that the results given in Table 3 underscore the importance of consumer awareness with regard to matters of production. Consumers who stated that they check where products are grown before buying have a considerably higher

likelihood of being organic buyers at the higher degrees of agreement as compared to someone who does not agree with this statement. The variables *check_grow4* and *check_grow5* are highly statistically significant. A respondent with characteristic *check_grow5* is 19.1 percent more likely to buy organic products than someone who does not care about product origin. A similar effect can be seen as far as agreement with the statement that one tries to buy food that is locally produced is concerned. Again, *local4* and *local5* are highly statistically significant. "Totally agreeing" (*local5*) with the statement renders a respondent 19.1 percent more likely to buy organic as compared to someone who does not at all try to buy local. However, being concerned about company ethics (*comp_ethics*) has no significant impact. This could be due to the fact that issues related to company ethics in general apply mostly to matters of fair production, e.g. no use of child labour, and are less important in the field of organic production. Still, it seems that caring strongly about rather specific issues related to the way food items are produced are important factors in motivating the purchase of organic products. This can also be seen in the highly statistically significant impact of being a vegetarian. Someone who chooses this lifestyle is 12.5 percent more likely to buy organic. Vegetarians presumably show a greater interest in the things they eat and consume and being vegetarian is often related to a "greener" lifestyle (Lusk and Norwood, 2009). Interestingly enough, willingness to pay more does not have a statistically significant impact at any level of agreement.

Looking at the list of variables capturing potential obstacles keeping people from buying more organic products, we find that four variables are statistically significant. Claiming that a lack of availability (*not_available*) hinders more purchases actually increases the odds of buying organic food. A person agreeing with this statement is 5.3 percent more likely to be an organic buyer. An explanation for this somewhat puzzling finding could be that a lack of availability of certain products is mostly noticed by people who already buy some organic products on a regular basis. Another interesting result is the highly significant impact of the variable that captures the statement that a respondent "is not interested in/does not see the point with" this kind of product (*not_interested*). Holding this opinion reduces the probability of buying organic by 23.6 percent. In a similar manner, saying that one "just does not think about" buying environmental-friendly products (*don't_thinkabout*) makes a person 6.1 percent less likely to be a regular buyer of organic food. This again confirms the suggested importance of awareness and attitude strength.

Experiencing difficulties in changing habits to make them more environmentally friendly (*habits*) has no statistically significant effect. The same holds true for variables capturing potential additional effort and time needed to realize organic consumption (*too_much_effort* and *not_enough_time*), as well as *convenience*. Also bad quality of organic products does not appear to be an influential factor as far as buying organic food is concerned.

As far as the control variables are concerned, we find a statistically significant effect of age in the sense that belonging to any of the older age groups as compared to the youngest makes it less likely that a respondent is buying organic food. E.g., someone aged 51-64 is 12.9 percent less likely to buy organic food as compared to someone aged 16-29. On the other hand, having higher education and belonging to the two highest social classes all increase the likelihood of buying organic products. For instance, a person who is a member of the highest social class is 14 percent more likely to purchase organic food than a member of the lowest social class. Similarly, someone who has completed higher education is 12.7 percent more likely to be an organic buyer than someone whose level of education remained below GCSE level. Gender and ethnical

background are not significant. The regional impact appears to be in line with the fact that availability of organic food is concentrated in southern England and tends to be more limited in other regions (Padel and Foster, 2005), as was discussed above.

3.4. Conclusion

This paper has attempted to explore what is commonly referred to as attitude-behaviour gap in the economic literature on ethical consumption. Based on the role of labelling as policy tool to overcome information asymmetries, a model attempting to capture various determinants of the demand side for (labelled) organic products was presented, making use of findings from the field of environmental psychology in defining determinants of demand for organic food. The employed model incorporates the aspects of consumer consciousness, label quality and credibility, and product availability. Improvements in any of these fields were shown to have a positive impact on demand for the product marked organic. The example of Great Britain was used in an empirical investigation of the theoretical considerations provided.

The empirical findings support the model predictions as far as the role of consumer awareness is concerned. It appears that consumer consciousness and interest in where and how goods were produced have an impact on organic purchasing behaviour. This effect seems to be more accentuated the stronger, or more extreme, expressed attitudes are. This finding lends support to the hypothesis of a non-linear relationship between attitudes and behaviour and the importance of attitude strength as advanced by Doorn et al. (2007). More generally, this can explain how external factors, such as scandals in the food industry, can make consumers cross the attitude threshold discussed in Section 2 and temporarily increase demand for organic products. But as this temporary influence on attitude strength vanishes with decreasing public interest in a scandal, consumption patterns are likely go back to "normal" after some time.

Being indifferent towards organic and environmental-friendly food seems to be one of the strongest explanatory factors in the UK survey at hand for why people do not buy this kind of product. This is an interesting aspect considering findings from older studies pointing to a lack of "perceived value" (Lactasz-Lohmann and Foster, 1997). However, the data at hand do not show evidence of an unwillingness to pay more for environmentally-friendly food. Only 13 percent of the survey respondents claimed they were not willing to pay more for this type of food. Still, it is interesting to note that stating a positive willingness to pay more for environmentally-friendly products was not of statistical significance in the analysis. This suggests that a genuine interest in specific matters of food and production is more important than acknowledging that related products have to be more expensive because of the difference in production methods.

In interpreting the results from the analysis in this study, it might further be instructive to keep in mind the policies pursued with regard to the organic market in the UK and the fact that organic agriculture in the UK has received very little direct government support. As was noted above, British governments' engagement with the organic market traditionally rested on the notion that state intervention should be based on consumer demand and not on creating it (Daugbjerg and Søderskov, 2012). This could imply a comparatively limited role for public sector involvement and social marketing aimed at raising consumer awareness, while these factors could be important in creating the necessary level of consumer consciousness. As there are no commercial interests involved, public sector social marketing is likely to be regarded as more trustworthy than commercial marketing by consumers. It is crucial to communicate the

additional value of organic products and the reasons for reasonable price premiums to the consumer in an accessible way (Pearson and Henrycks, 2008).

Availability and other contextual barriers to consuming organic products do not seem to have been playing a crucial role for the respondents at the time of the survey used for analysis in this paper. Neither the opinion that buying organic was too time-consuming, too much of an effort, nor that it was too inconvenient had a significant impact. It can be hypothesized that the early involvement of the conventional retail sector was an important building stone for the organic market in the UK. The effect of a limited availability of organic products is to some extent mirrored in the regional effect dummies' significance. Living in parts of Great Britain other than London or the South clearly makes it less likely to buy organic food.

The data at hand did not allow for a direct evaluation of the issues of labelling quality and credibility. The only variable related to the question of whether a lack of labelling and information kept respondents from purchasing organic ceased to be of significance in the empirical investigation. However, other studies have found clear signs of consumer confusion and distrust with regard to existing labelling schemes, so that improving the quality and reliability of labelling could be a major channel with respect to closing the existing behaviour gap. Labelling can only work properly if it conveys a clear message to the consumer, and if consumers feel they can trust the authority behind the labelling scheme and the standards and control systems it establishes.

The model at hand is a useful tool in identifying potential areas to be tackled in order to boost organic consumption. The generalisability of the empirical findings obtained in the frame of this paper is arguably somewhat limited because of the exclusive use of UK data; it should further be borne in mind that the impact of the various factors may well have changed in the meantime since the beginning of the economic crisis in 2008. Data availability provided, it would be fruitful for future research to compare findings gained from more recent data. In general, the formulated recommendations can be of interest to countries following similar policy approaches and having a similar retail set-up.

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4 PAPER 3: CONSUMER CHOICE IN THE PRESENCE OF A MULTITUDE OF ENVIRONMENTAL AND ETHICAL LABELS

4.1. Introduction

There is considerable interest in the study of labelling and its potential to overcome information asymmetries in the context of environmentally or ethically motivated shopping behaviour. The use of labelling as a policy tool usually rests on the justification that it has the potential to overcome market inefficiencies caused by dysfunctional information flows. Labelling can work in favour of removing information asymmetries, so that consumer choices can be more in line with preferences. For instance, labelling for ecological or environmental issues enables consumers to discriminate between "green" and "brown" goods and thereby raises awareness for the higher ecological quality of the labelled product (Brécard et al., 2009). Given that the production process and the greenness of the product are unobservable to the consumers, and can further not be judged after purchasing and consuming them, the environmental attribute is of credence nature to the consumer. Functioning labelling schemes make it possible for consumers to distinguish products that were produced in (voluntary) compliance with third party standards for environmentally and socially preferred production methods. An ideal scheme would hence transform the credence attribute into a search attribute (Grolleau and Caswell, 2006). Consumer response towards this group of credence goods is becoming increasingly important in the related literature (Loureiro and Lotade, 2005).

