KNOWLEDGE AND WILLINGNESS TO PAY FOR ORGANIC FOOD IN SPAIN: EVIDENCE FROM EXPERIMENTAL AUCTIONS

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Abstract

The aim of this paper is to analyse the main determinants of consumers' knowledge and their willingness to pay for organic food products. Moreover, the relationship between knowledge and buying behaviour is explored. Virgin olive oil is taken as an example. Data was generated by way of an experimental auction carried out in two cities in northeast Spain. A three-equation model is estimated: 1) Consumer knowledge; 2) the decision to pay a premium for organic olive oil; and 3) how much premium consumers are willing to pay. Results indicate that socio-economic variables are main determinants of consumer knowledge, and that consumer attitude, lifestyle and knowledge all influence the decision to pay a premium for organic olive oil.

Key words: experimental auction, knowledge, willingness to pay, organic olive oil, Spain.

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1. Introduction

Fifteen years have passed since the arrival of specialty organic food products in Spain. Yet, the market is still very narrow as only 0.7% of total food expenditure is devoted to organic products. Padel et al. (2003) in a Delphi analysis, catalogue Spain as an emerging market for these products. While small, organic production in Spain has expanded by 25 fold between 1995 and 2003 (MAPYA, 2004). Increasing subsidies have promoted a certain degree of substitution between conventional and organic farming. Foreign markets have been a natural destination for organic production. In particular, 50% of organic fruits and vegetables are exported to other European countries, leaving domestic consumers unattended to a certain extent. However, competition in European markets is growing (Michelsen et al., 1999) and might affect Spanish producers in the near future. In this context, the enlargement of the domestic market could be crucial for the survival of Spanish producers.

Domestic market growth faces three significant hurdles. First, prices are much higher than non-organic counterparts. Spanish producers are used to getting a premium price when selling in foreign markets and want to earn the same premium in the domestic market. Furthermore, most conventional food products purchased in Spain are less expensive than in other European countries, so the gap between conventional and organic product prices is greater. Second, Spanish consumers are less sensitive than consumers in other European countries to environmental and health concerns (Padel et al., 2003), which some authors have shown to be the main determinants of the demand for organic food products (Bigne 1997; Roosen & De Pelsmaker 1997). As a result, Spanish consumers are less aware of the specific benefits of organic food, with label recognition being one of the most important issues (Gil et al., 2000; Padel et al., 2003). Finally, Spain still faces some marketing problems due to supply heterogeneity and seasonality. For example, organic food is mainly sold in specialised retail stores (Michelsen et al., 1999) and not in the conventional outlets where consumers do most of their shopping.

Any hope of increasing domestic demand requires a better understanding of consumer reaction towards organic food. It is widely acknowledged that consumers' decisions are the

result of a complex process in which many personal and environmental factors can contribute to the final choices. Consumer knowledge, beliefs, attitudes and behaviour are interdependent according to some kind of causal chain mesh. Recent food scares have increased consumer concern about food products. As a consequence, consumers have become more rational and want better information before making decisions. Hence, purchases are becoming highly dependent on the degree of knowledge owned by consumers (Verdurme et al., 2001)

Assuming the price difference to be the main determinant of future demand, a number of studies have tried to indirectly analyse the potential consumption of organic food products by measuring consumers' willingness to pay (WTP) a premium for organic over conventional food products,. Differences in willingness to pay among consumers were found to be related to their life styles, socio-economic characteristics and health and environmental concerns. (Misra et al., 1991; Byrne et al., 1991; Weaver et al., 1992, Huang, 1996; Hartman & New Hope, 1997; Sanjuán et al., 2002; among others). Although some authors have included consumer knowledge as a potential explanatory variable on consumer's willingness to pay a premium for an organic food, as far as we know no one has tried to analyse the main determinants of consumer knowledge and how this knowledge is related to their WTP.

The aim of this paper is twofold: first, to analyse the existing relationship between consumer knowledge about organic food and their buying behaviour. Second, if a positive relationship exists, we wish to find what is the most effective communication channel to inform consumers about the benefits of organic food products. Virgin olive oil is taken as an example.

To achieve this objective, a tree-equation model is specified. A direct measure of consumers' knowledge about organic production is generated from responses to specific questions included in the survey. Knowledge is then incorporated into a willingness to pay (WTP) equation as an explanatory variable. Both the knowledge and the willingness to pay variables are treated as endogenous and are jointly estimated. Then, two types of WTP equations (a binary choice and a level of WTP) are used to fully capture consumer WTP behaviour.

