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Abstract. The evolution experienced by the food sector in the last ten years has greatly changed the models analysts employ to explore the purchase and consumption patterns of the post-industrial society. Nowhere is this more evident than in urban food markets, where consumers are furthest removed from the food production processes. New consumption patterns are based partly on undifferentiated food products and partly on typical ones, which are often characterised by a close link to specific geographical areas and their local traditions in food production. These changes have induced a major transformation of the EU food policy, whose regulations have increasingly been aimed at protecting and boosting the value of such 'typical' products.

However, "typicity" is difficult to assess on the part of consumers, who need to rely on labelling and certification, on which EU regulation is not very strict.

Exemplary is the case of extra-virgin olive oil. Olive oil bottlers are not required to report the olives' production areas on the commercial label, thus having the possibility of inducing the false belief that product is strictly Italian by stating that it is the product "of an Italian brand" or that it has been bottled in Italy.

In this paper we assess the effects of such false beliefs through estimation of a choice, on data collected by a survey of 169 Italian consumers interviewed after their purchase of extra-virgin olive oil in a supermarket.

Keywords: Extra-virgin olive oil, Labelling, Traceability, Choice Model, Consumer's Perception.

1. Introduction

The divergence between the perceived and real attributes of consumption items gives rise to asymmetric information. Such asymmetry may induce consumers to make erroneous purchases. Consumers perceive that certain products have attributes that they do not in fact possess. As a result, there is a loss of welfare due to deception. Labelling policies should prevent such loss from occurring. Pressure groups from consumer associations should ensure that these losses are minimized. This is a well-known argument behind the issue of product traceability.

Some categories of processed agricultural products, such as cheese, wine and even vinegar have strict protocols of production. Producers that do not adhere to the protocol are prevented from naming and labelling their product accordingly. Origin of production of the untransformed base product is often restricted in these protocols to a given geographic area.

A number of studies have shown that consumers have well-defined preferences over the origin of olives in the production of extra virgin olive oil (Scarpa *et al.*, 2001; Del Giudice and Scarpa, 2002; Del Giudice, 2002). However, consumer's information about these olive oils is often

inaccurate and the current labelling policies, which are limited to the geographical information of the bottling plant, may be confusing to the consumer, who may interpret the location of bottling as the location of origin of the olives from which the oil is produced.

In recent years the debate on asymmetric information and food safety has stressed the important role that "traceability" can play in this field, where traceability means the systematic record of information about a particular attribute of a food product from creation through marketing. In other words traceability systems are record-keeping systems.

Many authors have argued the evidence of social and private benefits and costs related to traceability (Lapan and Moschini, 2001; Bullock, 2002). The *private sector* may gain from: 1. differentiating products by credence attributes; 2. having traceback for food safety; 3. improving the organization of the threadmill from producers to consumers. On the other hand, *society as a whole* may gain from 1. monitoring and enhancing food safety; 2. addressing consumer knowledge about food safety and quality; 3. protecting consumers from fraud and producers from unfair competition (Economic Research Service/USDA, 2002).

This paper focuses on this last point, that is, the role traceability can play to protect consumers from fraud and producers from unfair competition in the specific market of extra-virgin olive oil.

The study provides some preliminary evidence consistent with the hypothesis that the lack of mandatory traceability together with a mandatory label for bottling place, gives rise to a loss of consumer's welfare due to "legal fraud". Evidence derived from this study indicates that many Italian consumers misperceive information about the place of origin of olives. They tend to believe that olive oil bottled in Italy comes from Italian olives, while this is, in many instances, false.

Starting from survey data on consumer behaviour we elicit intensity weights for various olive oil attributes. A random utility model from multinomial choices of olive oil purchase from a large grocery retailer is then estimated. From the model estimates we infer the welfare losses due to the unfounded belief about the origin of olives. Subsenquently the set of choices under a policy providing correct information about the origin of the product, rather than the place of bottling is simulated. The predicted changes in brand choice and welfare are substantial, leading to the conclusion that the current labelling practice ought to be amended.

2. The EU legislation on extra-virgin olive oil traceability and labelling

The European policy on olive oil has evolved over the last 20 years and it is now strongly focused on improving the quality of the final product. This involves encouraging olive growers, pressing mills and bottling plants to work better and to deliver higher levels of consumer satisfaction.

In 1998 and in 2001, the EU promoted a reform of the olive oil sector, with a particular focus on the common organisation of the market.