However, a topic that has only received marginal attention is the fact that an array of labels has emerged over the years. Shedding light on this issue and its potential impact on consumers is the objective of this paper, as will be lined out further below. Existing labels cover a wide range of topics, ranging from health- to eco- and fair trade-related issues, with a number of different certification schemes in each group. For instance, the market for organic products is characterized by a large number of labels issued by different certifying organisations with varyingly demanding standards. Obviously, the more different labels there are, the more likely a consumer is to find an alternative that matches his ideal characteristics defined for a certain product class. At the same, it becomes more difficult for consumers to be informed about the different labels' meanings and the distinction between them, which in turn can cause consumer confusion and makes an informed choice more burdensome. Consumers understand that a label certifies that a product's production process meets some quality standard, but in many cases are unsure of the exact standards involved (Harbaugh et al., 2011). Search or evaluation costs then become an important issue for consumers wanting to make a choice in line with their actual preferences, which is at the centre of a functioning, efficient and effective labelling scheme.

The impact of this multiplicity of labels on market forces has not been widely studied from a theoretical perspective. There is one study by Ben Youssef and Abderrazak (2009) which focuses on the co-existence of two labels in a vertical differentiation setting. They show that under complete information, the introduction of a second label improves environmental quality of the labelled goods. However, under incomplete information, introducing a second label raises prices and reduces environmental quality. In a recent paper, Brécard et al. (2012) study the determinants of consumer demand for three types of labels in an application to seafood products in France. Their

analysis comprises the co-existence of an eco-, a fair trade, and a health label. In addition to a short theoretical outline of a model featuring double differentiation building on the work by Neven and Thisse (1989), Brécard et al. (2012) further take an empirical approach to identify consumer profiles and characteristics related to the three different labels included in the analysis. While findings are of some interest with regard to identifying subgroups of consumers and their preferences for different labelling schemes, the results obtained in Brécard et al. (2012) rely on perfect information on the side of the consumers and do therefore not capture some of the most relevant aspects that prevent existing labelling schemes from functioning as predicted by theory.

Onozaka and McFadden (2011) focus on the potential differentiation and interaction among designation of production location labels (local, domestic, imported) and other label claims in the food market, namely organic, fair trade, and carbon footprint. To analyze potential competition and complementarities within sustainable market niches, they examine how consumer willingness to pay (WTP) varies depending on multiple combinations of label claims. This is done by eliciting consumers' purchase intentions through a conjoint experiment which uses various bundles of product claim-location combinations for apples and tomatoes. Using choice experiment data from a national sample and panel mixed logit estimation, Onozaka and McFadden (2011) find that locally grown is the highest valued claim, but carbon-intensive local products are discounted more than those sourced from other locations. Some claims (organic and fair trade) appear to mitigate some negatively valued claims (imports and carbon footprint). The results obtained by Onozaka and McFadden (2011) are interesting with respect to defining marketing strategies trying to bridge a broad set of sustainable consumer values by bundling a number of production and product source claims; they further have some potential implications for government policies in ensuring credible and reliable labelling schemes. However, contrary to the approach in this paper, Onozaka and McFadden (2011) do not concern themselves with the effect of a multitude of labels on consumer choice in terms of ability to distinguish different labels, nor do they address potential search and evaluation costs stemming from a proliferation of labels. In their study, hypothetical labels were used for fair trade and carbon footprint, so that in fact respondents had to deal with unfamiliar labels and a potentially more difficult choice situation than in a regular shopping environment.

In another recent paper, Harbaugh et al. (2011) discuss an aspect highly relevant for the focus of this paper, namely consumer confusion due to a proliferation of labels and uncertainty with regard to the associated standards. They investigate the joint estimation problem consumers face in the sense of being forced to estimate whether a label is more indicative of a high quality product, or of an undemanding standard which had to be met in order to obtain the label. Harbaugh et al. (2011) study how this joint estimation problem impacts on the power of labels to reduce information asymmetries. In addition to a direct information loss due to certification uncertainty, they find that the optimal responses by both consumers and firms can cause further information loss which can greatly undermine the value of voluntary labelling.

This paper relates to the work on labelled goods as lined out above. Additionally, it makes use of results stemming from the literature on consumer search and shares certain aspects with works on product differentiation. Search models in general have been playing an important role in economics ever since the publication of a seminal paper by Stigler (1961). Search cost models are used, e.g., in models investigating the existence of price and wage dispersions (Burdett and Judd, 1983; Rob, 1985; Stahl, 1989), technology dispersion (Acemoglu and Shimer, 2000), excessive product

diversity (Wolinsky, 1984; Anderson and Renault, 1999), as well as asymmetric price-cost adjustments (Lewis, 2003). There is a large share of the literature on consumer search which has focused on consumer search for the best available price (e.g. Stigler (1961), Salop and Stiglitz (1977) and Stahl (1989)), while consumer search for a better, i.e. more matching, product has received less attention. Contributions to name in this respect comprise Weitzman (1979), Wolinsky (1983, 1984), and Anderson and Renault (1999). The role of search frictions on the one hand and product differentiation on the other with respect to softening price competition has been studied extensively, with seminal contributions by Diamond (1971) on the former and Perloff and Salop (1985) on the latter. A search model with product differentiation was first advanced by Wolinsky (1983) and developed further by Anderson and Renault (1999). A recent strand of literature extends the Anderson and Renault (1999) model by incorporating directed rather than random search (e.g. Arbatskaya, 2007; Haan and Moraga-Gonzalez, 2009; Arbatskaya and Konishi, 2012).

Furthermore, there is a number of contributions concerned with search costs stemming from the marketing literature. Kuksov (2004) looks at spatial product differentiation between duopolists when consumers search for prices but know their product preferences in advance. With regard to non-spatial product differentiation, a lot of attention has been given to the concepts of information overload and mental evaluation costs (Villas-Boas, 2009), which are underlying the idea that evaluation of choice alternatives may be costly to consumers. In a recent paper, Kuksov and Villas-Boas (2010) model the impact of evaluation costs on consumer preferences for the number of alternatives. They consider search costs in the evaluation of fit of each alternative. In their model, offering a smaller (finite) number of alternatives reduces overall consumer search costs and results in more consumers actually choosing an alternative.

This paper attempts to add to the existing literature on environmental and ethical labelling. Its first contribution is a more in-depth discussion of the issue of consumer search costs and their potential impact on consumer behaviour. It investigates potential sources for consumer confusion and discusses how current labelling schemes are at the source for search or evaluation costs. Secondly, this paper illustrates consumer search behaviour in the presence of search costs with the help of a sequential search model featuring horizontal differentiation. Finally, an empirical investigation of the issues discussed in this paper is undertaken using Eurobarometer micro-level data on the perceived helpfulness of existing labelling schemes in identifying genuinely environmental friendly products. A generalized ordered logit model is fitted to the data at hand, revealing a considerable negative impact of label fragmentation on the likelihood of rating current labels as helpful.

The rest of this paper is organized as follows. First, the focus is on the issue of search and evaluation costs related to labelling schemes, as well as potential sources of consumer confusion. In the third section, a consumer search model with horizontal product differentiation is discussed. The fourth section is concerned with the econometric analysis, while findings are summarized and discussed in a concluding section.

4.2. Labelling, consumer confusion, and search costs

As a matter of fact, an increasingly wide range of environmental and ethical labels is used. The field of labels making an environmentally motivated claim is particularly noteworthy in this respect (Marette, 2010; Harbaugh et al., 2011). The website

ecolabelling.org lists more than 430 eco-labels (April 2012). This multitude has repeatedly been reported to cause confusion among consumers. Labels, or label meaning, may be perceived as very similar by consumers, which makes the choice situation particularly difficult[4]. Moreover, many labels make unsubstantiated claims, whereby low-quality labels may tarnish high-quality labels (Marette, 2010). The labels in use are not only issued by NGOs or run by governments, but quite some are run by industry groups or pro-profit firms, which adds to consumer uncertainty about labelling objectives and credibility (Harbaugh et al., 2011).

In many cases, a new label introduced in the field of environmental and ethical labelling is similar to existing ones in terms of design, content and standards to be met for obtaining it. A successful new label that certifies characteristics that are similar or perceived to be similar to existing labels is likely to be regarded as a good substitute by consumers. If the certified characteristics remain vague to the consumer, this likely causes confusion and difficulties in distinguishing the different labels. Much to the disadvantage of more demanding certification schemes, consumers may then perceive greater substitutability among existing labels than is the true case (Lohr, 1998). This further erodes the incentives for firms to search more demanding certification as these labels are often more expensive to obtain for producers due to more costly production processes that are required by the labelling organisation. In the presence of consumer confusion and lack of information, consumers who regard a more demanding and a less demanding label as close substitutes are likely to opt for the cheaper variety (Lohr, 1998)

There have been some efforts to counteract potential consumer confusion due to a proliferation of different labelling schemes. For instance, there have been investments to clarify labelling standards and campaigns to set the public focus on particular labelling standards. Governments and industry partly attempt to reduce the number of labels used and to harmonize or standardize different voluntary standards (Harbaugh et al., 2011). However, research has shown that even long-term educational efforts have not succeeded in eliminating consumer confusion about the meaning of different labels (Lohr, 1998), and that even small amounts of uncertainty about the involved standards and certification requirements can cause considerable confusion and weakening of the value to firms' adopting certification (Harbaugh et al., 2011).

