Quality dimensions and consumer preferences:
A choice experiment in the Italian extra-virgin olive oil market

Teresa Panico, Teresa Del Giudice[*] and Francesco Caracciolo

Department of Agriculture - University of Naples, Federico II
[*](Corresponding author) e-mail:agriqual@unina.it

Abstract

This paper investigates consumer preferences for extra-virgin olive oil in Italy. In order to segment the Italian extra-virgin olive oil market, the information obtained from a nationwide survey was analysed by using a randomised parameter logit regression and implementing a cluster analysis on the estimates of consumers' willingness to pay for origin of olives, production method and sensory attributes. Our results show that information on origin, both in terms of the adoption of PDO or PGI certification and labelling of the origin, production method and organoleptic characteristics crucially affect consumer preferences for olive oil. Market segmentation shows there are consumers who are particularly sensitive to origin and organic certification as well as labelling clarity.

***Keywords**: quality attributes; choice model; market segmentation; organoleptic characteristics; mixed logit; cluster analysis*

***JEL**: Q13; Q18*

1. Introduction

The growing importance attributed by stakeholders to denominations of origin and quality certifications of food products is due to the role that they may play in the development of specific production sectors and specific rural areas (Verlegh and Steenkamp, 1999; Caracciolo and Lombardi, 2012). However, their success as quality indicators depends on the degree of reliability attributed to them by the end consumer (Louriero and Umberger, 2003; Verbeke and Ward, 2006; Kim, 2012). In this scenario, Italian extra-virgin olive oil represents an emblematic product insofar as both its characteristics and their perception on the part of consumers are strictly influenced by the product's geographical origin (Di Vita *et al.*, 2013). This aspect acquires further importance in relation to the prime role played by extra-virgin olive oil in the Mediterranean diet, especially in Italy. Moreover, in the context of the international olive oil trade Italy occupies a somewhat anomalous position: according to Eurostat data (2011), it is ranked as the world's second largest producer of olive oil and at the same time both the second largest exporter and the top importer. With a per capita annual consumption of about 11 kg, Italy is the largest per capita olive oil consumer after Spain and Greece. In this scenario, the area of origin in the case of extra-virgin

olive oil represents the strategic tool most widely used to enhance production both by public authorities and by production and processing firms (Tregear *et al.,* 2007; Horská *et al.*, 2011). Indeed, Italy's adoption of the regulations concerning voluntary certifications of origin is reflected in the large numbers of certified extra-virgin oils: 39 PDOs and one PGI (Ismea, 2012). By contrast, mandatory public regulations have evolved in the last decade chiefly to meet the objective, achieved only recently, of clearly informing the consumer about the origin of the olives used.

As regards the close correlation between the area of origin and perception upon consumption of extra-virgin olive oil, over the years increasing space has been given to the analysis of how this characteristic affects preferences and purchasing choices. This interest is also due to the development and spread of the concept of quality in the agri-food sector: in the wake of a high differentiation strategy the concept is acquiring new meanings and functions.

This differentiation process involves both experiential eating quality and credence attributes related to environmental and other social outcomes. Consumers' perception of quality is increasingly influenced by extrinsic indicators and cues provided by the product seller (Caswell *et al.*, 2002). Many of these aspects are classified as credence attributes. Due to the well-known difficulties in obtaining related information directly from consumers even after food consumption (Nelson, 1970; Grunert *et al.*, 2004), credence attributes require a judgment or certification from an authority figure such as a government agency or organisations that consumers trust to give information on such attributes. Indeed, current consumer needs have generated increasing demand for more complex credence attributes that include a wide range of intangible and connected characteristics, such as public health, environmental conservation, employment creation and product origin (Moser and Raffaelli, 2011). Therefore, new certifications on both a public and private basis have proliferated in the food market.

