

Consumer-stated preferences towards Protected Designation of Origin (PDO) labels in a traditional olive-oil-producing country: the case of Spain

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1. Introduction

It is widely recognized that the recent changes in the agro-food systems are part of a wider trend in societies as well as in economic systems. Because of the current context marked by globalization, several food crises, and growing prevalence of obesity and chronic disease, consumers are aware of the link between food and health, and are thus questioning their consumption and searching for a new life-style. The public concern and interest in safety, healthiness, sustainability, and social issues on production practices have increased at all levels of food chain (Vermier and Verbeke, 2006). Additionally, in the current globalized, anonymous, and urban world, where a large variety of exotic and imported food products are available, consumers seem to feel that they have lost their identities and roots (Trabelsi-Trigui and Giraud, 2012). These reflections are the source of new trends in consumption in which consumers include in their purchasing decision such criteria as local and typical attributes and environmental as well as ethical issues. The emerging scenario, continuous adaptation, presents noteworthy implications for strategic management.

As a result, the European Union (EU) has implemented

Abstract

This study investigates the relative importance that European origin labels (Protected Designation of Origin, PDO) associated with extrinsic (price and packaging) and intrinsic (colour) cues of Spanish olive oil has in consumer preferences. We conducted a survey through face-to-face interviews in Andalusia (southern Spain) with 439 consumers of olive oil. The consumers' preferences were estimated using the conjoint analysis (CA). Furthermore, market segmentation was also performed through a cluster analysis. The results indicate that price and origin labelling (PDO label) are the attributes that most affect consumers' preferences. Four consumer segments were identified, two of which concern liking the origin label.

Keywords: PDO label, extra-virgin olive oil, consumer preferences, conjoint analysis, Spain.

Résumé

Cette étude examine l'importance relative de la certification Européenne d'origine (Appellation d'Origine Contrôlée, AOC) par rapport à d'autres attributs extrinsèques (prix et emballage) et intrinsèques (couleur) de l'huile d'olive espagnole dans la formation des préférences des consommateurs. Nous avons effectué une enquête face-à-face auprès de 439 consommateurs d'huile d'olive en Andalousie (Sud de l'Espagne). Les préférences des consommateurs ont été estimées en utilisant la méthode d'analyse conjointe (AC). En plus, la segmentation du marché a été réalisée par la technique d'analyse cluster. Les résultats indiquent que le prix et la certification d'origine (label AOC) sont les attributs les plus déterminants des préférences des consommateurs. Quatre segments de consommateurs ont été identifiés, dont deux sont liés à l'appréciation du label AOC.

Mots-clés: label AOC, huile d'olive vierge extra, préférences des consommateurs, analyse conjointe, Espagne.

several strategies of food labelling to encourage food differentiation and quality insurance by highlighting the attributes or benefits that may be valued by consumers. These labels may help ensure that consumers can correctly judge a product at the same time as enabling the producer to adapt production to meet consumer demands and expectations, promoting social or economic objectives (Menapace *et al.*, 2011). The primary overarching economic justification for product labelling is that labels can resolve market inadequacies associated with the supply of high-quality goods under asymmetric information (Menapace *et al.*, 2011).

One particular strategy has been used to certify products for which quality and reputation are linked to the region where they are produced through origin labelling. Regulations (e.g. EEC 2081/1992, EEC 510/2006, EEC 1151/2012, etc.) represent the legislative framework of Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Guaranteed Speciality (TSG). The PDO and PGI are intended to act as a system to protect and promote the reputation or image of typical food products against misappropriation and other practices that mislead consumers about the real origin, specific raw ingredients or traditional technical process developed in specific area (Resano *et al.*, 2012). One of the main objectives of the Protected Designations of Origin (PDO), as strategies of differential quality organization related to the territory, is to provide a competitive alternative for local productive systems that specialize in food products, such as olive oil, with

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a strong heritage and an authenticity component associated with differential quality attributes (Boyazoglu, 1999; Türkekul *et al.*, 2010; Sanz-Cañada, 2011). These labels are expected to offer food-safety guarantees based on their traceability and authentication as well as on the high organoleptic qualities linked to their origin (Trabelsi-Trigui and Giraud, 2012). The image of the region of origin and the differential specific quality create a unique identity for the products, enabling companies to achieve greater added value and higher prices in markets that tend increasingly to value quality over quantity. This strategic orientation is not aimed at increasing production, but rather towards diversifying the food supply by highlighting attributes or benefits which may be valued by the consumers and therefore differentiate the product from competitors.