Mitchell et al. (2005) attempt to formulate a conceptual model of consumer confusion which features basically three different types of confusion: (i) similarity confusion, (ii) overload confusion, and (iii) ambiguity confusion. Type (i) refers to situations where brands, or in our case labels, are difficult to tell apart for the consumer because of very similar features in terms of appearance or meaning. Type (ii) comprises confusion related to the volume and diversity of the information generated by the existing number of brands (labels), as well as to the increasing amount of decision-relevant information on the product. The greater the number of characteristics to be considered, the more difficult it will be to choose. Lastly, type (iii) captures a lack of understanding that forces the consumer to re-evaluate and revise their current assumptions about a

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[4] It may of course well be that a multitude of labels and worries about difficulties of finding truly environment friendly labels are both caused by a better educated/more aware and more critical public in some countries than in others, at least to some extent. This potential causality is an important issue and would be interesting for future research but will not be investigated more in detail in this paper. Still, it appears a plausible assumption that higher awareness would make it easier for customers to find proper alternatives rather than the other way around if it was not for problems caused by a larger variety. This closes the circle with regard to the main hypothesis advanced in this paper concerning the impact of a multiplicity of labels.

product or shopping environment (this may refer to product complexity, ambiguous information or advertising, false product claims, or non-transparent pricing).

The above definitions are useful in clarifying the potential impact of an abundance of labels in the field of environmental and ethical certification. In particular the second source of consumer confusion as identified by Mitchell et al. (2005) appears to be of high relevance to consumers with regard to environmentally and socially motivated labelling schemes. These kinds of labels often cover very complex issues and information on related standards set for obtaining the label often is neither widely spread nor easily understood by consumers. The credence good aspect of labelled products due to the fact that the production process cannot be directly observed further adds to confusion and the lack of consumer knowledge (Harbaugh at al. 2011). With respect to eco-labels, Bougherara and Piguet (2009) point out that the introduction of a label implies that the consumer has to deal with a considerable amount of new information which has to be acquired. They identify three main sources of label quality information cost, namely (i) definition costs (labelling criteria), (ii) verifying costs (credibility and reliability of the labelling scheme), and (iii) label analysis costs (the actual information content included in the chosen labelling signal).

Mitchell et al. (2005) further identify a number of confusion moderator variables, referring to individual characteristics, and confusion mediator variables, or situational factors, that affect the impact of the different types of confusion identified above. For instance, individual characteristics such as age or gender can potentially have a strong impact on confusion. E.g. age may reduce confusion because consumers become more experienced with age, or it may increase confusion as consumers' information processing capability decreases with the ageing process.

Based on these considerations, it is reasonable to assume that attempting to make an informed choice of a specific label implies considerable evaluation cost for the consumer. As Schmidt and Spreng (1996) stress in their work on consumer prepurchase information search, the perceived costs and benefits of this search process are among the antecedents for purchase-related information gathering. They further emphasize the role of ability and motivation, where it appears likely that the ability to gather and process information impacts on the perceived costs of engaging in this process. Individuals with limited ability can be expected to be more prone to experience feelings of frustration, confusion, or even helplessness when faced with a complicated choice task, all of which arguably add to increasing perceived search or evaluation costs.

The topic of optimal product line design, i.e. the characteristics and number of varieties to offer to the consumers, has received considerable attention in the literature (Salgado, 2006; Kuksov and Villas-Boas, 2010). Contrary to the notion in standard economic theory that larger choice sets should increase utility, recent research has found that increases in the choice set actually can decrease utility (Salgado, 2006). It has been shown that people are more likely to consume a product or to choose a certain programme when fewer options are available (Iyengar and Lepper, 2000). With respect to environmentally and ethically motivated labelling as the core focus of this paper, it appears likely that the evaluation costs are actually increasing in the size of the choice set as the underlying issues are highly complex and the more labels are used, the more effort the consumer has to invest to learn to tell them apart and he may experience cognitive overload.

Summing up the points made above, it can be stated that with the increasing proliferation of labels consumer confusion appears a likely consequence. In order to make a choice among the labels present in the market that is in line with a consumer's preferences, an evaluation effort has to be made. This suggests that the "market for labels" as such cannot function as envisaged by theory because of the consumer search required for making an informed choice. Search costs are further likely to increase with every additional label used, as labels often are similar in design and cover similar issues, but to varying degrees (Lohr, 1998). Label proliferation aggravates the effect of uncertainty concerning which label is the best match for the consumer, so that label informativeness rather decreases than increases (Harbaugh et al., 2011). With regard to consumer search costs, a certain degree of search cost heterogeneity appears likely, in line with the factors identified by Mitchell et al. (2005) and Schmidt and Spreng (1996) concerning moderator and mediator variables.

4.3. Labels and consumer search

4.3.1. Vertically and horizontally differentiated labels

The issue of differentiation is a key element in the justification of labelling schemes, as we are dealing with credence goods that cannot be verified by the consumer as long as no credible signalling information mechanism exists. With regard to environmental and ethical labels, it remains an unresolved issue whether this market is characterized by horizontal (here consumer utility decreases with the price and the distance between the ideal alternative desired by the consumer and the alternative actually offered) or vertical differentiation (here consumers differ in their valuation of the quality of the same product; consumer utility increases both in product quality and in valuation of product quality), or whether both elements are present. In the related economic literature, this kind of label is perceived as both a sign of variety and of quality (Brécard et al., 2012). As Lohr (1998) argues, certifiers generally prefer to view the market as both horizontally and vertically differentiated with quality ratings consistent across consumers so that higher quality labels (in terms of certified positive impact guaranteed by the label) would command higher prices. In other words, if prices were the same, consumers would choose the labelled product in the presence of only one label, or the label with the highest quality in the presence of several labels to choose from. Given that there appears to be strong evidence suggesting consumer confusion about certification categories and actual meanings of labels (Lohr, 1998), others argue that the market for labels is characterized by horizontal differentiation only.

While imperfect information apparently prevents fully functioning double differentiation, both horizontal and vertical differentiation would likely be present in the market if perfect information prevailed. Models capturing double differentiation originate from the seminal work by Neven and Thisse (1989). In this framework, each consumer has an ideal label which is in line with his social and moral values and would like to buy a product with a label that is as close as possible to the ideal label. Additionally, consumers view labels as signs of quality and are capable of differentiating between the quality levels achieved by the different labels. It is assumed that products differ from each other in the content and quality of their respective label but are otherwise identical. The horizontal component corresponds to the label type, while the vertical component corresponds to the altruistic quality captured by this label. E.g., one may think of organic vs. fair trade with regard to the horizontal dimension and of the different standards set by different certifying organisations in the

organic sector with regard to the vertical dimension. Consumers are assumed to be heterogeneous in two dimensions, corresponding to the two dimensions of differentiation present in the labelling sector.

Given that information asymmetries prevail and that information gathering is costly, in the following the focus of the analysis is limited to consumer evaluation of the horizontal aspect of labelling. In a real-market setting, consumers as a group appear to partly display asymmetric preferences with regard to the location of labelled products on the continuum. An example cited by Lohr (1998) in this respect refers to the fact that different consumer studies found that a considerable share of consumers was not willing to buy reduced chemical or organic products even at a zero price premium. However, large parts of related consumer behaviour can likely be explained by a lack of information rather than by asymmetric preferences. A market that would be characterized by vertical (in addition to horizontal) differentiation if product attribute levels were perfectly known can appear to be only horizontally differentiated in the presence of uncertainty of confusion about relative quality. Based on these considerations and given the fact that quality and level differences between various existing certification schemes covering the same issues are arguably difficult to evaluate for consumers, limiting the focus to horizontal differentiation is a defendable approach which also simplifies the analysis. Evaluation costs would easily become prohibitively high for the majority of consumers if they attempted to become fully informed about those labelling aspects related to matters of vertical differentiation.

4.3.2. Consumer search behaviour when evaluation is costly

In their study on consumer choice with costly evaluation of alternatives, Kuksov and Villas-Boas (2010) present a well-laid out model of sequential, random consumer search without replacement but with perfect and costless recall. In the following, their set-up and findings are applied to the case of environmental and sustainability labelling. In order to focus on the aspect of a multiplicity of labels, it is assumed here that within a given product class, each product differs from others only in terms of its label so that products can be characterized by the label they are certified with. Products are otherwise identical in terms of quality and other attributes as perceived by the consumer prior to consumption. The terms product and label can thus be used interchangeably in the following. Labels are heterogeneous in the sense that they cover different issues even if they belong to the same group of labels, e.g. organic or environmental labels. This implies that the consumer is confronted with a considerable number of labels to choose from. The consumer who generally regards labels as a sign of quality needs to identify which issues are covered by which label and is interested in finding a label that best matches his preferences. For instance, in the range of organic labels, some labels may exclusively focus on the non-use of chemicals and pesticides, while others also cover questions of animal welfare or other aspects. The choice problem then is between buying an unlabelled product or a labelled product chosen from a range of labels which earns the consumer the additional utility attached to the label attribute. This, as well as the focus on consumer preferences for production methods, is a convenient simplification serving analytical purposes. In a real-life choice situation, consumers do not only have to choose between different labels and a single unlabelled variety. They face a similarly complex choice between products with various bundles of attributes others than labels and have to incur evaluation costs related to these as well.

