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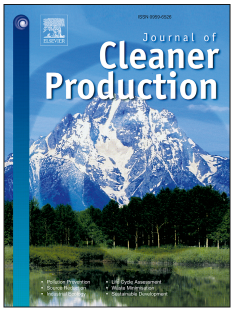

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Tiziana de-Magistris, Azucena Gracia

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Consumers' Willingness-to-Pay for sustainable food products: The case of organically and locally grown almonds in Spain

Tiziana de- Magistris[1,2]*, Azucena Gracia[1,2]

[1]Unidad de Economía Agroalimentaria. Instituto Agroalimentario de Aragón (CITA-Universidad de Zaragoza). Gobierno de Aragón. Avda Montañana 930, 50059, Zaragoza, España

[2]Instituto Agroalimentario de Aragón-IA2 (CITA-Universidad de Zaragoza).

[*] Corresponding author: tmagistris@aragon.es.

Abstract

Organically and locally grown products have positive environmental impacts due to the reduction in the greenhouse emissions required for their production. This paper contributes to this research stream by investigating consumers' preferences and their willingness to pay for almonds that have different sustainable labels: distance claims (100 km, 800 km, and 2000 km) and the organic logo established by the European Union. To achieve the objective, consumers participated in a non-hypothetical choice experiment; latent class modeling was employed to identify distinct patterns of valuation. The results suggest that consumers were willing to pay a positive price premium for locally grown (traveled the shortest distance) and organically produced almonds, whereas they were not willing to pay a price premium for almonds that have traveled longer distances. Moreover, the findings show that consumer preferences for these claims were heterogeneous, with three consumer segments identified as: "conventional consumers", "short distance consumers", and "sustainable consumers". Overall results confirm the results of previous studies because Spanish consumers were willing to pay a premium price for those almonds that are organically and locally produced, and, therefore, generate fewer greenhouse gases emissions. The findings of this study added scientific value to scholars of sustainable consumer behavior because of the use of Real Choice Experiment. Since no-hypothetical evaluation method simulates real markets with real products and a transaction of money, real choice experiment provides better approximations of true willingness to pay for organic and local almonds. Therefore real choice modelling eliminates hypothetical and social bias.

The results of this study contribute to insights in the promotion of sustainable consumption among citizens by policy makers. In this regard, promotional and educational campaigns could drive different segments of consumers to increase their knowledge on the benefits of reduction of the quantity of GHG emissions required for organic and locally grown production.

Keywords: Almonds, Distance label, Organic, sustainable consumer behavior
JEL Classification: **C23, D12, Q18**

1. Introduction

Currently, the number of people interested in sustainable consumption has increased tremendously, particularly in developed countries (de-Magistris et al., 2012). The issue of sustainability in food consumption is stressed in Agenda 21, which declares that unsustainable consumption and production patterns are the main causes of global environmental deterioration (Pack, 2007). Agenda 21 postulates that sustainable development could result in advancements in the areas of economic growth, social progress, and environmental protection (UNDSD, 2006; Pack, 2007).

Sustainable consumption can also be the result of a decision-making process that considers not only consumers' individual needs (related to taste, price, and convenience) but also attitudes towards social responsibility (environment and fair trade), sustainable labels and sustainable food production (Vermeir and Verbeke, 2006; Hartikainen et al., 2014). Sustainable products are perceived by individuals as higher quality, with higher social and economic values, and higher environmental sustainability (Forbes et al., 2009; Biswas and Roy, 2015; Maniatis, 2015); in addition, they are perceived as being more resource and energy efficient (Sirieix et al., 2008).

Sustainable consumption refers to consumption patterns that are economically, socially, and environmentally compatible within all areas of the food system, from food production, processing, and distribution to the food purchases of consumers and to waste disposal (Pack, 2007). Approximately 25% of total greenhouse (GHG) emissions are from goods that travel thousands of kilometers for final consumption or that are used as inputs in several production processes along the way (Cadarso et al., 2010; Lopez et al., 2015). Currently, empirical evidence has shown that, with the increase of stages of production in global value chains, international transport has become more important as a source of pollution and energy consumed (Amate and Gonzales de Molina, 2013; Lopez et al., 2015).