Despite the time lapse since their inception, the debate continues concerning awareness of these labels and their effect on consumers' attitudes, preferences, and quality perception, (European Court of Auditors, 2011; Hadjou *et al.*, 2013).

In this framework, the main objective of the present study is to assess consumer preference towards a PDO-labelled extra-virgin olive oil and analyse the market potential of the European PDO label in the Spanish olive-oil sector. For this, general geographical indication labels (PDO label) have been considered. Using the conjoint-analysis method, we investigate the relative importance of PDO-labelled extra-virgin olive oil in consumers' utility function. Then, by means of clustering techniques, we seek to establish market segmentation and profiling.

This paper is structured as follows. Section 2 will offer a literature review. Information about the Spanish and particularly the Andalusian olive-oil sector is presented in Section 3. Section 4 explains the research methodology (sample, original consumer surveys and statistical measurements) and justifies its selection. Section 5 presents the results and explains the structure of consumers' preferences and market segmentation and characterization. Finally, the conclusion highlights the marketing implication of these findings.

2. Literature review

Several studies have specifically considered consumer preferences for PDO-labelled products through a great variety of methodological approaches, using mainly stated-preference techniques such as conjoint analysis or choice experiment. These studies have covered different food products including wine (Caniglia *et al.*, 2008; Hertzberg and Malorgio, 2008), cheese (Bonnet and Simioni, 2001), meat (Platania and Privitera, 2006), air-cured ham (Fandos and Flavián, 2006; Mesías *et al.*, 2009; Resano *et al.*, 2012), and olive oil (Van der Lans *et al.*, 2001; Scarpa and Del Giudice, 2004; Krytallis and Ness, 2005), the latter being the aim of the present study.

Fotopoulos and Krytallis (2003) performed conjoint and cluster analysis to determine Greek consumers' preference

and willingness to pay for Zagora apples having a Protected Designation of Origin (PDO) label. The results indicate that the appearance of a PDO label is more important than the product's price only for discrete buyers, who mostly belong to upper social and income groups. The study by Fandos and Flavián (2006) concerning air-cured ham in Spain suggests that the information transmitted by the PDO via images positively and significantly influences consumers' feelings towards PDO products increasing consumer loyalty. This agrees with the findings of Resano *et al.* (2012) showing that consumers who attach more intense connotations of authenticity, tradition, quality, safety, taste, and social prestige to the PDO label also manifest a stronger preference towards the quality-certification label. Furthermore, these authors indicate that the regional specialty protected with a PDO, compared with a generic non-certified product, boosts the probability of choice by 9.34%. Also, according to Van Ittersum *et al.* (2007), consumers' perception of PDO is linked to quality warranty and to the economic-support dimension (rural development). These authors have shown that the perceived quality of this label has substantial impact on willingness to pay (WTP). This result disagrees findings by Bonnet and Simioni (2001), who suggest that French consumers prefer the brand of Camembert cheese products more than the PDO label. In fact, at the same price, only a small proportion (less than 15%) of consumers would prefer to buy a similar Camembert brand with a PDO label rather than without it.

In the case of olive oil, the literature examining consumer preferences of PDO labelling is not extensive. In Italy, Van der Lans *et al.* (2001) found that the Region of Origin and PDO label have indirect impact on consumers' preference through perceived quality of the product. Moreover, the Region of Origin has a direct effect on willingness to pay (WTP) for "local" consumers. However, PDO label has no direct effect on WTP but influence consumers' preferences of olive oil only indirectly through perceived quality because they are perceived by consumers as an indicator of the olive oil's quality. The study of Scarpa *et al.* (2005) focused also on the importance of PDO label in oranges, olive oil, and table grapes for Italian consumers, confirmed that the role of this label was stronger for olive oil than for the other two products. Krystallis and Ness (2005), applying conjoint analysis, indicated that Greek preferences of PDO-labelled olive oil are affected by factors such as the consumers' age, education, and income. More recently, Menapace *et al.* (2011) have found that Canadian consumers are willing to pay an additional premium for both a geographical indication on olive-oil PDO and PGI. However, these consumers valued extra-virgin olive oil bearing a PDO more than a PGI label. Aprile *et al.* (2012) carried out two surveys: one in which information on the meaning of the labels (PDO, PGI, organic) was provided right before the presentation of the choice questions (treatment with information); and another one without any information on the la-

bels (treatment without information). Their results generally suggest that in the “without information” treatment, respondents revealed that they are willing to pay the highest premium price for labels indicating extra-virgin olive oil, followed by PGI, PDO, and Organic Farming labels. On the other hand, respondents in the “with information” treatment tend to value PDO labelling the most, followed by Organic farming and PGI labelling.