Assume further that consumers are uninformed or uncertain about the exact content and issues covered by the label at hand and have to incur an evaluation cost per label evaluated. This evaluation cost may comprise closer inspection of the label itself and the information on the product, gathering additional information, as well as the mental cost of processing the obtained information. As briefly discussed in preceding sections, considerable efforts have been undertaken by governments, industry and other certifying institutions to educate consumers about label contents, to raise awareness about the various labels, and to make certain labels focal with the help of so-called "look for the label" campaigns (Harbaugh et al., 2011). However, studies have shown that consumers still express considerable confusion and a lack of knowledge about the exact meaning of and distinction between labels (Harbaugh et al., 2011; Langer et al., 2008; Lohr, 1998; Valor, 2008)[5].

More formally, assume that there is a population of consumers willing to make an informed choice of one alternative from the set of labels (in a given product class) that span the preference set. At cost k, the consumer can evaluate a randomly selected product i with label l_i and price p_i. After the evaluation, the consumer has four options: purchasing the product and leave the market, purchase a product evaluated previously, continuing to search, or leaving the market without purchasing any labelled variety. The valuation a consumer has for his ideal label (utility level or willingness to pay for the presence of this label) is denoted with $v \in [0, \bar{v}]$ and the location of this ideal label is denoted with $x \in [0,1]$. Each consumer's preference is defined by a pair (v, x), with v and x assumed to be distributed independently and uniformly in the population. As noted, the locations of the alternative labels l_i are spread on the linear space $[0,1]$. It is assumed that at the outset consumers know their own taste parameters v and x and additionally observe n, the number of alternative labels available in the given shopping situation. Even though the latter assumption may strike as partly unrealistic, in many market situations the consumer may first have a sense of the number of products available before learning their value and price (Kuksov and Villas-Boas, 2010). Based on observing the number of alternative labels, the consumer then has to decide whether or not to engage in the costly process of evaluating these or to refrain from choosing any label. In their search, consumers rely on their expectations concerning the distribution of alternatives and prices. The utility of not choosing any of the labelled options is normalized to zero. Producers (produce a product and) obtain a label at a location at zero marginal costs given that they fulfil the related certification criteria[6].

Choosing label l_i gives consumer j a utility of $v_j - t \mid x_j - l_i \mid - p_i$, where the term $t \geq 0$ is a measure of the disutility arising when l is chosen instead of the ideal label, and p is the price of the labelled good in question which the consumer also learns only after evaluation. A consumer will only start the search process if the expected utility to

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[5] The effect of potential learning effects are ignored in the following, as is the issue of prominence in the sense of some labels being more known than others. These are interesting aspects for future research on the matter.

[6] Note that the decision of the producer whether or not to search labelling, as well as the certification process are not modelled in this paper. The zero cost assumption is a simplification, as labelling schemes are costly to the producer, and different schemes imply different costs.

be gained from the evaluation is positive. Evaluating m alternatives and finally choosing label i earns the consumer a utility of [7]

$$U = v - t \mid x - l \mid - p - mk \tag{5}$$

Notice further the individual participation constraint with regard to the decision of whether to start the evaluation process or not:

$$v - t \mid x - l \mid - p \geq 0 \tag{6}$$

Furthermore, the valuation v of the marginal consumer indifferent between choosing and not choosing is determined by $\hat{v}(x,n) = \tilde{d}(x,n)$, where $\tilde{d}(x,n)$ represents the expected disutility (i.e. the expected search costs plus the expected misfit from settling for an alternative that does not match the consumer's preferences exactly) of a consumer located at x given that n alternatives are offered. As Kuksov and Villas-Boas (2010) point out, the decisive question in this respect then is which number of alternatives, n, minimizes expected consumer disutility and hence results in the largest number of consumers choosing an alternative.

4.3.2.1. Search when there is an abundance of labels

When there is a very large number n of label alternatives[8] on the market and all firms set the equilibrium price $p *$, the only way for a consumer to improve utility is to find an alternative closer to his ideal alternative as consumers rationally expect the common price level (Cornière, 2009). Kuksov and Villas-Boas (2010) formally analyze consumer behaviour in this set-up with choice alternatives uniformly distributed on the segment $[0,1]$[9]. A consumer's strategy then consists of choosing an optimal stopping rule in evaluating the various labelled products on the market. That is setting a reservation distance to his ideal label so that the consumer is indifferent between buying the product with the label at reservation distance D and continuing to evaluate other labels. The consumer hence has to deal with the problem of finding an alternative sufficiently close to his ideal point x.

Kuksov and Villas-Boas (2010) show that if $\sqrt{\dfrac{k}{t}} < x < 1 - \sqrt{\dfrac{k}{t}}$, the consumer can achieve reservation utility with a product either to the right or to the left of his location. If, however, $x < \sqrt{\dfrac{k}{t}}$ or $x > 1 - \sqrt{\dfrac{k}{t}}$, the consumer can achieve reservation utility only

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[7] Subscripts i and j are dropped for notational convenience.

[8] This assumption serves analytical convenience as the search process with a very large number of alternatives converges to the (analytically simpler) one with an infinite number (Wolinsky, 1983). Analysing an n-alternative market would greatly complicate the analysis because the distribution of unsampled alternatives changes as the evaluation proceeds. Furthermore, the possibility that a consumer is unable to find an alternative within the critical reservation distance can also be ignored when a very large n is assumed (Arbatskaya and Konishi, 2012).

[9] See Kuksov and Villas-Boas (2010) for a complete formal derivation and analysis of the results presented in this section.

on one side of his location. We know from above that it is only individually rational for the consumer to start the evaluation process if his valuation exceeds the expected disutility from the evaluation process. Following Kuksov and Villas-Boas (2010), the following participation constraints for starting the evaluation process can be obtained for the three cases identified above[10]:

$$v \geq \sqrt{kt} + p \qquad \text{for} \qquad \sqrt{\frac{k}{t}} < x < 1 - \sqrt{\frac{k}{t}} \qquad \text{(PC1)}$$

$$v \geq \sqrt{2kt - x^2 t^2} + p \qquad \text{for} \qquad x < \sqrt{\frac{k}{t}} \qquad \text{(PC2)}$$

$$v \geq \sqrt{2kt - (1-x)^2 t^2} + p \qquad \text{for} \qquad x > 1 - \sqrt{\frac{k}{t}} \qquad \text{(PC3)}$$

Notice that the (expected) price level is important for the consumer in the decision whether or not to start evaluating different alternatives available whereas the equilibrium reservation distance is independent of the equilibrium price. Consumers whose valuation does not exceed the respective threshold prefer the no-choice option and refrain from choosing a label. The rest of the consumers follow the optimal stopping rule below:

Optimal stopping rule. Consumers characterized by a location $x \in [\sqrt{\frac{k}{t}}, 1 - \sqrt{\frac{k}{t}}]$

search until they have found a label at most $\sqrt{\frac{k}{t}}$ away from them; consumers with

$x < \sqrt{\frac{k}{t}}$ stop searching once they find a label at most $\sqrt{2\frac{k}{t} - x^2}$ away; and consumers

with $x > 1 - \sqrt{\frac{k}{t}}$ search until they find a label at a distance of at most $\sqrt{2\frac{k}{t} - (1-x)^2}$.

The findings above underline the important role of consumer valuations and search costs. If the valuations consumers hold with regard to the issues covered by environmental and social labelling schemes is too low, they will not engage in the costly evaluation process required to make an informed choice that would be in line with their preferences. Note that even though a higher valuation v raises the likelihood of a consumer to engage in the evaluation process, it does not change the evaluation behaviour as such. This is due to the fact that even if the value a consumer attaches to the category under consideration is high enough to induce choosing, it does not affect the trade-offs between different alternatives within the category.

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[10] This follows from the expected disutility from engaging in the evaluation process for the three identified cases:

$tD = \sqrt{kt}$ for $\sqrt{\frac{k}{t}} < x < 1 - \sqrt{\frac{k}{t}}$, $tD_R = \sqrt{2kt - x^2 t^2}$ for $x < \sqrt{\frac{k}{t}}$ and

$tD_L = \sqrt{2kt - (1-x)^2 t^2}$ for $x > 1 - \sqrt{\frac{k}{t}}$.

4.3.2.2. *The importance of the number of alternatives*

Labelling schemes have the objective of inducing and enabling consumers to make a choice in line with their true preferences. As was discussed in the previous section, the search costs a consumer has to incur are a crucial factor with regard to his decision whether to engage in the evaluation process or not. The analysis presented above has focused on consumer search behaviour in the presence of an infinite (very large) number of labels. Admittedly, a given consumer is unlikely to encounter all possible labels related to a certain product category in a single shopping situation, despite the large number of labels currently in use. Still, depending on the product in question, the number of labels a consumer has to deal with in a shopping situation can be considerable[11]. The optimal or appropriate number of labels in the market hence could be of central importance if the probability of choice is to be maximized.

Kuksov and Villas-Boas (2010) show that when search costs are positive, the probability of choice is strictly greater for a certain finite number of alternatives than for an infinite (very large) number of alternatives. If too many alternatives are offered, consumers realize they will incur too many search costs and will therefore choose not to search, i.e. not to make a choice. Spreading out the location of alternatives and offering less alternatives allow the consumer to save on search costs because he can rule out areas of the product space that are less appealing to him (because of search without replacement).