However, local food supply chains with fewer stages between the producer and the end consumer are described as a means of promoting more sustainable consumption systems (Sirieix et al., 2007; Berruto and Busato, 2009) because they reduce environmental impacts, for example reducing energy consumption or GHG emissions in terms of the distance that the food products travel from production to consumption marketplaces. To illustrate, Blanke and Burdick (2005), in their study on the comparison between the costs of locally grown apple versus imported ones, note how more energy efficient local apples are than those imported from New Zealand. These results are in agreement with Sim et al., (2007) who find that apples produced in the U.K. have less environmental impact than those imported from foreign countries (e.g. Italy, Chile or Brazil). Likewise, Keyes et al., (2015) in their study on apple production conclude that the short distances of transportation have a less environmental impact than long distances, but transport by freight ship is environmentally preferable than transport truck delivery in long distance. Conversely, the study conducted by Payen et al., (2015) reports that imported tomatoes from Southern Morocco to french market have less environmental impact than locally grown tomatoes although the energy used to export tomatoes is lower for the Moroccan export tomato. Finally, Rothwell et al., (2015) indicate a better environmental impact of locally grown lettuce compared to de-localized lettuce.

Similarly, the consumption of organic food has been considered environmentally sustainable because it has been proven scientifically that is better for certain environmental impacts (Cerutti, 2011; Abeliotis et al., 2013; van der Werf et al., 2015) such as the reduction of the quantity of GHG emissions required for organic production. In this regard, a large number of studies compare organic and conventional farming systems (Flessa et al., 2002; Van der Werf et al., 2007; Meisterling et al., 2009; Venkat, 2012; Knudsen et al., 2014; Schader et al., 2014; He et al., 2016; Foteinis and Chatzisymeon, 2016). To illustrate, Flessa et al., (2002) and Venkat, (2012) find that conversion from conventional to organic system offers significant GHG emissions reduction. Van der Werf et al., (2007) report that the GHG emissions from organic pig production are lower than from a conventional pig production farm. Similarly, Meisterling et al., (2009) show that organic wheat bread cultivation produces lower GHG emissions than conventional ones. In the same line, Knudsen et al. (2014) indicate that the average greenhouse gas emissions per hectare in the organic arable crop rotation systems are lower than the conventional system. Schader et al., (2014) demonstrate that organic dairy production mitigated the GHG emissions to approximately 20% less than the GHG emissions for conventional dairy farming. Conversely, He et al., (2016) point out that organic production of tomatoes in China shows positive environmental impact only associated to the reduction of fertilizers and pesticides. Finally, Foteinis and Chatzisymeon (2016) indicate that organic cultivation of lettuce provides lower quantity of CO_2 emissions in comparison to conventional ones (e.g. 11% and 15% respectively).

Thus, overall results indicate that food products produced locally and grown organically are two suitable examples of sustainable food products.

The objective of this study is to contribute to the debate on consumers' preferences for sustainable food products by examining those related to the reduction of GHG emissions: organically and locally grown almonds, which are identified by a label on the product. For the locally grown attribute, a label indicating the distance in kilometers between the production and consumption areas is used. For organic foods, EU Regulation 271/2010 established that products should be labelled with the "Euro Leaf", which symbolizes the union of Europe and nature (the stars on European flag and green and stylized leaf).

To achieve the objective, a real choice experiment (RCE) has been used to elicit responses concerning preferences with the greatest veracity possible. Actually, it has been shown that studies based on stated preferences are likely to be subject not only to hypothetical bias but also to social desirability influences because of the environmental nature of the good to be valued (Kemp et al., 2010). Therefore, the added value of this paper is also the use of a real valuation method that has the advantage to simulate a real market and then, to mitigate the hypothetical and social bias because it includes both real products and an incentive compatible mechanism.

The remainder of this article is organized as follows: Section 2 presents the experimental choice design, procedures, data gathering, and the model specification. Section 3 describes the results and discussion. The final section presents conclusions, and the implications of this study are discussed.