Extensive research (Van der Lans *et al.*, 2001; Ward *et al.*, 2003; Krystallis and Ness, 2005; Gazquez-Abad and Sánchez-Pérez, 2009) has shown that consumers, also in different countries such as Italy, Greece and Germany, attach priority value in consumption choices to knowledge of the country of origin. With particular reference to Italy, consumers are known to assign to origin not only national value but often also regional value. In the past, Italian consumers were often supplied with misleading information concerning origin, with the term "product of Italy" used for olive oils that may have been sourced from other EU and non-EU countries and then blended and bottled in Italy. In this context, some works also showed the loophole in the legislation, going as far as to estimate the loss of welfare from such misleading information (Cicia *et al.*, 2002). The "product origin" attribute has also been analysed through the study of the effects of EU denominations of origin (PDO and PGI; EC Reg. 509/06 and 510/06) upon individual preferences. Several studies (Van der Lans *et al.*, 2001; Menapace *et al.*, 2011; Di Vita *et al.*, 2013) have investigated the aspect described, arriving at two conclusions broadly shared by all the works focusing on area of origin. The first concerns the considerable importance of origin as a pivotal element in the choices of individuals. In many markets, provenance is a synonym of local produce. Consumers prefer, aside from other evaluations, a product obtained in an area close to that of consumption. Moreover, since sensory and organoleptic properties of extra-virgin olive oil are highly influenced by agronomic aspects and by the olive cultivars used, knowing

the area of origin means being able to choose a product whose gustatory characteristics are those to which individuals are traditionally accustomed.

The second conclusion reached by various studies is that EU denominations of origin (PDO and PGI) have never fully expressed their expected potential as instruments of product differentiation and protection. Indeed, these denominations have never been well known by consumers, who have continued to look for and recognise other signs as guarantees of origin and product traceability. In line with the trends in food demand on the part of consumers, also in works on extra-virgin olive oil there has been increasing focus on aspects such as food safety and traceability. Indeed, in more recent works (Cicia *et al.,* 2009; Gazquez-Abad and Sánchez Pérez, 2009; Chan-Halbrendt *et al.,* 2010; Menapace *et al.,* 2011), the link between origin and traceability has become stronger. Traceability and related information, reported on the label, are increasingly analysed. In general, some studies (Krystallis and Ness, 2005; Lombardi *et al.,* 2013) show that information linked to the aspects in question affects consumer choices because consumers are increasingly concerned about food safety. This concern also accounts for the focus on organic certification of extra-virgin olive oil. Some scholars (Van der Lans *et al.*, 2001; Sandalidou *et al.,* 2002; Panico *et al.*, 2011) have shown that this characteristic is positively perceived on the part of consumers despite the continued unsatisfactory level of information in this respect.

Given this background, it is possible to define extra-virgin olive oil quality as a multidimensional concept in which origin appears flanked by intrinsic attributes, such as organoleptic qualities, and by extrinsic elements, consisting in particular of production processes (organic methods) or other types of assurances concerning the product's safety and health.

The aim of our paper is to attempt a market segmentation of extra-virgin olive oil consumption on the basis of the importance attributed by the consumer to different quality dimensions, such as the origin of olives or adoption of PDO or PGI certification brands, explicitly indicated in the label, or the presence of specific sensory attributes. Our findings permit some considerations on the conditions under which differentiated quality, with the above meaning, may represent a strategic element for the enhancement of Italian extra-virgin olive oil.

Our study is based around the analysis of data obtained via a consumer survey conducted nation-wide by administering a questionnaire to a representative sample of extra-virgin olive oil consumers. For data analysis we used a discrete choice model. The paper is structured as follows: section 2 presents the methodology used for the analysis while section 3 discusses the results obtained. The last section contains some concluding remarks.

2. Data and Methods

In order to segment the Italian market of extra-virgin olive oil consumption we carried out a nationwide survey so as to define the role played by the various product attributes, whether intrinsic or extrinsic, on consumer perception of quality. The information obtained was analysed by using a discrete choice model, a randomised parameter logit regression. The estimates obtained by the econometric model then

supplied the main input for segmentation of consumer preferences. The econometric approach in question aims to characterise the heterogeneity of preferences in the reference population (Scarpa and Del Giudice, 2004).

The data used to analyse the perception of extra-virgin olive oil quality were collected by a leading company in market research, administering a computer-based questionnaire to a representative panel of Italian consumers in 2011. The sample consisted of 1,054 Italians responsible for household purchases (Table 1).