From this literature review, we conclude that the influence of PDO labelling on consumer preference and willingness to pay varies among products and countries. Despite that the literature covers different European countries, mainly traditional producers of olive oil and other countries from outside the EU (Canada, etc.), there is insufficient literature on the particular topic of olive-oil PDO labelling and the effect that such labels have on consumer preferences in Spain. The new and increased interest in locally produced foods and their social and environmental externalities make this topic worth investigating.

3. Importance of olive-oil sector in Spain and Andalusia

The olive-oil sector is of particular social, economic, and environmental importance within Mediterranean agricultural food systems, and more specifically in Spain. Olive orchards occupy 2,584,564 hectares, including both rain-fed and irrigated areas (IOOC, 2010), and Spain is the first world producer and exporter of olive oil and table olives. The country produces 43% of the total olive-oil world production, which comprises a gross production of 1,990 million euros (MAGRAMA, 2012). In Spain, olive oil has had a long tradition as a product marketed as a commodity and has been considered as such in the preferences of consumers, even though it is a food product with high differentiation possibilities (Sanz-Cañada, 2011). Olive oil is also an essential component of the so-called “Mediterranean diet”.

The region of Andalusia, located in southern Spain, is the major olive-producing area worldwide with a total area of 1.5 million hectares (19% of worldwide olive-orchard area, 30% of the total olive-orchard area in the EU, and 59% in Spain (MAGRAMA, 2012). Olive production in this region is the second most important agricultural sector after horticulture, creating an overall income of 2,660 million euros in 2007 (26% of total agricultural production of Andalusia).

Nearly 38% of the Spanish olive-oil-orchard surface area was labelled with a PDO, so that about 703,500 ha of olive oil was PDO labelled in 2010. Spain has 27 PDO for olive oil, producing 99,988 tonnes in 2010. Only 22,119 tonnes were sold as PDO-labelled olive oil, about 84% of them sold in the domestic market, and the remaining in the EU countries (9.75%) and third-party countries (6.49%) (ICEX, 2012).

Andalusia has 12 olive-oil PDO labels. Nearly 31% of the Andalusian olive-orchard surface area is protected with this label (479,906 ha) (MAGRAMA, 2012).

Olive-oil PDOs are economically important in the rural Andalusian areas. The potential benefits of olive oil PDOs are related not only to the economic profit gained through the differentiation of the product, but also to a wide array of social and environmental externalities (employment, high biodiversity, landscape, etc.) that contribute to the sustainable development of rural areas and territorial governance (Sanz-Cañada, 2011; Ruiz Avilés *et al.*, 2013).

4. Research methodology

4.1. Data

The input data for achieving the research aims were gathered through face to-face surveys of adult consumers (+ 18 years) from the region of Andalusia (southern Spain). The questionnaire was pre-tested using 45 consumers (not included in the final sample). The pre-test aimed to check the coverage of the cards used in the conjoint analysis; the wording, length, design of the questionnaire; and potential bias in understanding. Respondents displayed no difficulty in comprehending the aim of the study and the conjoint-analysis task.

In this regard, the final semi-structured questionnaire, containing both closed- and open-ended questions, was

Table 1 - Descriptive analysis of the sample and population socio-demographic characteristics.

Sample Size	439	Population
Gender	(%)	(%)
Male	47.5	49.93
Female	52.5	50.07
Age	(%)	(%)
From 18 to 34 years	36.8	34.6
From 35 to 49 years	25.7	28.4
From 50 to 64 years	20.4	18.8
More than 64 years	17.1	18.2
Place of residence	(%)	(%)
Rural	28.5	29.1
Urban	32.7	33.4
Metropolitan	38.8	37.5
Occupation	(%)	
Employee	38.8	
Self employed	12.7	
Unemployed	12.1	
Home maker	9.8	
Student	5.3	
Retired	10.2	
Other occupation	11.1	
Level of studies	(%)	
Without studies	14.6	
Primary studies	20.1	
Secondary studies	45.8	
University studies	19.5	
Household income	(%)	
Up to 800 €	6.7	
801 - 1,600 €	30.7	
1,601 - 2,400 €	28.6	
2,401 - 3,200 €	13.9	
More than 3,200 €	9.0	
Decline to answer	11.1	
From olive-oil producer area (%)	57.4	

structured into four sections: (1) consumer habits, attitudes, and behaviour regarding olive oil in general; (2) consumer habits, attitudes, and behaviour regarding extra-virgin olive oil with a general PDO label; (3) test of consumer preferences using the conjoint analysis; and (4) socio-economic and lifestyle features of respondents.