2. Materials and methods

To assess consumers' preferences for different sustainable claims (distances and organic), an RCE, which includes both real products and an incentive-compatible mechanism, was used (Loomis et al., 2009; Gracia and de-Magistris 2013; de-Magistris et al., 2013). Generally, RCE is characterized by the inclusion of several options comprising the same product with different attributes and prices, with the subject selecting the alternative that best reflects his/her preferences (Van Loo et al., 2011). The advantage of using the RCE is that the task requested of respondents is similar to the purchase decision that people encounter when buying goods in the stores. Indeed, the willingness-to-pay (WTP) values obtained by RCE represent the best approximation of the true preferences corresponding to real payments in the market for a good frequently bought and memorized previously by consumers (Chang et al., 2009; Marette et al.,2008).

Several studies have examined consumers` willingness to pay for sustainable food products and services; however, these did not use a real choice experiment (RCE). Shuai et al., (2014) examined the willingness to pay for low-carbon products with carbon labels among Chinese consumers using a hypothetical experiment. The authors found that the willingness to pay for low-carbon was positively correlated with age and education of participants. Motoshita et al., (2015) investigated the impact of information on carbon dioxide emissions on choice for daily food products and drinks using a hypothetical choice experiment (CE). The authors found that Japanese consumers showed preferences for low GHG emissions, paying a price premium for them when the information associated with CO2 was provided in the product. Sun et al., (2015) applied a Contingent Valuation Method to estimate the WTP for reducing air pollution in the urban areas of China. The findings indicated that approximately 90% of the citizens were willing to pay for reducing air pollution. Finally, Vecchio and Annunziata (2015) analyzed consumers' willingness to pay for three sustainability labels (fair trade, rainforest alliance and, carbon footprint) using an experimental auction approach. The researchers note that gender, age and, income showed positive and statistically significant effects on WTP.

2.1. Choice set design

The implementation of the choice experiment consists of selecting the product and then its attributes and levels. Almonds were chosen in this study because its consumption has important economic, social, and environmental effects in supporting the local economy in the area in terms of jobs and income. Spain is one the most important producer of almonds in the world, and Aragón produces 23% of Spanish almonds (i.e., 44,384 of more than 188,600 tons harvested in the country) (Magrama, 2014). Conversely, organic almond production represents 3% of the total almond production in Aragon with 133,100 tons harvested (Mercasa, 2014b). With regards to demand, annual per capita dry fruit consumption in 2013 was 2.8 kg with an associated expenditure of 18.6 euros per year; 1.2% corresponds to almonds. In particular, the per capita consumption of almonds represented 200 g per year (Mercasa, 2014a). Specifically, in this experiment a packet of 100 g of natural almonds was selected.

Regarding the choice of attributes, the price was selected to calculate the marginal WTP values. The four price levels (1.35 euros, 1.84 euros, 2.33 euros, and 2.82 euros) for a packet of 100 g of natural almonds were chosen because these reflect the price levels found in Spanish supermarkets when the experiment was conducted (de-Magistris and Gracia, 2014). The price difference between the choices alternatives was €0.49. Currently, the retail price for unlabeled almonds sold in Spain ranged between €1.25 and €1.70 per package. However, prices for locally produced almonds or organic almonds ranged between €2 and €3 per package (Magrama, 2014).

The second attribute is the "distance" of almonds transported from the place of production to the place of consumption, expressed in kilometers. Four distance levels were defined. The first level corresponded to unlabeled almond because the package of almond had no label affixed indicating the distance expressed in kilometers. The next level indicated that the almond was produced locally within 100 km of the Zaragoza area. Thus, the second distance level was set at 100 km. The third level was set at 800 km corresponding to almonds that have traveled approximately 800 kilometers from the area of production. The last level was a claim which indicated that the almond traveled 2,000 km from the area of production. This means that almonds were produced outside Spain but in Europe (de-Magistris and Gracia, 2014; de-Magistris et al., 2013).

Finally, the third attribute is the "method of production" defined in two levels. The first level corresponded to unlabeled almond while the second level indicated that the products were organically produced in Europe under EU regulation (Refer to table 1.).

Participants were not deceived during the experiment because the almonds were purchased from places indicated by the distance labels and they were either organically produced or conventional (de-Magistris and Gracia, 2014; de-Magistris et al., 2013).

[Insert Table 1 about here]

The method proposed by Street and Burgess (2007) was used to create the choice set design and produce optimal choice sets. First, the 16 profiles in the first option were obtained using orthogonal main effect plan (OMEP) by SPSS software. Then, the 16 sets in the second option were obtained by applying one of the generators for difference vector (1 1 1) for three attributes with 4, 2, and 4 levels, respectively, and two options. The design obtained in this experiment was 92.5% D-efficient compared with the optimal design.