Data was generated from an experimental market with non-hypothetical scenarios conducted in two cities located in northeast Spain. Experimental markets have proved to be an interesting and alternative methodology to elicit consumers' WTP (Menkhaus et al., 1992; Buhr et al., 1993; Hayes et al., 1996; and Shogren et al., 1999; among others), since

experiments can be implemented so as to respect incentive compatibility. By using monetary incentives and real products which can be purchased by participants in an auction, this procedure allows the researcher to evaluate consumers' acceptance of new products as well as to measure the impact of using different sources of information to communicate the specific attributes about the new product. Furthermore, an experiment can place subjects in a context where consumption is required, forcing individuals to put cognitive effort into their bidding decisions (Fox, 1995)[1]. As a result, experimental auctions reduce problems associated with hypothetical bias in stated preference methods such as Contingent Valuation and Choice modelling. As an added innovation, our paper is the first application of experimental auctions to the olive oil market.[2]

The rest of the paper is organised as follows. Section 2 describes the experimental auction design. Results from the experimental auction are shown in Section 3. In Section 4 a three-equation model is estimated to explore the main factors affecting consumers' knowledge and their willingness to pay for an organic virgin olive oil. The paper finishes with some concluding remarks.

2. Experimental markets

In recent years, experimental studies have been employed to investigate consumer acceptance and WTP for new products (Lusk et al., 2004a). Using real money and real products, that can be purchased during the experiment by participants, a non-hypothetical valuation scenario tries to replicate a point-of-purchase decision. This methodological approach is derived directly from experimental economics research, which is a relatively new theoretical framework. Based on an economic incentive structure, experimental economics tries to influence individual behaviour in a laboratory environment. Experimental methods allow the researcher to control certain variables and also to test alternative theoretical hypotheses (Davis & Holt, 1993; Friedman & Sunder, 1994; Kagel & Roth, 1995).

Biases detected in contingent valuation methods, due to participants' awareness of the hypothetical nature of their choice (Hayes et al., 1996; Buzby et al., 1998; Stefani & Henson,

[1] The criticism of experimental auctions is that consumers' decisions on food at the point of sale are often done with less far involvement. Furthermore, consumers in a normal retail setting are not bidding for a limited stock. Finally, Hayes et al., 1996) showed that the WTP value elicited in a one-time purchase scenario is likely to be greater than if individuals were allowed multiple purchases.

[2] As far as we know, previous applications have elicited the WTP a premium for olive oil using conjoint analysis (Fotopoulus & Kristalis (2001) or choice experiments (Scarpa & Del Giudice, 2004).

2001) are overcome in experimental methods by using real products which can be purchased subject to budget constraints. Most of the literature in marketing research has used experimental auctions either to elicit consumer's willingness to pay (WTP) for a new or improved product or to exchange an endowed conventional product for another with new characteristics. Recently, Lusk et al. (2004b) estimated the willingness to accept (WTA) compensation to give up a non-genetically modified (GM) product. Neoclassical theory suggests that WTP-WTA measurements should provide similar results, although empirical evidence seems to show that observed values tend to diverge, with WTA being higher than WTP. Taking into account the nature of the product (organic food) and the scope of this study, we believe it is more appropriate to elicit consumer's willingness to pay for it.

Among the different alternatives, a second-price sealed-bid auction has been chosen to carry out the experiment. This auction format is theoretically regarded as incentive compatible, the price is endogenously determined and participants can incorporate feedback from the market, which has been proved to generate rational behaviour consistent with economic theory (Shogren et al., 2001a). Moreover, it has been one of the most popular methods used in the literature, although some authors have pointed out the limitation that subjects tend to over-bid (Kagel et al., 1987). Other alternatives such as the first-price or the random n^{th}-price have also been subject to some criticism (Shogren et al., 2001b). In any case, from a theoretical point of view, we have reasons to expect our auction format will give similar results to the five-price or random n^{th}-price techniques.

In a second-price auction, participants submit their bids to the auctioneer anonymously. The winner is the participant with the highest bid, but the purchase price corresponds to the second highest bid. Repeat bidding allows the participants, through experience, to arrive at their real price offer for the product being auctioned, and also permits experimenters to test the effect of changing conditions on participants' valuation of the product in question. In order to avoid the so-called "income effect", a bidding round is randomly selected among multiple rounds and the highest bidder of this selected round becomes the auction's winner (Menkhaus et al., 1992; Buhr et al., 1993; Shogren et al., 1994).