To give an example, if only one label existed, no consumer would incur evaluation costs. In the model line-out presented in the previous sections, a location of this single label in the centre of the market then yields the lowest disutility for the consumer. Consumers choose this alternative if and only if $v > t \mid x - 1/2 \mid$. In the case of two labels, some consumers will incur the evaluation costs required to make an informed choice, provided that their valuation is high enough. If a consumer searches one label, he will get his most preferred between the two because if the evaluated label is not the most preferred, he knows that the other one will be. Kuksov and Villas-Boas (2010) show that offering two instead of one alternative increases the probability of choice if and only if the search costs are low enough. In the comparison between one and two varieties in the model above, they identify a threshold of $k/t < \dfrac{2 - \sqrt{2}}{4}$, and in the comparison between two and three varieties of $k/t < 1/16$. If $k/t > 2 - \sqrt{2}/4$, the probability of choice is highest if only one alternative is offered. If $k/t < 1/16$, the probability of choice is highest with three alternatives, whereas it is highest with two varieties if $k/t \in [1/16, (2 - \sqrt{2})/4]$. From this it can be seen that if there are too many alternatives, some consumers may refrain from making a choice because they understand that it will be too costly to find the alternative that best fits their preferences. Moreover, search behaviour depends on k and t only through k/t, so that a consumer's search behaviour and preferred number of alternatives are affected by the importance of fit t relative to the consumer's evaluation cost k. Keeping the importance

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[11] To name just one example, a German consumer wanting to choose a 1-liter carton of milk could be confronted with a range of different organic labels (e.g. Bioland, Naturland, EU-Bio, the national Bio-Siegel, Demeter, a number of private label organic brands issued by supermarket chains), as well as "fair pay" (guaranteeing a "fair income" to dairy farmers), eco- (e.g. concerning the origin of livestock feed), GMO-free-, and animal welfare (e.g. indicating whether cows were left with their horns) labels, as well as various combinations of labels - all in a single choice situation.

of fit constant, the consumer will prefer a larger set of alternatives if the evaluation costs are lower (Kuksov and Villas-Boas, 2010).

The setting of an optimal number of alternatives generates a trade-off between providing consumer with a better fit with a label and complicating their evaluation process. When the number of alternatives is very large, consumer adopt a reservation rule strategy that never involves an exhaustive search for all alternatives but rather a search until the first product that satisfies the reservation rule is encountered (Kuksov and Villas-Boas, 2010). In this situation, increasing the number of alternatives does not improve the expected fit between preferences and the first product found to satisfy the reservation rule. So the positive effect of a better fit only holds with a sufficiently small number of alternatives. Moreover, raising the number of alternatives continues to increase the expected costs of search needed until the first alternative satisfying the reservation rule is found[12]. In sum, there is only the negative effect and no positive effect of increasing the number of alternatives on the probability of choice when the number of alternatives is large (Kuksov and Villas-Boas, 2010).

As was discussed above, the issues covered by labels with an environmental, sustainability or ethical background are highly complex so that evaluating these is a demanding task for the general consumer. Given this complexity, the task of making a conscious and informed choice among labels likely remains challenging even if consumers are faced with similar sets of labels in repeated shopping situations. Furthermore, decisions on grocery shopping seem to be guided by habits to a considerable extent (Pelsmacker et al., 2005), which suggests that informed choice among labels is not likely to be currently the rule among "normally concerned" consumers, i.e. consumers with a comparatively moderate valuation v. Even relatively few alternatives (in comparison to conventional product markets and the quantity of different choice options provided there) could imply prohibitively high evaluation costs with regard to making a conscious and informed choice. This can question the usefulness of labelling schemes with respect to their goal of enabling consumers to adjust their purchasing behaviour with their preferences. Keeping labelling fragmentation in the sense of the number of labels permitted to be used in the market at low levels hence could be a crucial factor in the strive to improve labelling policies.

4.4. Econometric analysis

4.4.1. Data

Data on perceived consumer search costs with regard to the number of environmental and ethical labels is sparse. To the best of my knowledge, no data addressing this topic directly is publicly available. However, a rather recent Special Eurobarometer (Nr. 68.2, 2007; European Commission, 2008) focused on attitudes of European citizens towards the environment and is used for analysis here. The data are provided by the Gesis Research Data Center (www.gesis.org). The Eurobarometer is a representative multinational survey series which has been introduced in the 1970s to regularly monitor the public opinion in the EU member countries on behalf of the European Commission. Intermittently, special topics, e.g. agriculture, environment, science etc., are addressed. The survey at hand contains information from 26,730 respondents from

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[12] This is because search with replacement is less efficient than search without replacement – and as the number of alternatives approaches infinity, the search process approaches search with replacement.

27 EU member states. Due to a lack of data availability regarding further characteristics to be included in the analysis, the analysis was restricted to 18 member states and included information on 16,846 respondents after final cleaning of the data.

The degree to which respondents feel that the number of labels in the market is posing a difficulty with regard to information and search effort is not directly observed in the data. However, individuals can be categorized on the basis of their general opinion about existing labelling schemes and the degree to which these are considered as helpful in identifying environmentally friendly products. In addition to a number of questions concerning people's attitudes towards the environment and environment-related behaviour, Eurobarometer 68.2 contained a question asking respondents to evaluate the helpfulness of existing labelling schemes (QF21-"Do you think that current labels on products allow you to identify those products that are genuinely environmentally friendly?"), which can arguably serve as an indicator for how informative people perceive these labels. This variable is not ideal in the sense that it does not capture the main focus of this paper perfectly. Consumers may buy labelled products even though they state that they do not find these satisfyingly helpful. These shortcomings have to borne in mind when interpreting the results of the econometric analysis. Due to the lack of better data, it was decided to use this variable as the dependent variable in the analysis despite the concerns discussed above. It is a categorical, ordinal variable taking on values 1 to 4 (1="no, not at all", 2="no, not really", 3="yes, to some extent" and 4="yes, certainly"). Table 1 shows the distribution of this variable.

Following the line of argumentation advanced in this paper, several explanatory variables were operationalized as follows. In addition to Eurobarometer data, the recent contribution by Koos (2011) on varieties of environmental labelling, market structures and sustainable consumption in 18 countries across Europe was consulted and his variable summarizing the fragmentation or multitude of labels existing within a given country was used in the analysis. There is no data on the exact number of environmental, organic or ethical labels, so that Koos (2011) constructed a fragmentation indicator which is dichotomized with countries with less than six private certifiers coded as "low" and countries with more than six private certifiers as "high". This proxy appears defendable given the lack of available data. The fragmentation variable is a dummy variable coded "0" for low fragmentation and "1" for high fragmentation. Based on the theoretical findings in this paper, one would expect that high label fragmentation has a negative impact on how useful consumers regard existing labelling schemes as more labels imply higher evaluation costs.

All other independent variables were constructed from Eurobarometer data. See Table 2 in the Appendix for summary statistics of the variables used for the analysis. Pro-environmental attitudes at the micro-level in their role of impacting on consumer valuation of environmentally friendly products were operationalized with the help of a question investigating as how important protecting the environment was regarded by the respondent on a scale from "not at all important" to "very important". Three dummy variables corresponding to a scale from 0="not important" to 1="fairly important" and 2="very important" were used to measure this personal importance. In addition, self-assessed informedness of respondents about environmental issues was taken into account as well, as this arguably illustrates a certain degree of interest in issues related to labelling. The information variable is a dummy coded "0" for not

informed and "1" for informed[13]. A willingness-to-pay variable was constructed based on agreement with the statement that one was ready to buy environmentally friendly products even if those cost a bit more. This variable is a dummy coded "0" for no willingness to pay more and "1" for stated willingness to pay extra.

Table 1. Distribution of "label" (answers to question QF21) and distribution by country.

	Number of obs.	Percentage
"No, not at all"	2,217	12.56
"No, not really"	5,310	30.08
"Yes, to some extent"	7,784	44.10
"Yes, certainly"	2,339	13.25

Distribution of answers by country.

	NAA	NR	YSE	YC
Austria	77	268	509	130
Belgium	102	354	402	118
Czech Republic	101	262	556	209
Denmark	111	261	443	145
Finland	72	252	577	129
France	103	313	399	171
Germany	289	617	478	103
Great Britain	100	376	604	133
Greece	319	292	271	112
Hungary	148	378	341	100
Ireland	127	216	419	130
Italy	127	221	480	152
Luxemburg	49	116	241	67
Netherlands	74	307	422	173
Poland	134	308	352	125
Portugal	70	213	425	174
Spain	105	263	358	88
Sweden	109	293	509	80

Question: "Do you think that current labels on products allow you to identify those products that are genuinely environmentally friendly?". NAA, NR, YSE, and YC stand for "no, not at all", "no, not really", "yes, to some extent", and "yes, certainly".

A range of control variables was included in the analysis. Gender is a dummy variable coded "1" for female. Age is measured in years[14]. Additionally, a dummy variable for the presence of children under ten years of age in the respective household was included (coded "1" in the case of children under ten living in the same household as the respondent), as this could be related to a raised concern about health and hence increased interest in labelled products. Respondents' living situation with regard to the location of their accommodation was operationalized by a variable summarizing the

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[13] There were very few respondents placing themselves in the lower (i.e. not important and not informed) categories for these two variables covering importance of and informedness about the environment, so that summarizing the respective two lower categories seemed advisable. For the informedness variable, also the two higher categories have been merged.