Finally, the total number of choice sets was 16 and three options were included in each choice set. The first two alternatives consisted of different almonds whereas the third alternative was the no-buy scenario (Refer Figure 1).

[Insert Figure 1 about here]

2.2.Real Choice Experiment procedure

In this study, RCE consisted of two sequential tasks. The first task (Task I) was a RCE while the second task was a hold-out task (Task II).

Before starting the RCE, the monitor informed participants that both tasks would be randomly selected as binding at the end of the experiment. Moreover, he/she explained the meaning of attributes and its levels to consumers who were also allowed to examine the different almonds in the 16 choice sets carefully. Then, the almond RCE was undertaken. Subjects chose in each of 16 choice sets one the two packets of almonds they would buy or not to buy either of them. At the end of the Task I, participants performed an additional "hold-out task" consisting of eight different choice sets of almonds. These choice sets were from the original full fractional design and they had not been used in Task I, plus a non-buy option (Ding et al., 2005; de-Magistris et al., 2013).

When the experiment ended, the experimenter randomly selected one of the two tasks as binding. If Task I (the RCE) was selected as the binding task, then the monitor randomly selected a number between 1 and 16 to determine the binding choice set. The individuals paid the corresponding marked price of the almond they had chosen in this binding choice set, unless they had picked the no-buy option. However, if monitor randomly selected Task II (the hold-out task) as binding, the participants bought the almond they had decided to purchase in this task and they paid the corresponding price. At the end of the experiment, subjects completed a short questionnaire on socio-demographic variables.

2.3 Data gathering

The participants in our experiment were selected from a specific target population (Harrison and List, 2004). In an attempt to ensure that individuals were the people responsible for the food purchase, primary food buyers in the household who consumed almonds were invited to participate in RCE the experiment (Harrison and List, 2004; Chang et al., 2009)

The RCE experiment was conducted in the capital of the Aragón region in Spain during fall 2011. The convenience sample of participants was stratified with a proportional allocation strategy according to age, gender, and education level and randomly selected in different places across the city (de-Magistris and Gracia, 2014). The total sample size consisted of 171 consumers, resulting in a sampling error of +/- 7.4% and a confidence level of 95.5% (K=2) when estimating proportions (p=q=0.5).

As shown in Table 2, the sample size consists of approximately 37% of consumers that have a higher degree of education (e.g. graduate, master or doctorate). Moreover, half the subjects were female (51.9%), and approximately 20% of the individuals had a net monthly income greater than €3,500.

[Insert Table 2 about here]

2.3.Latent class (LC) modeling

The empirical latent class model is based on Lancaster theory (Lancaster, 1966) and McFadden random utility (1974). This means that the total utility associated to almonds can be decomposed into separate utilities corresponding to each attribute and that these individual utilities are treated as stochastic because they are unobservable by the researcher.

In the LC model specification, preferences for the different claims in the choice experiment, as well as the no-buy alternative do not differ for each subject, but rather are assumed to belong to different classes, each of them characterized by different class-specific utility parameters (Hynes et al., 2008; Barreiro-Hurle et al., 2009; Gracia et al., 2014) as the following equation (1):

$$U_{njt|s} = \alpha + \beta_{1|s} price_{njt} + \beta_{2|s} organic_{njt} + \beta_{3|s} km100_{njt} + \beta_{4|s} km800_{njt} + \\ + \beta_{5|s} km2000_{njt} + \varepsilon_{njt|s} \quad (1)$$

where *n* denotes the number of individuals, *j* represents each of the three alternatives in the choice set and *t* is the number of choice sets. $\beta_{1|s}$, $\beta_{2|s}$, $\beta_{3|s}$, $\beta_{4|s}$, and $\beta_{5|s}$ are the parameter vectors of class *s* corresponding to the vector of attributes variables (*price*, *organic*, *km100*, *km800, km2000*) and $\varepsilon_{njt|s}$ are error terms of type I. The densities of the unobserved terms *f (* $\varepsilon_{njt|s}$ *)* assume heterogeneous consumer preferences.