The experimental market design

So, an experimental auction has been used to elicit, in absolute terms, consumers' WTP for an organic food. The product chosen was a 75 cl. bottle of organic olive oil[3], and it was selected for several reasons. Olive oil is a traditional ingredient in Mediterranean cuisine. It is consumed in the vast majority of Spanish households and consumers are usually well informed about its attributes. Olive oil is mainly purchased in supermarkets (90% of total market share) (MAPYA, 2006).

Participants in the experiment were given the opportunity to purchase the bottled olive oil, properly labelled according to government standards as organic, replicating a real market experience. We looked at two possible influences on this purchase. First, we tested the effect of informing consumers about the price of conventionally produced non-organic olive oil prior to the auction. Second, we compared the effect of using alternative information channels to communicate certain specific beneficial attributes of the organic product prior to the sale.

In the first case, the basic assumption is that by providing reference prices (the normal situation of a buyer in a retail outlet), the perceived transaction value of the organic virgin olive oil increases and then the perceived value of the product also increases (Monroe, 1990). Additionally, two distinct information channels were used to increase consumer knowledge about organic farming: 1) a written one: a leaflet used by the Organic Farming Committee in a promotion campaign in a supermarket retail chain was provided to participants; and 2) an oral one: a five minute talk given by a qualified representative of the Organic Farming Certification Authority. The information supplied was almost identical in the two cases.

The experimental design was of a randomised blocks type, considering both of the hypotheses mentioned above: 1) the "reference price" effect, with two levels: information on reference prices for non-organic virgin olive oil and no information; and 2) the "information source" effect, with three levels: no information, leaflet, and oral. The six resulting treatment combinations were randomly assigned to six groups of participants:

- Group 1: No information on organic farming – No reference to non-organic olive oil prices
- Group 2: No information on organic farming – Reference to non-organic olive oil prices

[3] All organic olive oil is extra-virgin. Although, for simplification purposes, throughout the text we have used the names organic and non-organic olive oil, we are always comparing organic extra-virgin with non-organic extra-virgin olive oil

- Group 3: Leaflet – No reference to non-organic olive oil prices
- Group 4: Leaflet – Reference to non-organic olive oil prices
- Group 5: Oral presentation – No reference to non-organic olive oil prices
- Group 6: Oral presentation – Reference to non-organic olive oil prices

The experimental auction was carried out in two cities in northeast Spain. One hundred twenty (120) participants were recruited from consumer protection organisations. The participants recruited were the principal food purchasers for their households and voluntarily agreed to attend the experimental session without any prior information about the purpose or the conditions of the study. We formed groups of around ten participants to make each session manageable

The experiment was divided in several steps. First, the purpose of the study was announced to participants, who were then endowed with 15€ and an identification number in order to preserve anonymity[4]. Then, detailed information about how the auction works was provided to participants. To familiarize them with the procedure, a non-hypothetical auction with bottled water was carried out. Finally, the experimental auction began. Eight rounds of bids were made – all for the same 75 cl. bottle of olive oil, emphasizing that only one of those eight rounds would later be randomly selected as the valid round. After each round, the number of the highest bidder and the corresponding price were announced to all participants. To test for the effect of information on participants' bids, after the fourth round, participants were informed about organic olive oil production methods, labelling and quality controls, using either one of the two information sources mentioned before. After providing the information, the auction went on to complete the last four of the eight rounds. One base group was given no product information at any time. Once the experiment had finished, one round was randomly selected to determine the winner of the bids, who had to pay for the product the existing purchase price in that round. Finally, participants were asked to fill out a questionnaire in which information was collected on their socio-economic characteristics, consumption habits, and attitudes towards food safety, nutrition, the environment, labelling and food prices.

[4] Buhr et al. (1993), Shogren et al. (1999) and Stefani and Henson (2001) have tested the endowment effect in second-price auctions, finding empirical evidence of an upward bias when no money was given before the auction started.

3. Consumers willingness to pay for organic olive oil

Table 1 shows the socio-economic characteristics of participants in the experimental auction. A higher share of participants was female, aged 50 to 64 years and with an elementary school level of education. One out of five households has children under 16 and two-thirds have tried organically produced food at least once. Although we have not used a stratified random sample, the socio-economic characteristics of the selected sample do not substantially differ from those of the population of reference taking into account the data from the Instituto Nacional de Estadística (INE) (National Institute of Statistics).