[14] For further analysis, a squared term of age was included to model an expected inverted U-shape effect of age. However, this variable was found insignificant in all estimations and additionally caused considerable problems with multicollinearity so that it was decided not to include this variable in the final specification.

type of community the respondent claimed to live in (1=rural area or village, 2=small or middle sized town, 3=large town) and entered into the analysis as a set of dummy variables. This is of potential importance with respect to the availability of labelled products and hence the degree to which the respondent is exposed to the various types of labels. The Eurobarometer survey unfortunately does not include a question concerning the level of education of the respondent. It does, however, comprise the information on the age when full-time education was completed. Based on this, an education variable was constructed in line with the approach in Koos (2011). Variables for primary education (education ended below age 15), secondary education (education ended between age 15 and 19) and tertiary education (education ended at 19 or above) were included as dummy variables. Unfortunately, no income variable can be obtained from Eurobarometer data. However, an employment dummy is included in the analysis, coded "1" if the respondent was employed at the time of the survey.

4.4.2. *Model and analysis*

As lined out above, we are dealing with a categorical, ordinal dependent variable. A standard model applied to ordered categorical data is the ordered logit model, also called proportional odds model. This standard ordered logit model assumes that all explanatory variables other than the constant term have an equal effect on the probability of crossing the threshold from one category to another in terms of the dependent variable. After fitting the ordered logit model to the data at hand, the Brant test revealed that the assumptions of the parallel lines model were violated. One common option to deal with this problem is the use of a nonordinal alternative such as the multinomial logistic regression model (Williams, 2006). However, this approach generally leads to a loss of information as it does not take the ordinal nature of the dependent variable into account. In addition, the attempt to fit a multinomial logit model to the data at hand showed that the assumption of independence of irrelevant alternatives was not met for this approach.

Given the difficulties lined out above, a generalized ordered logit model using the user-written gologit2 procedures (Williams, 2006) in STATA 10 was chosen for the analysis. The generalized ordered logit model relaxes the assumption of parallel lines and allows the effects of the explanatory variables to have varying effects on the different levels of the dependent variable. By default, gologit2 produces results which are similar to the series of binary logistic regressions estimated for the Brant test and can be interpreted in the same way. However, gologit2 is able to fit partial proportional odds models where the parallel-lines constraint is relaxed for those variables where it is not justified. This model is only slightly more difficult to interpret than the default model, and it provides insights that would be obscured otherwise (Williams, 2006).

The so-called partial proportional odds model for ordinal dependent variables was eventually fitted to the data at hand. As explained, this model allows variables not fulfilling the proportional odds assumption to have different effects on the dependent variable. The partial proportional odds model can be written as a generalized ordered logit model (Williams, 2006):

$$P(Y_i > j) = g(X\beta_j) = \frac{\exp(\alpha_j + X_i\beta_j)}{1 + \{\exp(\alpha_j + X_i\beta_j)\}}, \qquad j = 1,2,...,M-1 \qquad (14)$$

where M is the number of categories defined for the dependent variable, i.e. expressed perception of the helpfulness of existing labelling schemes (i.e. M=4); j is the answer

category (1="no, not at all", 2="no, not really", 3="yes, to some extent" and 4="yes, certainly"). Furthermore, β_j is specific for each j if the parallel lines assumption is violated, otherwise $\beta_j = \beta$. From (14), the probabilities that Y takes on the each of the values 1,...,M can be determined to be equal to:

$$P(Y_i = 1) = 1 - g(X_i \beta_1)$$

$$P(Y_i = j) = g(X_i \beta_{j-1}) - g(X_i \beta_j) \qquad\qquad j = 2,...,M-1$$

$$P(Y_i = M) = g(X_i \beta_{M-1}).$$

4.4.3. Results

4.4.3.1. Results 1: Odds ratios

Table 3 reports the results of the partial proportional odds specification of the generalized ordered logit model examining movement across the thresholds with respect to perception of labelling with countries pooled together. The generalized ordered logit model implies that the reference group for the log-odds interpretation is different from one value (threshold) to the other. In the case discussed here, the response variable is defined over an increasing degree of agreement with the statement that existing labelling schemes make it possible to identify truly environmental friendly products as shown in Table 1. Consequently, the first cumulative logit model compares "no, not at all" vs. "no, not really & yes, to some extent & yes, certainly", while the second model refers to "no, not at all & no, not really" vs. "yes, to some extent & yes, certainly". In this manner, each group is compared to a group expressing less agreement. The third comparison then is between "no, not at all & no, not really & yes, to some extent" vs. "yes, certainly".

In interpreting the results obtained from a gologit model, positive coefficients indicate that higher values of the explanatory variable make it more likely that the respondent will be in a higher category of Y than the current one. Negative coefficients indicate that higher values of the explanatory variable make it likelier that the respondent will be in the current or a lower category (Williams, 2006). However, for ease of interpretation and following the approach taken in the related literature, in Table 3 the odds ratios (i.e. $\exp \beta_h^j$ for the effect of variable h on the jth threshold) are reported. This means that values above 1 refer to a positive effect, whereas values less than 1 refer to a negative effect. As mentioned, the effects refer to comparisons between the differing reference groups. A positive effect implies a higher likelihood of belonging to the reference group in question or better, while a negative effect implies a higher likelihood of belonging to the complementary (lower) group.

There are three panels in Table 3, i.e., Not At All (NAA), Not Really (NR), To Some Extent (YSE), Certainly (YC). As explained, the first panel contrasts the NAA category with the NR, YSE and YC categories. The second panel contrasts the NAA and NR categories with the YSE and YC categories. The third panel contrasts the YC category with the NAA, NR and YSE categories. Turning to the results given in Table 3, it is instructive to recall that the coefficients for those variables that did not violate the

parallel-lines assumption are the same across regressions. This concerns the odds ratios that are only reported in the first panel and then left out in the last two panels. The variables in the last two panels are those that were found to violate the parallel-lines constraint. In interpreting the results of each panel, the current and lower-coded categories are taken as the base group. This implies that the results in the mth panel are equivalent to those of a binary logit model where categories 1 to m are coded as zero and categories $m+1$ to J are coded as one. Hence, odds ratios greater than 1 imply that higher values of an explanatory variable increase the probability that a respondent is in a higher/more positive category than the current one.

As far as label fragmentation is concerned, we find a highly statistically significant negative effect. All other things held constant, the prevalence of a multitude of labels made it more likely for a respondent to feel that existing labelling schemes do not make it possible to identify genuinely environmentally friendly products. The odds ratio for this variable was 0.82. In other words, the presence of fragmentation reduced the likelihood of finding existing labels helpful in identifying truly environmental friendly products.

With regard to environmental attitudes and consumer consciousness, it appears that expressed willingness to buy environmental friendly products even if they cost more implies a more positive attitude towards existing labelling schemes. Respondents who claimed to be ready to pay a little extra were notably more likely to be part of the groups agreeing with the statement that existing labelling schemes are helpful. The effect was highly statistically significant and strongest at the first threshold where a respondent was almost 2 times more likely to be in the higher categories if a positive willingness to pay was stated. This finding could imply a stronger interest or even trust in labelling schemes among those who state they would not mind paying more for related products. A further interesting point to note is the strongly positive impact of the self-expressed level of informedness about environmental issues. Respondents who claimed to feel well-informed were 1.3 times more likely to find existing labels helpful in identifying environmental friendly products. Similarly, the variable capturing the respondents' assessment of how important they see environmental protection had a strong positive and significant impact, apart from *env_imp2* which ceased being significant at the last threshold.

With regard to socio-economic characteristics, it can be seen that age had virtually no impact as the odds ratio was very close to one. It does not appear to be the case that older respondents have more knowledge and experience in handling labels and gathering relevant information, as was briefly discussed in previous sections. Gender had a strongly positive and significant impact, implying that women are about 1.2 times more likely to hold a positive opinion on the helpfulness of existing labelling schemes. The type of community a respondent lived in was not of any statistical significance. The presence of children under 10 had a somewhat negative impact statistically significant at the 10 percent level at the last threshold. Hence, having children under 10 slightly reduced the likelihood of crossing the threshold to highest agreement with the statement that existing labels are helpful. The education variables were not found to be significant, while being employed had a slight positive effect in the first two panels and a negative impact in the last (significant at the 5 percent level in the first panel and at the 1 percent level in the others).

Table 3. Results of the partial proportional odds model (odds ratio estimates).