As note in equation (1), the variable α is the alternative-specific constant, coded as a dummy variable equal to 1 for the non-buy option and 0 otherwise. The price (*price*) variable enters into the model as a continuous variable (€1.35, €1.84, €2.33, and €2.82) and the price difference between the choices alternatives is €0.49. The four price levels were real market prices for the different almonds found in the Spanish supermarkets. The distance variables (*km100*, *km800,* and *km2000*) and organic variable (*organic*) are coded as dummy variables because they indicate whether the corresponding claims analyzed are present or absent in the model (de-Magistris and Gracia, 2014).

Therefore, for the given class membership, the choice probability that individual *n*, conditional on belonging to class *s* (s = 1, …, S), will choose an alternative *j* is represented as showed in equation (2):

$$P_{ni} = \sum_{s=1}^{S} P_{ns} \prod_{t=1}^{T} P_{njt|s} \quad (2)$$

where P_{ns} is the probability that individual *n* belongs to class *s* and $P_{njt|s}$ is the choice probability that individual *n*, conditional on belonging to class s (s = 1,…,S), will choice option *j* from a particular choice occasion *t* (Greene and Hensher, 2003; Gracia et al., 2014; Gracia and de-Magistris, 2013).

3. Results and Discussion

The first step of the analysis consisted in estimating LC models taking into account one to four latent classes of the equation (1). Firstly, all consumers' socio-demographic variables were included in the class membership function, as defined in Table 2. However, solely those socio-demographic variables found to be significant (FEMALE and OLDER) were included in equation (1); and this new specification was estimated again considering one to four latent classes. In order to select the number of segments to be considered in LC modeling, different criteria were calculated: the minimum Akaike information criterion (AIC), the modified Akaike information criterion (AIC3), and the minimum Bayesian information criterion (BIC) (Gracia and de-Magistris, 2013) (Table 3). However, because all these were constantly decreasing, to select the optimal number of latent segments, whether additional segments would provide any further economic information was also examined, as posited by Swait (1994). Using this recommendation, the model was selected with three latent classes because it provided more meaningful information regarding the valuation of the different labels analyzed.

[Insert Tables 3]

LC model estimated with three classes and the coefficient estimates for a LC model with one class are included for comparison in Table 4.

Examining the parameter estimates for one-segment, it is noticed that price coefficient is negative and statistically significant indicating that increments in the price decrease the consumers' utility level. In the same token, the effect of the *organic* parameter in the utility function is statistically significant and positive at the 1% significance level, which indicates that the utility gained by consumers for a packet of almonds organically produced was higher than for conventional ones. In addition, with regard the significance of the distance labels variables, it is noticed that all of them are also statistically significant; however, the *km800* and *km2000* coefficients are negative while the *km100* coefficient is positive. This finding implies that the utility gained by the consumers from a packet of labeled almonds produced far away from the place of consumption was higher than for the unlabeled package. However, utility gained by participants from a packet of natural almonds labeled as produced less than 100 km from the consumption area respondents was higher than the unlabeled packaged.

Conversely, the coefficients estimates for the LC model with three segments are examined since it was found that the three-segment LC model had better statistical properties.

As shown in table 4, the first segment constitutes 31% of the sample. Moreover, the segment membership function coefficients indicate that the probability of belonging to this segment is positively influenced by being male and younger. Consumers in this segment are also indifferent towards the *km800* label because the corresponding estimate coefficient is not statistically significant. The consumers also positively value the *organic* and *km100* labels, but value the *km2000* negatively. This finding suggests that utility gained by consumers from a packet of almonds locally and organically produced was high. However, utility gained by respondents and associated to a packet of natural almonds traveled 2000 km from the production area was low.

The second segment includes 36% of respondents; its segment membership function coefficients show that the probability of belonging to this segment is positively influenced by being female (FEMALE) and older (OLDER). In this segment, consumers also positively value both the *organic* and the *km100* label. Moreover, the *km800* and *km2000* coefficients are statistically significant and negative. This finding means that Spanish consumers preferred to buy almonds without these distance labels since the utility from a package of almonds produced far away from the consumption area was less in comparison with the utility obtained by consumers for unlabeled almond.