The labour cost involved in harvesting olives and transforming them into olive oil is quite high. So, securing the future commercial viability of extra-virgin olive oil in the European and World market requires further quality enhancement, so that the product can command a higher market price. Quality improvement includes the provision of important safeguards for consumers through better information and eventually an increased trust on the product quality recognition.

Until now, the olive oil labelling regulations have required the following:

➢ Information on the category of oil (on the basis of EC REG 136/66);
➢ Results derived from chemical analyses;
➢ Capacity of the container;
➢ List of ingredients;
➢ Expiration date, and
➢ Name and address of the bottler.

Currently there is no requirement under EU regulations to include the place of origin of the unprocessed product: olives (79/112/EEC). Only olive oils with PDO or PGI status must be retailed with information about the geographic origin of olives (EC Reg. 2081/92). So, it is quite frequent that extra-virgin olive oils, bottled in Italy, come from different Mediterranean countries or are a blend of oils from Italian and non-Italian olives. This involves about 160 million litres of extra-virgin olive oil imported from other countries and blended with Italian olive oil.

This situation erodes consumers' trust in a credence attribute like the place of origin of the product. It also impairs producers from harvesting benefits from discriminating on the basis of quality.

On the other hand, other countries seem to have been more cautious. For example, the Spanish Food Certification Agency makes sure that accurate information is contained in the oil traceability system. Such information varies by producer, but some basic requirements for organic certification must be met. Data available via the system includes the olive production region, name of the producer, date of processing, place of processing, number of litres in the lot, date of bottling, acidity level, and taster's rating. Additional information can be obtained through the producer's web site by means of a lot number printed on the label (FTR, April, 2003).

In order to address this problem in a unified fashion across member states, and to improve traceability of olive oil to consumers, in June 2002 the European Union adopted a new regulation that was enforced on November 1st, 2003.

Under EU Reg. 1019/2000, all categories of olive oil will be better described[1]; the maximum packaging capacity for final retail to consumer will be 5 litres; some optional indications, like "cold pressing" or "cold extraction" will be strongly regulated. Every *blend* of vegetable oil and olive oil will have to be highlighted on the label.

The most important part of this regulation concerns blends of oils and the place of origin of the olives they come from. In particular, although the place of origin will still be optional, restrictions will be imposed on the names of blends. It will be possible to define a blended extra-virgin olive oil as "produced in Italy" only when more than 75% of its blend is from olives produced in Italy and the last 25% comes from other European Countries.

It can be argued that this solution is still short of ideal for the purpose of addressing the issue of asymmetric information and traceability in olive oils, but it represents a step forward.

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[1] In particular, 4 categories will be introduced: extra-virgin olive oil, virgin olive oil, olive oil composed of refined olive oils and virgin olive oils, olive-pomace oil.

The type of asymmetric information currently present in the extra-virgin olive oil market is very high. It is further amplified in Italy because of the widespread preference of consumers for oils produced from Italian olives.

For the credence attributes, economic theory suggests that market inefficiencies due to imperfect information gives rise to an equilibrium characterised by lower quality levels than in a perfect information condition. This is due to consumers making choices under uncertain information about goods attributes, and to the ensuing reduction of willingness to pay for different quality levels (Nelson, 1970; Becker, 1977; Coppola, 2000). As a result of such departure from optimum conditions, a decrease in social welfare was observed.

Market imperfection due to lack of information motivates the need for public policies aimed to exclude or to mitigate such problems.

A consistently accurate and exhaustive labelling is an important tool to increase consumer's information about products' attributes. Such public policies change credence attributes into search attributes, reducing the difference between perceived and real characteristics of a product. From a theoretical point of view, the reduction of uncertainty about a positive attribute (as is the case of the extra-virgin olive oil of Italian origin) yields an increase of demand for the same quality level (Zarkin and Anderson, 1992; Coppola, 2000).

3. The sample and the questionnaire

One hundred sixty nine extra-virgin olive oil consumers were interviewed at Ipercoop, one of the largest supermarkets in Naples. This outlet was chosen because it provides customers with one of the largest choice sets of extra-virgin olive oils in Southern Italy. The supermarket bookshelves hosted twenty-six types of extra-virgin olive oils, all in one-litre bottles. The bottles differed by brand, price, information content in the labels (information on panel test, non mandatory information on nutritional aspects), quality certification (PDO, PGI, Organic, 100% Italian), ISO certification, package (from more traditional white glass squared bottle vs. more innovative bottle), description of taste (light taste, strong taste, fruit taste), aspect (clear vs. turbid oil). Finally, eight out of the twenty-six were made from Italian olives, while the remainder were made partially or completely from non-Italian olives (see table 1)[2].