Dependent variable: assessment of the helpfulness of current labelling schemes (outcomes: NAA=not at all; NR=not really; YSE=to some extent; YC=certainly). Standard errors in parentheses.	
Variables	Odds ratio
No, Not At All (NAA)	
Fragmentation	0.82*** (0.04)
Age	0.99*** (0.01)
Gender	1.17*** (0.04)
Env_imp2	1.98*** (0.2)
Env_imp3	1.46*** (0.13)
Env_info	1.33*** (0.04)
Buy	1.94*** (0.11)
area_type2	0.97 (0.04)
area_type3	0.95 (0.04)
children under 10	0.9 (0.06)
secondary_ed	1.04 (0.05)
tertiary_ed	1.11 (0.08)
Employed	1.12** (0.06)
South	0.74*** (0.07)
East	0.86 (0.08)
West	1.0 (0.09)
No, Not Really (NR)	
Env_imp2	1.52*** (0.14)
Buy	1.81*** (0.08)
children under 10	1.0 (0.05)
tertiary_ed	0.97 (0.05)
Employed	1.12*** (0.04)
South	0.96 (0.07)
East	0.8*** (0.05)
West	0.8*** (0.05)
Yes, To Some Extent (YSE)	
Env_imp2	0.96 (0.10)
Buy	1.29*** (0.09)
children under 10	0.87** (0.06)
tertiary_ed	0.93 (0.06)
Employed	0.83*** (0.04)
South	1.53*** (0.15)
East	1.24** (0.11)
West	1.11 (0.09)
Number of obs	16,846
Pseudo R-Squared	0.024
Log Pseudo-Likelihood	-20509.144

Note: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Furthermore, regional dummies were included, grouping the 18 countries according to their geographical location into east, west, north and south to capture regional influences (north was used as reference category). Using individual country dummies was not possible due to multicollinearity issues. This is due to the fact that the fragmentation variable was created based on country identity so that there would not be a variation of this factor within a given country. The use of regional dummies ensures a satisfactory degree of variation and VIF analysis showed that there were no problems with multicollinearity in the final specification (mean VIF was 2.55). As far as the included regional dummies are concerned, the analysis did not reveal a consistently significant impact of any of the dummies. However, a few interesting points can be noted which suggest some regional differences that would warrant further research. For instance, living in the east or south as compared to living in the north made it 1.2 and 1.5 times more likely to be certain that existing labels are helpful (significant at the 1 percent level in the last panel), all other things being equal. Similarly, living in the south as opposed to the north reduced the likelihood of having the most negative opinion about labelling schemes. The odds ratio for this variable was 0.74 in the first panel (significant at the 1 percent level). Note that the regional dummies included in the analysis serve the mere purpose of capturing potentially omitted region-specific variables which might have an impact on how helpful existing labels are perceived in identifying genuinely environmentally friendly products. The dummies do not give a clue concerning the nature of the identified effects.

A number of model specification tests was undertaken to check for the adequacy of the partial proportional odds model in terms of how well the model fits the data at hand. These tests are listed in Table 4 below. The Wald chi-square test tests for the hypothesis that all the coefficients in the model are simultaneously equal to zero and is hence a test of the overall goodness-of-fit of the employed model. The strongly significant p-value shown in Table 4 indicates that the null hypothesis is strongly rejected. The general model specification test, also known as link test, is a test of the appropriateness of the functional form of the model. If a model is properly specified, then no nonlinear function of the explanatory variables should be significant when added to the model. In Table 4, "_hatsq" represents this nonlinear function, which is tested insignificant for each of the J-equations. This implies that there is no functional form misspecification. Finally, the alpha terms are the threshold parameters or cutpoints on the continuum of the dependent variable. With four categories, there are three thresholds to be tested (alpha_1 to alpha_3). The results of the threshold parameter test indicate that these are significant at the 1 percent (threshold 1 and 3), respectively 10 percent level (threshold 2) and hence are relevant for the model. Taken together, the partial proportional odds model appears to fit the data at hand reasonably well. Further checks for robustness were undertaken by running the model on various subsamples and by formulating different model specifications. Conclusions from key variables remained largely the same (results unreported here), so that it can be concluded that the chosen model seems reasonably robust.

Table 4: Model specification tests.

Test	Result
Wald chi-square test	*p*-value=0.000
General model specification test i. first threshold: _hatsq	*p*-value=0.471
ii. second threshold: _hatsq	*p*-value=0.185
iii. third threshold: _hatsq	*p*-value=0.137
Threshold parameter test i. alpha_1	*p*-value=0.000
ii. alpha_2	*p*-value=0.094
iii. alpha_3	*p*-value=0.000

4.4.3.2. Results 2: Marginal effects and outcome probabilities

Table 5 presents the marginal effects which were computed at a representative value, i.e. the mean values of continuous variables and mode values of dummy variables. In general, it can be stated that the majority of the marginal effects identified as significant in Table 5 are of the expected sign. The marginal effects of those variables capturing attitudes towards the environment have the largest magnitudes of impact. For instance, a respondent who agrees with the statement that he is willing to buy environmentally friendly products even if they cost a bit more (*buy*) sees a reduction of the probability of not finding existing labelling schemes helpful at all (NAA) by 6.1 percent, while the probability of finding existing labels helpful to at least some extent (YSE) increases by 10 percent. Similarly, attaching a lot of importance to protecting the environment (*env_imp3*) reduces the probability of regarding labels as not really helpful (NR) by 5 percent. This suggests a link between attitudes and the propensity to gather information about label meanings and implications.

Table 5 further shows that the presence of label fragmentation increases the probability of not finding existing labelling schemes helpful at all (NAA) by about 1.5 percent, while the probability of not really finding them helpful (NR) increases by almost 3 percent. Similarly, the probabilities of having a positive opinion on the helpfulness of existing labelling schemes, YSE and YC, are reduced by 1.5 and 2.5 percent, respectively. While the magnitude of this impact is admittedly small, this finding serves to underline that label fragmentation is likely to exert a negative impact on the working of labelling schemes in the sense that it lowers consumers' perception that they can identify genuinely environmentally friendly products with the help of labels. This is a point that should receive further attention in future research making use of more detailed and appropriate data.

Table 5: Marginal effects.

	No, Not At All (NAA)		No, Not Really (NR)		Yes, To Some Extent (YSE)		Yes, Certainly (YC)	
Variable	MER	s.e.	MER	s.e.	MER	s.e.	MER	s.e.
fragmentation	0.0146***	0.00405	0.0259***	0.00649	-0.0152***	0.00513	-0.0254***	0.00601
age	0.000618***	0.00010	0.00117***	0.00014	-0.0005***	0.000118	-0.0012***	0.000179
gender	-0.0117***	0.00248	-0.0210***	0.00422	0.0118***	0.00304	0.0208***	0.00432
env_imp2	-0.0357***	0.00493	-0.0404***	0.0120	0.0819***	0.00909	-0.00573	0.0137
env_imp3	-0.0307***	0.00847	-0.0507***	0.0119	0.0352***	0.0115	0.0463***	0.00978
env_info	-0.0224***	0.00322	-0.0383***	0.00475	0.0246***	0.00467	0.0362***	0.00471
buy	-0.0608***	0.00785	-0.0723***	0.0102	0.100***	0.0116	0.0328***	0.00892
area_type2	0.00213	0.00258	0.00398	0.00482	-0.00193	0.00238	-0.00418	0.00505
area_type3	0.00394	0.00285	0.00730	0.00522	-0.00365	0.00276	-0.00759	0.00540
child_under10	0.00728	0.00514	-0.0106	0.00819	0.0220**	0.0100	-0.0187**	0.00840
secondary_ed	-0.00262	0.00338	-0.00500	0.00640	0.00220	0.00296	0.00542	0.00686
tertiary_ed	-0.00680	0.00466	0.0123	0.00846	0.00497	0.00849	-0.0104	0.00916
employed	-0.00836**	0.00388	-0.0153**	0.00658	0.0508***	0.00845	-0.0271***	0.00764
south	0.0237***	0.00774	-0.0159	0.0117	-0.0763***	0.0145	0.0685***	0.0155
east	0.0110	0.00685	0.0355***	0.0114	-0.0792***	0.0148	0.0327**	0.0129
west	-7.88e-05	0.00587	0.0481***	0.0102	-0.0631***	0.0123	0.0151	0.0112

Note: Significant at the *10%, **5%, and ***1% level. MER=Marginal effects computed at a representative value, i.e. at mean values of continuous variables and mode values of dummy variables. s.e.=standard errors.

The area type a respondent lives in, as well as the level of education, do not have any statistically significant impact. The impact of age is highly statistically significant but can be ignored due to its extremely small magnitude. As far as gender is concerned, being female reduces the probability of having a very negative (NAA) or a negative (NR) opinion about existing labels by 1.2 and 2.1 percent, respectively, and similarly increases the probability of having a positive (YSE) or very positive (YC) perception by 1.2 and 2.1 percent, respectively. The magnitude of the impact of having children under ten living in the household was equally small and only significant for the YSE and YC case. The presence of children under ten increases the probability of regarding existing labels as helpful to some extent (YSE) by 2.2 percent, while it reduces the probability of being very positive about the helpfulness of labels (YC) by almost 2 percent.

So far, it has been examined how much the outcome probabilities change due to changes in an explanatory variable. In order to obtain a comprehensive overview, it will now be analyzed what the outcome probabilities are when there is a change in a variable or a subset of variables.

Table 6 shows six scenarios. Each scenario represents a hypothetical survey respondent with characteristics as listed. Scenario 1 and 2 depict a male respondent of average age (48.2 years) with a relatively negative/indifferent attitude towards environmental issues and average (secondary) education who is employed and lives in a small to middle-sized town in the group of included countries located in the west. The only difference between these two scenarios is the presence of label fragmentation scenario 2. From Table 6, it can be seen that while the probability of not finding current labels helpful at all (PR(Y=NAA)) is relatively high in both scenarios, it still increases from PR(Y=NYY)=0.2666 in scenario 1 to PR(Y=NAA)=0.3062 in scenario 2. At the same time, the presence of labelling fragmentation reduces the probability of perceiving

existing labels as very helpful (PR(Y=YC)) from PR(Y=YC)=0.0696 in scenario 1 to PR(Y=YC)=0.0580.