Finally, the third segment consists of 33% of respondents; the probability of belonging to this segment is also positively related to FEMALE and positively to OLDER. Consumers in this segment also positively value the ORGANIC and the *km100* label; however, they do not express preference for the *km800* label because its estimated coefficient was not statistically significant. This result indicates that consumers prefer to buy almonds without the distance label of km800. Moreover, as in the first segment, the *km2000* coefficient was statistically significant and negative.

However, in order to better understand the valuation patterns of Spanish the WTP values were calculated and they are shown in the bottom of table 4. In the first segment, consumers would be willing to pay a positive premium for a package of organic labeled almonds and for a packet with a label indicating that the product was produced locally within 100 km of the consumption area (i.e., locally produced within the Zaragoza province); however, these premiums are lower than the other two segments. Moreover, consumers are not willing to pay for the *km800* and present a negative premium for the *km2000*. This last result is similar to the third segment. Concluding, the premiums for the four labels are the lowest in the first segment. In particular, respondents would be willing to pay €0.27/100 g for the organic almonds and €0.21/100 g for the local (*km100*) almonds.

However, it is observed that the WTP values for the second segment are all statistically significantly different from zero at the 5% significance level. In particular, consumers were willing to pay a positive premium for a packet of natural almonds with the EU organic label and for a packet with a label indicating that the product locally produced within the Zaragoza province. In particular, consumers are willing to pay more for a product with the locally produced label (*km100*) (€1.18/100 g) than for the EU organic label (€0.85/100 g). This result means that, on average, €1.18/packet was the premium that consumers in this segment would pay to purchase a packet of local almonds with the *km100* distance label affixed, and €0.85/packet was the premium that consumers in this segment would pay to purchase a packet of almonds with the EU organic label. In contrast, consumers were willing to be compensated for the €1.68/package and the €1.00/package for the almonds with 2000 km and 800 km distance labels, preferring to buy almonds without these distance indicators.

In the third segment, the WTP values for the organic and local labels (*km100*) are also positive and statistically significantly different from zero at the 5% significance level, but higher than for segment 1. This finding means that, on average, €1.40/package is the premium that consumers in this segment would pay to purchase a package of local almonds with the *km100* distance label affixed and €1.22/package is the premium that they would pay to purchase a packet of almonds with European organic label. WTP for the *km800* label is statistically equal to zero, indicating that consumers in this segment would not pay any premium for almonds with this label affixed compared with the unlabeled almonds. Moreover, WTP for the *km2000* label is negative, meaning that consumers were willing to pay €1.33/package less for almonds that were 2000 km further away compared with the unlabeled almonds.

Hence, the first segment can be termed "conventional consumers" because individuals in this segment are willing to pay a premium; however, this segment is small and lower than the other two segments. Conversely, we can define the second segment as "short distance consumers" because, although they are also willing to pay for organic almonds, they are willing to pay a higher amount of money for almonds produced within 100 km from the consumption area. Finally, the third segment is defined as "sustainable consumers" because it consists of consumers who, although the value local label (*km100*) is higher than the EU organic labels, the WTP values are the highest of the first and second segments.

[Table 4 about here]

Overall results indicate that consumers were willing to pay more for a packet of natural almonds traveled 100 km from the place of production than for a package organically produced in Europe. Findings reported that Spanish consumers were willing to pay a price premium of approximately 25% for locally produced almonds and 5% for organically produced almonds. These findings are in agreement with Sun et al., (2015) and Motoshita et al., (2015) because Spanish consumers were willing to pay a price premium for those almonds that are organically and locally produced, and therefore generate less greenhouse gases emissions. Surprisingly, the findings also suggest that participants valued more almonds that had no label affixed indicating the distance expressed in kilometers compared with almonds that were produced further away, i.e., 800 km and 2000 km. Therefore, these results are in accordance with Yue and Tong (2009), James et al. (2009), Hu et al. (2009) who reported that individuals preferred products locally grown. Similarly, findings are also similar to those of Grebitus et al., (2013) and Onozaka and McFadden (2011) who indicated that Americans negatively valued those goods imported from foreign countries (e.g., Chile or Mexico).