The final surveys were carried out by a single professional interviewer who was trained especially for this survey to prevent survey bias. A total of 439 representative surveys were administered from May to July 2010. Sample selection was conducted by stratified random sampling with proportional allocation to age, gender, and place of residence (rural, urban, and metropolitan) to avoid under- or over-representation of some consumer profiles. This sample was selected using Andalusian socio-demographic statistical data (INE, 2010). Furthermore, the maximum sampling error was approximately 5% for intermediate proportions ($p = q = 0.5$) with a confidence level of 95%. Each interview lasted approximately 25 min. All analyses were conducted with the SPSS Version 15.0 program. The sample profile is shown in Table 1.

4.2. Consumer preference model: application of conjoint analysis

➤ Theoretical approach of conjoint analysis

A conjoint analysis was used to determine the effect of PDO label on consumer preferences for extra-virgin olive oil. Conjoint is “a practical set of methods predicting consumer preferences for multi-attribute options in a wide variety of product and service contexts” (Green and Srinivasan, 1978; Mesias *et al.*, 2009). This methodology has been widely used in consumer marketing because it has been shown not only to predict, with great accuracy, which products or services (real or hypothetical) people will choose, but also to assess the weight that consumers give to various factors that underlie their decisions (Steenkamp, 1987). Conjoint analysis assumes that consumers’ utility of a product can be decomposed into a separate utility for each of the product’s attributes. Thus, conjoint analysis transforms consumers’ subjective attitudes towards estimated parameters into the form of utility functions (Green and Srinivasan, 1978). Utility, which is the conceptual basis for measuring these values; it is a subjective judgment of the unique preferences of each individual. Individual consumer’s utility, which represents the overall preference or total “worth” of a product, can be disaggregated into “part-worths” for each level of the important product attributes (Hair *et al.*, 1999). Based on these “part-worths”, conjoint analysis allows also researchers to implicitly estimate the relative importance of these attributes.

➤ Design and implementation of conjoint analysis

To estimate the relative importance of PDO label associated with extrinsic (price and packaging) and intrinsic (colour) cues of Spanish extra-virgin olive oil on con-

sumers’ preference, four key steps were followed in the present study:

Step 1: Specifying attributes and levels: Selecting extra-virgin olive oil attributes in this study was based on the following criteria: (i) the review of existing literature and especially the most-used attributes reported; (ii) the opinion of several researchers and experts on olive oil; (iii) Data from focus groups: three focus groups were established of roughly 2 h in duration, each in different geographical places of residence, with people having different social characteristics (level of studies, age, etc.); and (iv) the proposals of this research.

According to these criteria, four olive-oil attributes were finally selected: Origin; price and packaging as extrinsic attributes and colour as an intrinsic attribute. With respect to origin attributes, three levels were considered: in the first, extra-virgin olive oil without any production zone indicated on the bottle, i.e. “Origin not indicated”; the second level represents an extra-virgin olive oil with an indication of production region but without any label that guarantees this origin, i.e. “Origin indicated not labelled”; third, an extra-virgin olive oil with a PDO label i.e. “PDO labelled”. For the extra-virgin olive oil colour, we have considered two levels “Golden-yellow” and “Greenish-yellow”. Concerning packaging attributes, we include three levels: “Plastic packaging”, “Standard glass packaging” and “Design glass packaging”. Finally, with respect to the price attribute, three levels were included in the conjoint analysis: 3 €/l; 4.5 €/l, and 6 €/l. Price levels were determined based on the average price of 1 litre of extra-virgin olive oil in different modern retail stores (for different packaging, brand, labels, etc.). The attributes selected and their levels are summarized in Table 2.

Table 2 - Extra-virgin olive-oil attributes and levels considered in the experiment design for conjoint analysis.