Figure 1 and Table 2 show some descriptive results from participant's bids. Bidding prices ranged from 3.50 to 6.25 Euros for organic virgin olive oil. The average bid in the last four rounds (once the information was provided) shows that 10.8% of participants were willing to pay more than 4.80 euros for the product and that only 5.8% bided more than 5.10 Euros, the minimum market price at which organic virgin olive oil was sold at that time in the two cities where the experiment was held[5]. If we take into account the 90th percentile in Table 2, we observe that for those groups to whom no information was provided, the average bids were closest to the threshold of 5.10 Euros. This result is consistent with those found in Shogren et al. (2000), who indicated that it is the novelty of the product and not the novelty of the procedure (experimental auction) what can bias bids upwards.

(Insert Table 1)

Figure 2 shows the average WTP for each group mentioned above, and that participants' bids increase significantly as the eight rounds advance. This would suggest that participants have a kind of strategic behaviour, submitting their own low bids for the first round and yet expecting the first winning price to reveal what everyone else thinks is the true value. Alternatively, it can be argued that each group follows a different path, which can only be explained by the idiosyncrasy of its membership. For example, the level of bidding has to do with the presence of group members who are inclined to buying organic products.

(Insert Figure 1)

The reference price effect

In order to see if there is a significant effect on participant's willingness to pay based on the a previous presentation of non-organic virgin olive oil prices, standard t-tests were

[5] Market prices for organic extra-virgin olive oil price at the marketplace ranged from 5.1 to 6.8 Euros per bottle.

conducted between average bids from participants to whom reference prices were provided and those to whom this information was not given. The analysis was carried out for the eight rounds. Results are shown in Table 3. In all cases, those possessing reference prices bid higher, although differences are more marked from the third round onwards. This is consistent with Monroe (1990), who showed that reference prices increased the perceived value of the product.

(Insert Table 2)

(Insert Figure 2)

The information effect

Providing information about the intrinsic beneficial characteristics or attributes of a new specific product has been found to be quite an important influence on the consumer's final acceptance of that product. In this paper, we have tried to analyse the effect on consumer WTP for one organic food product, of not only the information on how the olive oil is produced but also of the way this information is communicated,. To find this out, t-tests have been conducted comparing the fourth and fifth round bids, that is, just before and just after the information was provided. The analysis has been done for both the written and oral presentation of the information.

(Insert Table 3)

Table 4 shows the main results. As can be observed, when no information is supplied to participants after the fourth round, differences between bids are not significant. Bids follow one another, smoothed by bidding "inertia". The leaflet is not very effective, hardly disturbing the bidding flow. Differences are only marginally significant in the case where reference prices had not been provided. However, information provided by a specialist has a significant effect on participant's bids. It seems that the technician's information is regarded as more reliable by the participants. A similar result was found in List & Shogren (1998). The main conclusion is that both the information and how it is provided matter[6].

(Insert Table 4)

4. Factors affecting consumer's knowledge and WTP for organic olive oil

[6] Following Roosen et al. (1998), to ensure that differences found between the fourth and the fifth rounds did not stem from an increasing trend in the auction bids, we also tested for differences between the third and fourth rounds and between the fifth and the sixth rounds. No significant differences were found in these cases.

4.1. Model specification

The relationship between consumer knowledge and their willingness to pay in the case of an organic food product has not received too much attention in the literature. Blend & Ravensway (1999) and Underhill & Figueroa (1996) are the only exceptions. Both include a "knowledge" variable in the willingness to pay equation but they found contradictory results. While in the first paper, a positive and significant relationship was found, in the second one, the knowledge was not found to be relevant.

Consumers make food choices in order to get greater utility from their decision. It is acknowledged that part of this utility can be derived from using food to maintain their health or to preserve the environment, two inherent characteristics associated with organic food. In a net benefit approach, consumers will choose organic food if the perceived marginal benefit of improving their diet or preserving the environment is greater than the marginal cost of buying such a product. The perceived marginal benefit will depend on the information consumers have about organic food although, on the other hand, the level of consumers' knowledge will be determined by factors that affect the expected value or costs associated to acquire that knowledge. What those factors are is one of the issues addressed in this paper.