Conversely, a small group of consumers also positively valued the organic and short distance labels, but to a lesser extent than "conventional consumers"; in addition, they valued the organic label more than the local one. However, the least valued almonds for consumers in this small segment are those produced far away from the production region. Finally, in attempting to profile these segments according to consumers' socio-demographic characteristics, two characteristics were noted to be significant, meaning that consumers have heterogeneous preferences that depend on gender and age. In this regard, this result is vary reasonable because empirical evidence has noted that consumer preferences for sustainable food products depend on certain socio-demographic characteristics such as gender and age (Pomarici and Vecchio, 2014; Vecchio and Annunziata, 2015; Wu et al., 2015). For example, Vecchio and Pomarici (2015) and Annunziata and Vecchio (2015) found that women and younger people were willing to pay more for fair trade products and, sustainable wine, respectively. Similarly, in this investigation, the probability of belonging to the first and second segment is higher for female and older people, whereas the probability is higher for males and younger consumers in the third segment.

4. Conclusion

Nowadays consumers and stakeholders are paying attention to two sustainability attributes that are organic and local because of their relation to the reduction of GHG emissions. Consequently, empirical research on consumers' preferences for both of these attributes has increased tremendously during the recent years.

This paper contributes to this research stream by studying consumers' preferences for almond products with organic and/or different distance labels affixed (local origin being one of these, i.e., *km100*). Moreover, findings also provide added scientific value to scholars of sustainable consumer behaviour since the consumers' WTP for those labels was assessed using a real valuation method (RCE). The use of RCE has several merits in terms of real market simulation and consumer friendly application. The RCE has the advantage of simulating real markets and mitigating hypothetical and social bias because it includes both incentive compatible mechanism and real products. Thus, the WTPs for organic and local almonds revealed by Spanish consumers in this study are better approximations of true preferences and true values corresponding to real payments in the Spanish stores.

In addition, the findings showed that consumers could be grouped into three segments, in which two segments could be considered as sustainable consumers. The first segment consists of consumers who prefer to buy unlabeled and conventional almonds compared with almonds produced out of the region and country; in addition, they are willing to pay the lowest premium price for organic almonds and locally produced almonds. However, the second and the third segments are composed of those consumers who highly value locally and organically produced almonds. Conversely, the third segment compared with the second consists of those consumers who are willing to pay a price premium for organic and local almonds that are higher than what consumers in the other two segments will pay.

Because it was found that consumer preferences for organic and distance labeling were heterogeneous, the results of this study could be considered useful when policy makers promote sustainable consumption among citizens. To increase knowledge on the benefits of sustainable consumption in relation to the adoption of cleaner production and the environment in general, workshops and training activities on the relation between environmental sustainability and food consumption should be conducted. For instance, consumers should be educated concerning the decrease in energy consumption for food produced closer to the place of consumption (local production), and the reduction of GHG emissions from organic methods of production. In addition, these educational campaigns should be targeted first at the conventional consumers segment, which is composed of younger and male consumers who prefer unlabeled conventional almonds. In the second stage, the educational campaigns should be targeted to consumers in the second segment, which is characterized by older and female individuals who value both organic and local labels but who do so less than consumers in the third segment. Therefore, there is the potential to exert greater influence. Nonetheless, promotional campaigns should also be implemented to reach the consumer segments that are willing to pay more for local and organic labels (segment 3).

However, to check whether these results hold, further studies are needed. For example, since some study used a homegrown auction to estimate WTPs for sustainable products (e.g. fair trade) among young consumers, it would be interesting to conduct this current study using auctions while also considering different mechanisms (e.g., random n^{th} price auctions and BDM). In addition, it would be interesting to test whether differences in WTP values between these incentive compatibility methods exist.

Conversely, given the important role that information on labels could have to increase consumer awareness of collective welfare problems and to change consumption patterns, an interesting further research study could be to implement the RCE under different information scenarios. For example, because it is scientifically proven that organic and local productions reduce the GHG emissions in their production, it would be interesting to investigate the effect of additional information on this topic and to examine the difference in WTP values between informed and uninformed consumers.