Table 1: *Descriptive statistics of the sample*

Variable	Description	Mean	Min	Max
Northwest	1 if the family resides in northwest regions	0.277	0	1
Northeast	1 if the family resides in northeast regions	0.194	0	1
Centre	1 if the family resides in central regions	0.18	0	1
South and Sicily	1 if the family resides in southern regions or in Sicily	0.35	0	1
Small towns	1 if the family resides in towns with less than 20,000 inhabitants	0.187	0	1
Frequency of purchase	1: once or more per week; 2: once every ten days; 3 once every two weeks; 4 once every month; 5 less than once every month	3.372	1	5
Purchased from the farmer	1 if the respondent purchases olive oil directly from the farmer	0.303	0	1
I choose for health reasons	1 if the respondent purchases olive oil for health reasons	0.027	0	1
I choose by origin	1 if the respondent purchases olive oil according to its geographic origin	0.147	0	1
Female	1 if the respondent is male; 2 if female	1.755	1	2
Age	0 under 18 years; 1, 18-24 years; 2, 25-34 years; 3, 35-44 years; 4, 45-54 years; 5, 55-64 years; 6, over 64	3.654	1	6
Income	1, low; 2, average; 3 high	1.88	1	3

The questionnaire contained four areas of information. The first comprised questions regarding the socio-demographic background of consumers (responsible for household purchases). The second included a group of questions to detect the interviewee's level of knowledge concerning quality certifications of extra-virgin olive oil. The third area focused on buying behaviour described by purchase frequency, the retail channel preferred and purchase motivations. The fourth was designed to analyse preferences according to the *choice model* approach. The interviewees were shown nine cards, each of which depicted a type of extra-virgin olive oil (profile) which differed from others in the presence of different levels for the four attributes: taste, certification, origin and price (Table 2, Table 3).

Table 2: *Attributes and levels of extra-virgin olive oil*

Attributes	Levels	Attributes	Levels
Taste	Sweet	Origin	EU blended
	Pungent		100% Italian origin
	Fruity		EU and non - EU blended
Certification	Organic	Price (€/l)	€4.50
	PDO/PGI		€6.00
	No certification		€7.50

Table 3: *Alternatives of extra-virgin olive oil*

Alter-native	Pungent (yes/no)	Fruity (yes/no)	Sweet (yes/no)	EU blended (yes/no)	100% Italian origin (yes/no)	EU and non EU blended (yes/no)	PDO, PGI certification (yes/no)	Organic yes/no	Price (€/litre)
1	yes	no	no	yes	no	no	no	no	4.5
2	yes	no	no	no	yes	no	no	yes	6
3	no	yes	no	no	no	yes	no	no	6
4	no	yes	no	no	yes	no	yes	no	4.5
5	no	yes	no	yes	no	no	no	yes	7.5
6	no	no	yes	no	yes	no	no	no	7.5
7	no	no	yes	no	no	yes	no	yes	4.5
8	no	no	no	no	no	yes	yes	no	7.5
9	no	no	yes	yes	no	no	yes	no	6

To define the levels of the "origin" attribute, we used specific phrasing introduced by EU Regulation 182/2009 (which made important changes to Regulation 178/2002). The three levels chosen were: 1) "100% produced in ..." in the case in which the oil was obtained in the same Member State where the olives were harvested (in our case 100% Italian); 2, "Blend of EU olive oils", and 3) "Blend of EU and non-EU olive oils". EC Regulation 182/2009 was also used as reference for the choice of levels for the attribute "organoleptic characteristics" which may figure exclusively on virgin and extra-virgin olive oil labels. Thus, the use of adjectives for attributes such as *fruity* (*green* or *ripe*), *bitter* and *pungent*, perhaps associated to the terms "*intense", "medium" and "light*", of the term "*balanced*" and the expression "*sweet oil*"[1], is permitted only if based on the results of objective assessment using the method laid down by the International Olive Council (COI) for the organoleptic evaluation of virgin olive oils[2]. In this paper we

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[1] The former refers to an oil which shows no imbalance in elements, i.e. the organoleptic sensation in which the bitter and/or *pungent* attribute is, on average, two points higher than the attribute *fruity*; the expression "*sweet oil*" may be used for an oil in which the bitter and piquant attributes are, on average, less than or equal to 2 (cfr. EC Reg. 640/2008).