Attributes	Levels
Price (Euro/liter)	3 €/l 4.5 €/l 6 €/l
Origin	Not indicated Indicated not labelled PDO labelled
Colour	Golden-yellow Greenish-yellow
Packaging	Plastic Standard glass

Step 2: choosing a presentation method: Having established the relevant attributes and their respective levels, a full factorial design would contain 54 ($3 \times 3 \times 3 \times 2$) possible combinations. Both the cost of administering a consumer-evaluation study of the magnitude of this set of profiles, and also respondents’ fatigue and confusion would be excessive (Walley *et al.*, 1999). Thus, to reduce the number of profiles to a manageable size, while at the same time maintaining randomness, a subset of these hypothetical product profiles was generated using the fractional factorial design. More specifically, the confounding of attribute main effects is

minimized by selecting a subsample of orthogonal product combinations. The “orthogonal array” allows the estimation of the part-worths based on a “main effects” on an uncorrelated basis (Kirk, 1982), assuming that there are no interaction effects between attributes. The decision to use a main-effects design without considering interaction effects was based on the trade-off between simplicity and efficiency. The main effect explained up to 80% of the variance model, whereas the interaction effect explained an additional 2% or 3% of the model variance (Louviere *et al.*, 2000).

In this research, using the “Orthoplan” command of SPSS conjoint design version 15.0, nine combinations “stimuli” were finally produced to be presented to consumers for assessment.

Table 3 displays the nine profiles resulting from the fractional factorial orthogonal design. Each product profile was presented visually in the form of a card “stimuli” with a text description of hypothetical extra-virgin olive oil (see an example of the card shown to respondents in Annex 1). Each card represented a specific combination of attribute levels for each extra-virgin olive oil. Descriptions of the card used in public-preference models and other techniques for stimulus presentation can be found in Shelby and Harris (1985). Respondents were asked, after examining each card (olive-oil profile), to rate each product on an interval rating scale¹ according of their preferences from 0 (“extremely dislike”), to 9 (“extremely like”).

Step 3: Selection of estimation technique and econometric model: To estimate total and partial utility, an additive conjoint model was used. Moreover, the additive preference model is one of the most commonly used models in the marketing literature, and the one that best tends to explain individuals’ preferences (Hair *et al.*, 1999). This model as-

sumes that each level of attributes participates independently, and that the individual’s total utility is the sum of the utilities of the different levels.

The empirical conjoint model is expressed as follows:

$$Total\ Value = U_0 + \sum_{i=1}^n \sum_{j=1}^{m_i} a_{ij}$$

Where:

$i : 1, \dots, n =$ number of attributes

$j : 1, \dots, m_i =$ number of levels for attribute i

U_0 : Constant

a_{ij} : Part -Worth for attribute i and level j

Part-worth utilities were estimated using Ordinary Least Squares (OLS) regression analysis. This is the most extensively used method and establishes the relative importance of the attributes and the part-worth of each of their levels. The relative importance (RI) of each attribute can be calculated from the resulting utilities. This importance is determined as the proportion of the rank assigned to each attribute to the variation of total ranks (Hair *et al.*, 1999), by means of the following equation:

$$RI_i (\%) = \frac{\max a_{ij} - \min a_{ij}}{\sum (\max a_{ij} - \min a_{ij})} \times 100$$

RI_{*i*}: Relative importance (%) of the attribute (i)

$\max a_{ij}$: Maximum of utility

$\min a_{ij}$: Minimum of utility

4.3. Consumer segmentation: cluster analysis

For a better understanding of how consumer preferences might be revealed in the market place, a *post hoc* cluster was applied to identify consumer segments on the basis of the similarity of their utility-functions pattern for the four related olive-oil attributes and the corresponding attribute levels. Ward’s hierarchical cluster analysis with the Euclidean distance was used to determine the number of clusters to be considered. Thus, heterogeneity of respondent preferences is minimized within a particular market segment and the heterogeneity of respondent preferences is maximized across the market segments.

Moreover, additional socio-economic variables most commonly associated with consumer behaviour were identified by chi-square tests, which defined consumers’ profiles in the market segments.

5. Results

5.1. Conjoint analysis and consumer preferences for PDO-labelled extra-virgin olive oil

Table 4 shows the aggregate preference model, including both the relative importance % (RI) and the utilities (U_i)

Table 3 - Hypothetical extra-virgin olive oil shown to consumers according to orthogonal design.

	Colour	Price (€/l)	Packaging	Origin
Extra-virgin olive oil 1	Greenish-yellow	3	Plastic	PDO labelled
Extra-virgin olive oil 2	Golden-yellow	3	Plastic	Indicated not labelled
Extra-virgin olive oil 3	Golden-yellow	4.5	Design glass	Indicated not labelled
Extra-virgin olive oil 4	Golden-yellow	4.5	Standard glass	PDO labelled
Extra-virgin olive oil 5	Greenish-yellow	4.5	Plastic	Not indicated
Extra-virgin olive oil 6	Golden-yellow	6	Design glass	Not indicated
Extra-virgin olive oil 7	Golden-yellow	6	Design glass	PDO labelled
Extra-virgin olive oil 8	Golden-yellow	3	Standard glass	Not indicated
Extra-virgin olive oil 9	Greenish-yellow	6	Standard glass	Indicated not labelled

¹ Rating instead of ranking was used to evaluate the olive oil profiles so respondents were able to express indifference among one or two products. Also rating is likely to be more reliable and provide more flexibility in estimating the different types of combinations (Hair *et al.*, 1999; Sayadi *et al.*, 2005 and 2009).