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Table 1. Sample characteristics (%) and definition of the variables

Variable definition		Sample	Population*
Gender			
Male	FEMALE	48.1	47.3
Female	(dummy 1=female; 0 otherwise)	51.9	52.7
Age	OLDER		
Between 18-35 years	(dummy 1= age more than 54 years; 0 otherwise)	26.4	25.1
Between 35-54 years		34.4	30.8
Between 55-64 years		17.0	11.6
More than 64 years		22.1	19.4
Education of respondent			
Elementary School	HDEGREE	24.6	29.0
High School	(dummy 1=high degree;	38.0	44.0
High degree level (university, master or doctorate degree)	0 otherwise)	37.3	27.0
Average household monthly net income	HINCOME		
Between 900 and ,1,500 Euro	(dummy 1=more than 3,500€; 0 otherwise)	28.0	N.A[a]
Between 1,501 and 3,500 Euro		52.0	N.A
More than 3,500		20.0	N.A

*Source: IAEST (2010).

[a] N.A means not available

Table 2. - Attributes and levels used in the choice experiment design

Attributes	Levels
Price (€ per package)	1.35, 1.84, 2.33 and 2.82 (*price*)
Method of production	**Unlabelled** (conventional)
	EU organic label (*organic*)
Distance label associated with the distance in kilometres between the producing and consuming area	**No label** (no information on the distance)
	100 kilometers label (*km100*) Which means that the almonds were produced in the province where the town is located
	800 kilometers label (*km800*) Which means that the almonds were from in other Spanish or neighbor regions
	2000 kilometers label (*km2000*) Which means that the almonds were from foreign European countries

Table 3**:** Statistics used to determine the optimal number of consumer segments.

Number of Segments	Number of parameters(p)	Log-likelihood (LL)[a]	AIC[b]	AIC3[c]	BIC[d]
1	6	-5627.46	11266.92	11272.92	5635.657
2	13	-5432.29	10890.58	10903.58	5450.051
3	20	-5381.57	10803.14	10823.14	5408.894
4	27	-5327.57	10709.14	10736.14	5364.457

[a]Log likelihood evaluated at zero is −6767.47
[b]AIC (Akaike Information Criterion) is calculated using −2(LL − p).
[c]AIC3 (Bozdogan Akaike Information Criterion) is calculated using −2LL + 3p.
[d]BIC (Bayesian Information Criterion) is calculated using −2(LL−(p/2)ln(T)) where T represents the number of choices

Table 4. Parameter estimates with one and three segments

	One-segment model		Latent classes					
			Segment 1		Segment 2		Segment 3	
	Coef	z-test	Coef	z-test	Coef	z-test	Coef	z-test
organic	0.787***	13.35	0.983***	6.47	0.931***	6.60	0.827***	9.45
km100	0.847***	10.80	0.813***	4.10	1.291***	8.27	0.951***	6.33
km800	-0.284***	-3.02	-0.156	-0.67	-1.103***	-4.56	0.157	0.99
km2000	-1.081***	-11.34	-1.21***	-5.55	-1.831***	-6.45	-0.90***	-6.35
price	-1.329***	-21.07	-3.70***	-3.70	-1.087***	-7.57	-0.677***	-6.83
no_buy	-2.149***	-15.21	-6.44***	-6.44	-0.561*	-1.85	-0.262***	-9.31
OLDER					3.641***	3.64	2.872***	4.15
FEMALE					1.570**	1.57	1.405**	2.36
Class probability			31%		36%		33%	
Population mean WTP= $-(\beta_{attribute} / \beta_{price})$ (€/100 grams)								
ORGANIC			0.27***	6.36	0.85***	5.82	1.22***	5.62
km100			0.21***	4.20	1.18 ***	5.97	1.40***	4.79
km800			-0.04	-0.67	-1.01 ***	-4.08	0.23	0.98
km2000			-0.32***	-5.54	-1.68***	-5.08	-1.33***	-4.75

(***) (**) (*) denotes statistical significance at the 1%, 5% and 10% significance

Figure 1: Example of choice set

Choice situation 5	Almond A	Almond B
	 Conventional almonds Distance :**800 km** **1,84 €**	 Organic almonds Distancia: **2000 km** **2,33€**

I want to choice :	**Almond A**	**Almond B**
I choice neither Almond A nor Almond B		

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Highlights

- Consumers are willing to pay a positive premium price for local and organic almonds.
- Consumers are not willing to pay for almonds travelled with longer distances.
- Consumer preferences are heterogeneous, with three consumer segments.
- Three segments are named “conventional”, “shortest distance” and “sustainability”.