[2] As regards organoleptic properties Regulation 182/2009 refers to the provisions under EC Reg. 640/2008 which amends EC Reg 2568/91 and to the amendment adopted by the COI in November 2007 for organoleptic evaluation of virgin olive oils with which the descriptions of positive and negative oil attributes are updated, as well as the method used to detect them.

therefore considered the following levels: 1) *sweet*, 2) *fruity* and 3) *pungent*. In the context of the certifications attribute, the levels chosen refer to organic and PDO/PGI certifications. Finally, the price levels selected were €4.50, €6.00 and €7.50 per litre, which reflected the 2011 list price for extra-virgin olive oil in Italy and represent the price range usually paid by consumers without promotion.

The consumer was asked to rank alternatives from the most preferred to the least preferred. The various combinations of attributes and levels were obtained thanks to an orthogonal design according to the *full profile* approach with the aid of SPSS statistical software.

The empirical framework used here has roots in random utility theory (McFadden, 2001; Verneau *et al.*, 2014). The model assumes that when a number J of extra-virgin olive oil alternatives are shown to the *i-th* consumer, the utility assigned by the consumer to each *j-th* alternative is a linear, additive and separable function of all *t-th* attributes that defines the alternative:

(1) $$U^i_j = f(\mathbf{z}_j) + \varepsilon^i_j$$

where $\mathbf{z}_j$ is a *T*-vector of observed attributes.

The random utility model considers utility U_j equal to the sum of an observable component Ωz_c, with $\mathbf{\Omega}$ a *K*-vector of unknown parameters, and ε_j the stochastic component:

(2) $$U^i_j = \mathbf{\Omega} \mathbf{z}_j + \varepsilon^h_j .$$

Furthermore, $\mathbf{\Omega}$ parameters can be distributed in the sample according to a distribution function defined by the parameters of location (μ) and scale (σ).

(3) $$U^i_j = \mathbf{\Omega}^i \mathbf{z}_j + \varepsilon^i_j$$

where $\mathbf{\Omega}^i = \mathbf{\Omega} + v^i, \ v^i \sim N(0, \sum \mathbf{\Omega})^3$.

The empirical data populating the model generally come from stated preference choice experiments. Logistic regression can be adopted to estimate $\mathbf{\Omega}^i$ explaining the factors influencing the choice of one extra-virgin oil of olive over another.

Routines based on maximum simulated likelihood methods (Train, 2009) are available, obtaining consistent estimates of these parameters. The estimation presented here is derived using 150 Halton draws for the simulation.

Finally, for the process of market segmentation, cluster analysis was applied to the results of the econometric model, especially the WTPs estimated for the various attributes, so as to obtain homogeneous groups of the target concerned, in relation to the estimates of utilities obtained. Among the various clustering techniques we chose what supplied the best fit to the data concerned: the aggregation technique chosen for this work is the Two-Step Cluster (Punj and Stewart, 1983; Honkanen and Frewer, 2009; Migliore *et al.*, 2012). It consists in identifying preliminary clusters and their centroids by means of Ward's hierarchical method of the minimisation of variance, followed by re-definition of assignment to groups through the iterative procedure based on K-means distance. All the statistical analyses were performed using SPSS 15.0 (SPSS Inc., Chicago, USA).

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[3]   The combined error term $(v^i\mathbf{z}_j + \varepsilon^i_j)$ is correlated across alternatives, relaxing the IIA assumption.

3. Results

Below we report the estimation and interpretation of results obtained by the econometric model (Tab 4).

Table 4:   *Random parameter model estimates*

	Attributes		Coefficient	*t*	*p-value*	WTP
sensory chara-cteristics	Pungent	M	-0.7	-10.75	0.00	-5.52
		σ	0.82	11.34	0.00	
	Fruity	M	-0.08	-1.82	0.07	-0.63
		σ	-0.14	-1.13	0.26	
country of origin	100% Italian	M	0.32	8.09	0.00	2.52
		σ	0.32	2.78	0.01	
	EU and non-EU Blended	M	-0.12	-2.84	0.01	-0.94
		σ	0.59	9.57	0.00	
Certifi-cations	PDO/PGI	M	0.28	5.95	0.00	2.23
		σ	0.39	6.28	0.00	
	Organic	M	0.46	12.75	0.00	3.67
		σ	-0.03	-1.59	0.11	
Price	Price	M	-0.13	-9.6	0.00	
		σ	0.16	5.03	0.00	