(part-worth) of each correspondent level. The internal and predictive validity of the model was estimated using Pearson's R and Kendall's tau statistics, which provide measures of the observed and estimated preferences (Hair *et al.*, 1999). The resulting model is consistent for both the prediction and the inference purposes, since the Pearson's R parameter had a value of 0.923 and the Tau de Kendall is 0.995; both are significant at 95% level. This signifies a good fit between the estimated and observed preferences.

Attributes	Relative importance (%)	Levels	Part-Worths/Utilities
Price	36.66	6 €	-1.167
		4.5 €	-0.050
		3 €	1.217
Colour	16.57	Golden-yellow	-0.157
		Greenish-yellow	0.157
Packaging	18.67	Design glass	-0.050
		Standard glass	-0.257
		Plastic	0.307
Origin	28.10	PDO labelled	0.971
		Indicated not labelled	-0.188
		Not indicated	-0.784
Constant term: 4.516			
R de Pearson : 0.923*** Tau de Kendall : 0.995**			
Asterisks (***) and **) denote significance at 1% and 5%, respectively.			

Analysing results presented in Table 4, with reference to the relative importance (RI) of each attribute, we found that consumers clearly consider "price" the most important attribute in selecting extra-virgin olive oil, with a relative importance of 36.66%. The main role of price was also indicated by García *et al.* (2002), who found that price was the factor most influential on consumers' preferences and choice attributes in the United Kingdom.

"Origin" appears to be the second most important factor (28.10%) in determining consumer preference and utility, followed by "packaging" (18.67%), whereas the olive-oil colour (16.57%) was regarded as the least important attribute in consumer choice. Jiménez-Guerrero *et al.* (2012), in their literature review, stated that the extrinsic attributes of extra-virgin olive oil (e.g. price, origin or variety) are most important when consumers face the act of purchase. Instead, intrinsic attributes, such as colour or flavour, are relegated to second place, with the exception of Mtimet *et al.* (2009), who analysed the Japanese consumers, for whom colour comes first.

Considering the results of utility level, theory suggests that higher utility values indicate greater preference. In this sense, taking in consideration the "price" utility levels, we find that the lowest price level of 3 € was the most preferred (1.217) where the 6 € level has a negative utility. The inverse relationship between price and utility also shows that the model is consistent with the theory of consumer behaviour of Lancaster (1966). Also, other studies indicate that consumer utility decreases when the olive-oil price increases (Mtimet *et al.*, 2009).

Among "origin" attribute levels, PDO label on extra-virgin olive oil had the highest part-worth (0.971), while the o-

igin indicated (not labelled) was valued more than the absence of any information (not indicated origin). The positive influence of the PDO label on consumer preference is supported by the empirical literature on different countries and food products. For example, Menapace *et al.* (2011) found evidence that Canadian consumers value olive-oil PDOs more than olive-oil PGIs, but the result was not so strong as that found for Geographical Indication vs. non-Geographical Indication.

Regarding "packaging" attribute-level utilities, extra-virgin olive oil packed in a plastic bottle is preferred over other kinds of packaging. A standard glass bottle followed by design glass were less valued, their part-worths being negative, -0.257 and -0.050, respectively. This result agrees with studies of Erraach *et al.* (2012), whose results indicate that consumers invariably mentally associated these types of packaging with high-end extra-virgin olive oil and, therefore, high price. Moreover, consumers also consider themselves familiar with the plastic packaging and that glass containers are more uncomfortable and dangerous for habitual domestic olive-oil uses (i.e. risk of breakage).

Finally, based on the olive-oil "colour" utilities levels, consumers expressed their preference for the "greenish-yellow", this having a positive part-worth (0.157) surpassing that of the "golden-yellow" colour. This result is in accord with findings of Navarro *et al.* (2010) analysing consumers' knowledge and attitudes towards virgin-olive-oil quality in some Andalusian provinces. Moreover, as indicated by Mtimet *et al.* (2009) concerning the colour attribute, Japanese consumers prefer a green olive oil over a yellow product. However, Menapace *et al.* (2011) have found that visual attributes of olive oils (appearance and colour) are not reliable quality cues for Canadian consumers, who prefer yellow olive oil.