Consumers were interviewed during the month of February 2003. An uneven number of questionnaires were submitted during the six days of the week, according to the daily sales of olive oil of supermarket records (the most was sold on Saturday). A random format was chosen to submit the questionnaire to consumers that bought at least one bottle of extra-virgin olive oil. The questionnaire was organized in three parts and the final format was structured after one focus group and two pre-test runs in Fall 2002.
The first part of the questionnaire focused on the consumption patterns for extra-virgin olive oil and other vegetable oils.

The second part contained questions about the reasons why the consumer wanted to buy that specific extra-virgin olive oil. More precisely respondents were asked to give a score to the chosen extra-virgin olive oil. Scores ranged from 1 to 5 (1 = irrelevant; 5 = very relevant) to these

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[2] Attributes coding: *Italian olives*: 1 olives produced in Italy – 0 in other countries; *Special Taste*: 1 declared special taste on label – 0 otherwise; *Aspect*: 1 limpid – 0 turbid; *Packaging*: 1 innovative – 0 classic; *Label information*: 1 Nutritional information – 0 only mandatory information; *Quality certification*: 1 PDO, PGI, Organic, 100% Italian – 0 no certification; *ISO certification*: 1 Iso certification – 0 no certification; *Brand*: 1 brand with investment in advertising equal to or greater than 10% of grossmargin – 0 other brand; *Private label*: 1 private label – 0 no private label.

8 attributes: 1. Price; 2. Taste; 3. Aspect; 4. Packaging; 5. Label's Information; 6. Olives' geographic origin; 7. Brand; 8. Quality certification (PDO, PGI, Organic, 100% Italian, ISO).

Table 2 shows that in this sample, Taste, Price, and Aspect are the most relevant characteristics of extra-virgin olive oil, receiving an average score greater than 3.5, followed by olive origin with an average score of 2.83.

If the respondent gave a score of 3 or more do the attribute "Olives' geographic origin", then the following question was asked: "*Could you tell me the country of origin of the olives used to make this oil?*". If she\he answered "Italy", the question "*Would you still buy this specific oil, if you knew the olives where not Italian?*" followed.

Fifty-three consumers out of 169 perceived as Italian a non-Italian extra-virgin olive oil and stated that if the olives were not-Italian they would reconside their choice[3].

Table 3 shows that olive oil number 13 was the most frequently misperceived (9 out of 10 times this oil was chosen by the sample). This was probably because the bottler is a well-known traditional Italian pasta-maker.

The forth part of the questionnaire included questions investigating the consumer's socio-economic characteristics as shown in table 4 and 5.

4. Theory and methods

Let us assume the economic rationality of consumers in their choice of extra virgin olive oil. Given their decision to purchase olive oil, they will seek to maximize utility. So, if a number J of alternative oil brands are available, each observed choice j will represent the outcome of an income constrained utility maximization exercise. This implies that each observed purchase will be such that $U(j^*) \geq U(j)$ for each alternative j in the choice set J.

This theoretical framework is conducive to the classic random utility maximization analysis. The assumptions behind this approach are well known, but can quickly be summarised in what follows. The utility that each individual consumer n associates with each olive oil type j is assumed to be made-up by two components. The first component, indirect utility V_{nj} is assumed to be common knowledge between the researcher and the consumer. The second is an unobservable component u_{nj} or error term, which for convenience is assumed to a type one extreme value distribution (or Gumbel), which has a cumulative distribution function equal to:

$$F(u_{nj}) = \exp(-\exp(-u_{nj})) \tag{1}$$

and density function equal to:

$$f(u_{nj}) = \exp(-u_{nj})\exp(-\exp(-u_{nj})) \tag{2}$$

with a variance

$$ar[u_{nj}] = \pi^2/6. \tag{3}$$

From a practical viewpoint, this assumption is of value because differences between Gumbel-distributed random variables have a logit distribution. So, upon defining $\varepsilon_{nji} = u_{nj}-u_{ni}$ under the above assumptions, it is implied that the cdf for ε_{nji} takes the following simple form.

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[3] When most of these consumers they were told at the end of the questionnaire that the olive oil they bought was not from Italian olives, were really surprised and some even quite upset.