From the estimation of the model it appears clear that taste, the only intrinsic attribute considered, in its piquant, fruity form, was not appreciated by the interviewees, who preferred "sweet" oils. Indeed, both for fruity and piquant oils the model coefficient was negative. As regards origin, the model considered both national origin and that certified by PDO or PGI designations. The findings indicate that Italian provenance has a very positive weight in product desirability: the oils obtained from 100% Italian olives appear favoured over those obtained from blends of EU and non-EU olives which negatively affect consumption choices. Moreover, the possession of EU origin denominations positively affects the utility of interviewees. The same positive impact is recorded for organically produced olive oil. Finally, in line with the theory, price shows a negative coefficient. In monetary terms, the WTP estimated for Italian olive oil receives a premium of € 2.52 per litre, WTP for PDO/PGI certification is valued at € 2.23/l, and WTP for organic certification is estimated to be € 3.67/l.

According to the empirical model, the set of parameters which measure the role of attributes in consumer choices varies stochastically in the sample according to a known distribution function (in our study, a Gaussian function).

The distribution function for each attribute is thus estimated using the parameters of position μ and scale σ. As is evident from figure 1, which reports such distributions for the attributes indicated, heterogeneity in the tastes of the consumers is a major characteristic. In particular, upon estimating the cumulative function at 0, it results that the whole population prefers organic oil; 100% Italian oil is appreciated by 84% of the
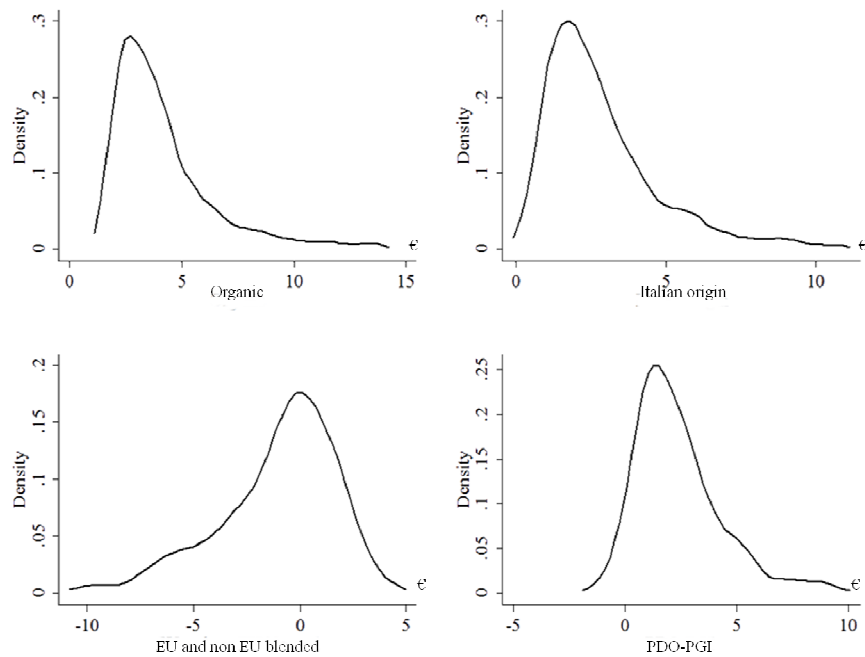
Figure 1*: Heterogeneity of tastes for organic, Italian origin, EU and non-EU blended, PDO/PGI*

population while 58% do not like the blends of EU and non-EU oils. Finally, certification of origin, PDO/PGI, is liked by 76% of the population.