Based on the part-worth utility (Table 4), the most preferred profile for extra-virgin olive oil, i.e. the profile with the highest utility for each attribute, is a PDO-labelled extra-virgin olive oil having a "greenish-yellow" colour in a plastic bottle and sold at 3 €/l.

5.2. Market segmentation and profiling

As mentioned in the Methodology section, we combined the conjoint analysis and cluster analysis to group respondents based on the similarities of their preference functions (olive-oil rating). Thus, four groups or segments among olive-oil respondents were identified. Table 5 shows the segment size and the relative importance of the segment's olive-oil attributes. Once the typology of the respondents was established, Pearson's Chi-square tests were applied to examine significant differences in socioeconomic profiles across the four segments. As a result, significant differences were found between clusters in terms of gender, place of residence, education levels, residing or not in an olive-oil production zone, and household income (see Table 5 and 6).

Table 5 - Preference for extra-virgin olive oil by market segment.

Attributes	Levels	Segment 1 (n=122) 28.6%	Segment 2 (n= 72) 16.8 %	Segment 3 (n= 140) 32.8 %	Segment 4 (n= 93) 21.8 %
Price	6 €	-0.76	-0.78	-1.74	-1.04
	4.5 €	-0.06	-0.04	-0.02	-0.09
	3 €	0.82	0.82	1.77	1.77
	RI (%)	24.89	20.72	56.22	32.63
Colour	Golden-yellow	-0.11	-0.42	-0.05	-0.17
	Greenish-yellow	0.11	0.42	0.05	0.17
	RI (%)	11.56	45.29	9.66	12.19
Packaging	Plastic	0.21	0.27	0.31	0.39
	Standard glass	-0.22	-0.17	-0.29	-0.30
	Design glass	0.01	-0.10	-0.02	-0.09
	RI (%)	14.30	16.64	14.35	27.92
Origin	PDO labelled	1.63	0.64	0.81	0.85
	Indicated not labelled	-0.34	-0.19	-0.16	-0.11
	Not indicated	-1.29	-0.45	-0.66	-0.74
	RI (%)	49.30	18.22	19.79	27.36

The first segment was called “PDO liking” and consisted of 28.6% of respondents. Most of them were female (60.4%), living in a metropolitan area (75%) and coming from an olive-oil production zone. Most members of this cluster had university studies and a high income (more than 2400 €/month). The origin attribute is the main determinant of olive-oil preferences for this cluster. Among origin levels, PDO label was the most important (see Table 5).

The second cluster was called “colour sensitive” with 16.8% of the sample. This group included respondents from urban areas with secondary studies and a medium level of income (between 801 and 1600 €/month). Of this group, 55.7% were male. In this segment, intrinsic cues, especially olive-oil colour, mainly determined their preference, with a relative importance of 45.29%.

The third cluster, called “price”, with 32.8% of the sample, was the largest one. This group consisted of female consumers (64.8%) of high education (university 58.8%). Most were not from an olive-oil production zone. The members of this segment had lower-medium incomes (57.2% earned less than 1600 €/month). Perhaps for that reason, this cluster revealed strong importance for olive-oil price as the most determinant factor of preference.

Finally, the fourth group, comprising 21.8% of respondents, lived mostly in rural areas. Also, the group was composed mainly of men (60.5%) with primary (39.5%) and secondary (34.0%) studies. In this cluster, extrinsic cues were key, and thus choices were made mainly by combining price (32.36%), packaging (27.92%), and origin (27.36%) concerns (see Table 6).

Among Spanish consumers’, there appears to be a strong positive correlation between the preference for PDO labelled extra-virgin olive oil and some key socio-economic variables, such as gender, place of residence, education level and household income. This result is in accord with findings of Fragata *et al.* (2007), who conclude that preference for PDO/PGI products of Portuguese consumers are strongly correlated with some key socio-economic variables, such as education level and purchasing power (income).

Table 6 - Socio-economic and demographic characteristics of segments.