Scenario 3 and 4 undertake the same comparison (absence of fragmentation vs. presence of fragmentation) for a female respondent. Again, labelling fragmentation increases the probability of being critical towards the helpfulness of labelling schemes. PR(Y=NAA) increase from 0.2370 in Scenario 3 to 0.2738 in Scenario 4.

Scenario 5 and 6 focus on the impact of individual attitudes towards the environment. Scenario 5 depicts a male respondent whose characteristics are identical to those in Scenario 1 and 2 apart from the fact that he now considers protecting the environment important, regards himself as well-informed as far as environmental issues are concerned and states that he is willing to buy environmentally friendly products even if these cost a bit more. Labelling fragmentation is present. Scenario 6 applies the same set-up to the case of a female respondent.

Table 6: Outcome probabilities.

Variables	SCENARIOS					
	1	2	3	4	5	6
gender	0	0	1	1	0	1
age	48.2	48.2	48.2	48.2	48.2	48.2
env_imp2	0	0	0	0	0	0
env_imp3	0	0	0	0	1	1
env_info	0	0	0	0	1	1
buy	0	0	0	0	1	1
area_type2	1	1	1	1	1	1
area_type3	0	0	0	0	0	0
child_under10	0	0	0	0	0	0
secondary_ed	1	1	1	1	1	1
tertiary_ed	0	0	0	0	0	0
employed	1	1	1	1	1	1
south	0	0	0	0	0	0
east	0	0	0	0	0	0
west	1	1	1	1	1	1
fragmentation	0	1	0	1	1	1
Predicted outcome probabilities						
PR(Y=NAA)	0.2666	0.3062	0.2370	0.2738	0.1051	0.0912
PR(Y=NR)	0.4028	0.4046	0.3967	0.4036	0.3062	0.2826
PR(Y=YSE)	0.2609	0.2311	0.2858	0.2552	0.4548	0.4730
PR(Y=YC)	0.0696	0.0580	0.0805	0.0673	0.1338	0.1531

Summarizing and comparing the findings from Scenario 5 and 6, we find that strongly positive attitudes towards the environment (i.e. a high degree of awareness and concern) partly outweigh the negative effect of labelling fragmentation with regard to the question of how helpful existing labels are perceived in identifying genuinely environmentally friendly products. The probability of having a very negative perception of the helpfulness of existing labelling schemes is almost divided by three both for male

and female respondents (PR(Y=NAA)=0.3062 in Scenario 2 vs. PR(Y=NAA)=0.1051 in Scenario 5 for males; PR(Y=NAA)=0.2738 in Scenario 4 vs. PR(Y=NAA)=0.0912 in Scenario 6 for females). The probability that a respondent states that existing labels are helpful to at least some extent (PR(Y=YSE)) is considerably higher in the case of positive environmental attitudes. For males, PR(Y=YSE) increases from 0.2311 in Scenario 2 to 0.4548 in Scenario 5.

4.5.   Discussion and conclusion

This paper has addressed the issue of the existing multiplicity of labels in the field of environmental and ethical labelling. It has discussed the imperfections of existing labelling schemes and the role of consumer confusion in undermining a smooth functioning of labelling schemes in providing consumers with information so as to enable informed choices in this class of products. As has been argued in this paper, there appears to be considerable uncertainty and a lack of knowledge on the side of the consumers when it comes to issues covered by the various labels and the certification criteria demanded.

Although an ideal labelling scheme with perfectly informed consumers would allow for a market featuring both vertical and horizontal differentiation in terms of quality and issues covered, from the consumers' perspective the market seems more likely to be horizontally differentiated. This is due to confusion and a lack of understanding and information (Lohr, 1998). This paper paid justice to this notion by discussing consumer search behaviour in a horizontal differentiation setting when evaluation of alternatives is costly as presented by Kuksov and Villas-Boas (2010). The model results stress the importance of consumer valuations, search costs, and the number of label alternatives present in the market. If the valuations consumers hold with regard to the issues covered by labelling schemes are too low, they will not engage in the costly evaluation process required to make an informed choice that would be in line with their preferences. Similarly, if the search costs a consumer has to incur for choosing among the existing label alternatives are too high, these costs make evaluation prohibitively expensive for the consumer in question and he stays out of the market. Given the complexity of evaluating the issues covered by labels with an environmental, sustainability or ethical background, even relatively few alternatives (in comparison to conventional product markets and the quantity of different choice options provided there) could imply prohibitively high evaluation costs with regard to making a conscious and informed choice. This can question the usefulness of labelling schemes with respect to their goal of enabling consumers to adjust their purchasing behaviour with their preferences. This finding underscores the need to design policy measures in the field of environmentally or ethically labelled products to lower search costs as much as possible. Furthermore, keeping labelling fragmentation in the sense of the number of labels permitted to be used in the market at low levels could be a crucial factor in the strive to improve labelling policies.

Lower search costs can be achieved by several means. Continued consumer education and information campaigns, as well as a reduction of the number of labels used in practice are arguably promising in this respect. As Harbaugh et al. (2011) point out, introducing "look for the label" campaigns and the attempt to make certain labels focal for the consumer have had some success. As discussed briefly above, harmonizing the standards required to obtain labels could further be helpful. One example for this is the introduction of the EU organic label (Sawyer et al., 2008). However, while harmonization lowers search costs, welfare gains are not guaranteed if the existence of

different standards reflects the existence of different consumer preferences across society. If consumer preferences for certain standards are very strong, harmonizing standards may actually reduce consumer utility (Sawyer et al., 2008).

The econometric analysis undertaken in the frame of this paper confirms the notion that label fragmentation appears to play an important role in making consumers feel less certain about the usefulness and reliability of existing labelling schemes. This being said, it has to be borne in mind that the generalisability of the findings in this study is somewhat limited because of a lack of data on consumer search effort and perceived difficulties with regard to labelling. It would be highly desirable to employ data providing a stronger link between the formal model discussed and the econometric analysis. Still, the results obtained offer some insight and serve as a first analytical step. The analysis undertaken in the frame of this paper revealed a strongly significant negative impact of label fragmentation. Positive attitudes towards the environment and a high degree of awareness seem to partly outweigh this negative effect. If consumers are aware of the issues at stake and feel well-informed about these, they appear to perceive current labels as notably more helpful. The same holds true for consumers who express a readiness to pay a little extra for environmentally friendly products. Education appears to play a less important role than what could maybe be expected. This lends support to the hypothesis that high levels of concern increase the willingness to deal with the complexity attached to an evaluation of label meaning and content. Attempts to raise consumer concern and awareness of issues related to labels used in practice should hence be a building stone in the construction of a comprehensive policy effort combining consumer education with efforts to lower search costs. Easing access to information for consumers and a potential re-design of labels are important policy approaches to consider. A re-design of labels could ensure that these provide not only a relatively simple sign, but more detailed information on issues covered and certifying requirements (Harbaugh et al., 2011).

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APPENDIX 2   TABLE 2

Table 2. Variable description.

Variables	Description					
A 4-category dependent variable	QF21-"Do you think that current labels on products allow you to identify those products that are genuinely environmentally friendly?"					
1=NAA	"No, not at all"					
2=NR	"No, not really"					
3=YSE	"Yes, to some extent"					
4=YC	"Yes, certainly"					
Explanatory variables		**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Mode**
Label fragmentation (fragmentation)	Fragmentation indicator; 0 for low fragmentation, 1 for high fragmentation	0.47	0.499	0	1	0
Pro-environmental attitude (env_imp)	QF1-"How important is protecting the environment to you personally?" (0=not important, 1=fairly important, 2=very important)					
	env_imp2	0.3	0.46	0	1	0
	env_imp	0.67	0.47	0	1	1
Self-assessed informedness about environmental issues (env_info)	QF4-"How informed do you feel about environmental issues?" (0 if not informed, 1 otherwise)	0.6	0.49	0	1	1
Willingness-to-pay more for environmentally friendly products (buy)	QF12- "Please tell me whether you totally agree, tend to agree, tend to disagree or totally disagree with the following statement: You are ready to buy environmentally friendly products even if they cost a little bit more" 0 if not ready, 1 otherwise	0.82	0.39	0	1	1
Age	Age in years	48.22	17.73	15	94	
Gender	0 if male, 1 if female	0.54	0.5	0	1	1
Children under 10 in the household	0 if no, 1 if yes	0.19	0.39	0	1	0
Type of community of residence	area_type2 (small or middle sized town)	0.37	0.48	0	1	0
	area_type3 (large town)	0.27	0.44	0	1	0
Secondary education (secondary_ed)	1 if education ended between age 15 and 19, 0 otherwise	0.4	0.49	0	1	0
Tertiary education (tertiary_ed)	1 if education ended at age 19 or above, 0 otherwise	0.44	0.5	0	1	0

Employed	1 if employed at the time of the survey, 0 otherwise	0.51	0.5	0	1	1
Regional dummies	Location of respondent's country of residence within Europe					
south		0.2	0.4	0	1	0
east		0.17	0.37	0	1	0
west		0.46	0.49	0	1	0

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