This preliminary segmentation, based only on preference heterogeneity, may be enriched with the aid of the socio-demographic characteristics of the interviewees. On the estimates of WTP obtained by the econometric model, we thus implemented cluster analysis in order to identify homogeneous groups in relation to preferences for various attributes (figure 2).
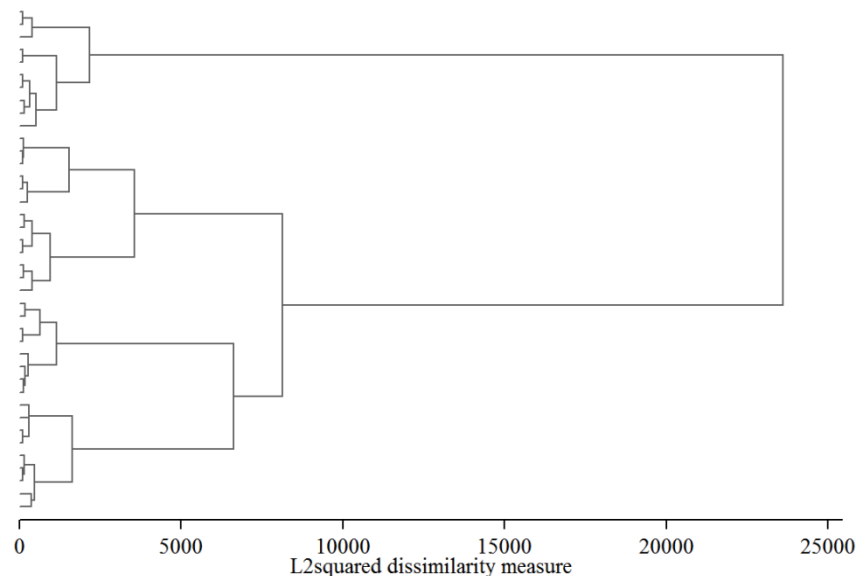

Figure 2: *Dendrogram for hierarchical cluster analysis*

The results reported in table 5 show the presence of four homogeneous groups of consumers who, from the values of the characteristics in question, are not differentiated by gender, age or income, but rather by preferences and, moderately, by frequency of purchase and by the level of direct purchases from the farmer. Therefore, the differences between the first and the fourth group are well evident especially in terms of WTP for different quality characteristics and for buying motivations: health or origin. Vice versa, the second and third groups differ only slightly. However, their characterization is the combination of differences, albeit minor, which arise with respect to the next or previous group and the sample average. To give more detail, the first group is the most numerous one and includes about 40% of the sample. It might be called "*indifferent to more advanced certifications*", i.e. certification of origin and organic, showing a far higher than average WTP for blends of EU and non-EU oils. The second group, including 30% of the sample, could be called "*attentive to local origin*". Indeed, it shows little attention to certifications, but rather to the geographical proximity of production as shown by the higher purchase frequency and direct purchase from the producer with respect to the first. These are all elements that also fit with the group's geographical connotation which consists of individuals mostly living in small towns in central and northern Italy.

Table 5: *Results of cluster analysis*

	Consumer groups				Total sample
	Indifferent to advanced certification	*Attentive to local origin*	*Sensitive to certification*	*Strongly oriented vs certification and attentive to labelling*	
PDO/PGI WTP	0.933	2.131	4.351	6.694	2.548
EU and non-EU Blended WTP	0.910	-3.435	1.138	-8.133	-1.238
Italian Origin WTP	1.435	2.713	4.627	8.310	3.136
Organic WTP	2.671	3.648	6.412	10.703	4.505
Northwest	0.278	0.28	0.276	0.268	0.277
Northeast	0.203	0.22	0.159	0.146	0.194
Centre	0.185	0.193	0.165	0.146	0.180
South and Sicily	0.334	0.307	0.400	0.439	0.350
Small towns (< 20,000 inhabitants)	0.173	0.20	0.194	0.183	0.187
Frequency of purchase	3.266	3.429	3.453	3.463	3.372
Purchased from the farmer	0.242	0.33	0.353	0.378	0.303
I choose for health reasons	0.030	0.016	0.018	0.073	0.027
I choose by origin	0.075	0.209	0.165	0.220	0.147
Female	1.764	1.732	1.759	1.780	1.755
Age	3.701	3.689	3.606	3.451	3.654
Income	1.848	1.957	1.859	1.817	1.880
obs (%)	39.83	30.20	20.21	9.75	100%

The third group, also fairly large (20% of the sample), displaying a more marked attention to certifications, may be termed "*sensitive to certifications*", whether of origin or organic. However, such sensitivity is not yet so pronounced as in Group 4 which, given its size, may be considered an elite and called "*strongly oriented towards certification and attentive to labelling*". These are individuals who are already loyal customers and oriented towards the purchase of products with well-defined, certified quality characteristics, as shown by the values of centroids for WTP for certification of origin, 100% Italian olive oil and organic certification. What completes their characterization is the clear aversion to oils from blends of EU and non-EU olives, and higher health-conscious motivation of purchases compared with the other groups and the population average.