	Segment 1	Segment 2	Segment 3	Segment 4
Gender (%)*				
Female	60.4	44.3	64.8	39.5
Male	39.6	55.7	35.2	60.5
Place of residence (%)*				
Rural	18.8	39.1	51.7	50.5
Urban	6.2	58.4	38.3	38.5
Metropolitan	75.0	2.6	9.0	5.0
Household income (%)**				
Up to 800 €	11.5	17.5	24.9	26.6
801 – 1600 €	19.2	39.4	32.3	29.2
1601 – 2400 €	16.4	15.7	14.7	19.3
2401 – 3200 €	28.3	6.1	8.6	7.5
More than 3200 €	17.1	3.4	4.5	5.0
Decline to answer	7.5	17.9	10.9	13.4
Education level (%)*				
Without studies	10.0	9.4	6.4	10.1
Primary studies	13.6	11.1	10.3	39.0
Secondary studies	28.8	48.5	24.5	34.5
University studies	47.6	31.0	58.8	16.4
Coming from or living in olive oil zone (%)	68.1	46.0	37.9	60.6

Asterisks (* and **) denote significance at 10% and 5% level, respectively.

6. Conclusions and Implications

The European Commission has developed strategic initiatives to facilitate information flows between farmers, buyers, and consumers through the use of Protected Designation of Origin, Protected Geographic Indication, etc. The labels present on the market, highlighting peculiar features, may solve problems of asymmetric information. A number of studies have been conducted on consumer preferences towards such food labels.

In this context, the aim of this study was to explore the market potential for PDO labelling. The olive-oil sector in Spain was chosen as a case study, given its importance in terms of production, as a cultural and identity symbol, and because of its long tradition on origin and quality labelling.

A survey on stated preferences was conducted in Andalusia (southern Spain), the main production region for olive oil and PDO-labelled extra-virgin olive oil in Spain.

Aggregate results of conjoint analysis show that origin, after price, most determines consumer choices, compared with other attributes considered in this study (oil colour and packaging). Thus, for Spanish consumers, olive-oil quality is not only what it is intrinsically, but also what it represents: the origin and the tradition of its production, identification with what is natural, and other peculiarities linked to territory and extrinsic characteristics.

With respect to PDO label, the focus of this study, it appears that the presence of this label on the extra-virgin olive oil positively influences consumers’ utility function. Thus, based on the preference structure, the cluster analysis discriminated four consumer’s segments. Two among them are PDO sensitive. The first one contained almost 30% of the sample. Consumers in this cluster mainly preferred origin and more especially the PDO label. In the second one, PDO label is also determinant of consumers preference but combined with price and packaging.

The above findings show that the PDO label has the greatest potential to benefit Spanish olive-oil sector because

consumers' preferences towards PDO label may provide opportunities to increase consumer demand for a PDO-labelled olive oil. Thus, we can state from a marketing standpoint that the differentiation of Spanish extra-virgin olive oil by territorial certification alternatives, the European Protected Designations of Origin can provide an added value for olive oil and a competitive edge in the market. This strategic orientation is not aimed at increasing production, but rather towards diversifying the food supply by highlighting attributes or benefits that may be valued by the consumers and therefore differentiate the product from those of competitors. From an economic argument, PDO labelling can transform this added value into economic income for olive farmers and small local producers.

However, this strategy should be accompanied, as recommended also in a recent report of the European Court of Auditors (2011), by some promotion and communication campaigns to take full advantage of the distinct characteristics of the natural environment and the traditional processing method in each territory and to promote the image of high and differentiated quality of olive oil. This may improve the consumer perception of this label and reduce sensitivity to high prices for PDO extra-virgin olive oil in Spain.

Furthermore, consumer segmentation and the knowledge of socio-demographic characteristics of each cluster can help in designing market strategies. These may guarantee that each policy or strategy is more precisely oriented to the desired market niches using the adequate language and message for each cluster.

A limitation of this study is that we focused only on one label related to origin. Future studies can integrate the Protected Geographical Indication (PGI) label for a comparative viewpoint, as performed by Aprile *et al.* (2012) and Menapace *et al.* (2011) for Italian and Canadian consumers, respectively.

The present study contributes to the literature by developing a consumer-preference model with an empirical application, meant to better understand consumer preference. These preferences depend on the olive-oil attributes considered and the study area. However, we should not ignore some inherent limitations and weakness of these stated preferences methods. These limitations are linked to methodological biases which are both instrumental and non-instrumental. The assumptions in this study concerning the additive and non-interactive utility function, the hypothetical decision context, the technique of estimating public preference, constitute the main limitations. Nevertheless, some steps have been taken (pilot survey, respondent understanding and commitment, interviewer training, among others) to minimize the strongest biases.

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ANNEX 1

Figure 1 - Example of card shown to consumers.

 Extra-virgin olive oil 2	
Colour of olive oil	<i>Golden-yellow</i>
Packaging	<i>Plastic</i>
Origin	<i>Indicated not labelled</i>
Price (€ / l)	3