4. Discussion and Conclusions

Analysis of consumer preferences for extra-virgin olive oil is a fairly consolidated research field. Such investigations have followed, and in some cases anticipated, the development of instances involving both end purchasers of the product and large distributors.

Extra-virgin olive oil quality can be defined as a multidimensional concept in which origin appears flanked by intrinsic attributes, such as organoleptic qualities, and by extrinsic elements, consisting in particular production processes (organic methods) or other types of assurances concerning the product's safety and health. The "origin" attribute of extra-virgin olive oil still works at two levels. The first concerns the national level, where Italian oils can be differentiated from those imported. This meaning of "origin" is that laid down by the legislation in force. The second is product origin linked to more circumscribed production zones, where the geographical area is synonymous with uniqueness. This meaning of origin is that protected and enhanced by EU Regulations 509/06 and 510/06 through PDO and PGI certifications.

Information on origin, production method and organoleptic characteristics plays a major role in determining WTP for extra-virgin olive oil. Some producers, thanks to the progress made by agronomic research, have also identified in the sensory attributes of oils one of the innovative levers on which to act in the near future to improve product differentiation and sales, alongside more mature characteristics such as traceability, organic certification and origin labels. In this context, the ability to inform the consumer better than was done in the past on the innovative content of the product is deemed an aspect of fundamental importance to boost sales.

This paper analysed the information content of labels on consumer choices, evaluating first the WTP for some of the more important aspects listed on the label, such as product origin, but also sensory attributes and production methods insofar as they are indicative, taken together, of health and organoleptic characteristics. On the basis of the heterogeneity of consumer preferences encountered in the choice experiment, we then carried out demand segmentation in order to identify homogeneous segments of consumers in relation to preferences for the various attributes.

Our findings allow a few interesting considerations to be made. First, on the basis of characteristics tested in the model, it may be inferred that geographical origin,

especially when 100% Italian, and credence attributes - PDO/PGI certification and organic production - positively affect consumer preferences. By contrast, organoleptic characteristics still have little effect upon consumer preferences: the negative WTP for the attributes *fruity* and *pungent* clearly shows that the consumer still prefers olive oils that are fairly neutral in flavour. The next step of the analysis to segment the population into homogeneous groups showed that the market comprises consumer segments which are either indifferent to the various quality dimensions analysed or are highly attentive to certifications and clarity of label information. In particular, as much as 40% of the market shows preferences which are not influenced by the quality attributes considered in our study. On the contrary, they show a certain preference towards blends of EU and non-EU olive oils. However, a further 50% split into two segments, "Attentive to local origin" (30%) and "Sensitive to certification" (20%), shows greater sensitivity to origin and production methods. Finally, 10% of the market, hence a consumer niche, is markedly oriented towards the quality attributes which we studied.

This may suggest the feasibility of exploiting, to a greater extent and better than was done hitherto, the attributes of production area and origin which, together with organic certification, may still constitute strategic levers in which to invest for sound value enhancement of Italian extra-virgin olive oil. This should be accompanied by clear, reliable labelling as an important means of filling the information gap and dispelling the confusion that still abounds in the olive oil market, although indication of geographical origin, which has become mandatory, actually reduces the information asymmetry that still exists today, especially among consumers. Finally, given the results, attention still needs to be paid to promoting olive oil sensory qualities: up till now, there have only been pioneering attempts at gustatory education despite the consolidated results obtained by agronomic research in this field.

With regard to the latter point, we believe it is important to stress one of the major limitations of this study: the inclusion of sensory characteristics among the choice set attributes without making provision for the interviewees to do oil tasting does not allow thorough analysis of the effect of such characteristics upon consumer preferences. That said, our results represent a valid starting-point. Identifying consumer education policies to fill the gap between a propensity for neutrally flavoured olive oil and innovative production of oils with a more decisive sensory and organoleptic profile calls for complementary techniques of analysis. In particular, analysis of revealed preferences would need to be supported by techniques derived from integrated approaches such as sensory analysis and auctions.

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