The empirical model used in this paper is composed of three equations: a reduced form equation (1) of knowledge about what constitutes organic food, and two structural equations of consumer willingness to pay (2) and (3):

$$\Pr(K_i) = \text{Poisson}(S_i, F_i, C_i, I_i) \tag{1}$$

$$\Pr(y_i^* > 0) = g(K_i, S_i, A_i, u_i) \tag{2}$$

$$\left[WTP_i \middle| y_i = 1\right] = h(K'_i, S'_i, A'_i, \varepsilon_i) \tag{3}$$

The first equation describes the "knowledge" equation where each respondent's amount of knowledge is measured by the number of correct answers (K_i) to a set of seven statements included in the survey. Equation (1) is specified as a count model in which the count random variable K_i is assumed to follow a Poisson distribution[7]. Explanatory variables include the socio-economic characteristics of respondents (S_i), the information sources used (F_i), the respondent past experience on organic food consumption (C_i) and, finally, the information received during the experiment (I_i). Among the socio-economic characteristics,

[7] The Poisson distribution is chosen since the mean and the variance of the "knowledge" variable were very similar.

the education level is included as a proxy of information capital, since well-educated people have been exposed to more information and are more capable of understanding the information provided. Household income may also affect the level of knowledge about organic food, although the sign of this relationship is not evident. While wealthier people may show more efficiency in processing information[8] they also probably have a higher opportunity cost of time, generating potential for a substitution of information by brand loyalty, confidence in the retailer, etc. Finally, household composition may also affect the degree of knowledge. Households with young children, as well as older people without children, may be more aware of the health characteristics of new products.

Equation (2) is a binary choice willingness to pay equation, which describes the probability that the i^{th} respondent is willing to pay a premium for the organic food product over the conventional counterpart. The variable y_i^* indicates the difference in utility provided by the organic food product in relation to the non-organic one. If the difference is positive ($y_i^*>0$), then y_i takes the value 1 (the respondent is willing to pay a premium). Otherwise, if the difference is negative ($y_i^*<0$), y_i is 0. The error term u_i is assumed to follow a standard normal distribution (Probit Model). Explanatory variables include the consumer knowledge about organic food (K_i), socio-economic characteristics of respondents and consumer attitudes (A_i) towards: a) the impact of agriculture on the environment; b) food safety; 3) food diet; 4) food prices; and 5) organic food products.

Finally, equation (3) represents the premium respondents are willing to pay for an organic food product over the conventional counterpart once they have decided to pay a premium ($WTP_i | y_i=1$). The error term is also assumed to follow a standard normal distribution. This set of explanatory variables can be different from those included in equation (2).

4.2. Estimation procedure

As mentioned above, equation (1) is a count model where each K_i is drawn from a Poisson distribution with parameter θ_i, which is related to the set of explanatory variables $Z_i = (S_i, F_i, C_i)$. The primary equation of the model is:

$$\Pr(K_i = k_i) = \frac{e^{-\theta_i}\theta_i^{k_i}}{k_i!} \qquad k_i = 0,1,2,...$$

[8] Wealthier people have a real chance to buy any product, even the more expensive ones. So, they may take into account the whole set of information available to them.

The most common formulation for θ_i is:

$$\ln\theta_i = \beta' Z_i$$

The Maximum Likelihood (ML) estimator is used to derive $\hat{\beta}$ from the data in the sample.

However, in the case of equation (2) the ML procedure is inconsistent since an endogenous variable (K_i) is included among the explanatory variables (Kim et al., 2001). Thus, the two-stage conditional maximum likelihood estimator (TSCML) (Rivers & Vuong, 1998) is used. In the first stage, the knowledge equation is estimated following the procedure described above. In the second stage, the Probit Model is estimated by ML, with K_i, S_i, A_i and the estimated residuals from equation (1) ($\hat{v}_i = \theta_i - \hat{\theta}_i$)[9] are used as explanatory variables. The null of no significance of the residuals coefficient can be used as an endogeneity test of the "knowledge" variable in the binary choice willingness to pay model. If the null of no significance is rejected, then the estimation procedure described is consistent. If we fail to reject that the knowledge variable is exogenous, then equation (2) can be directly estimated by ML.

In equation (3) we find a similar endogeneity problem. In this case, we use the exogeneity test developed by Grogger (1990), which has the following form:

$$h = \frac{\left(\hat{\delta}_{END} - \hat{\delta}_{EX}\right)^2}{\left[\mathrm{Var}(\hat{\delta}_{END}) - \mathrm{Var}(\hat{\delta}_{EX})\right]} \qquad (4)$$

where $\hat{\delta}_i$ is the coefficient estimate of the regressor K assuming endogeneity or exogeneity, and var ($\hat{\delta}_i$) is the corresponding estimated variance. Under the null of exogeneity, this statistic is distributed as a χ^2 with one degree of freedom.

Equations (2) and (3) can be specified as:

$$\begin{aligned} y_i^* &= W'\gamma + u_i \qquad & WTP_i^* &= X_i\beta + \varepsilon_i \\ y_i &= \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \le 0 \end{cases} & WTP_i &= y_i WTP_i^* \end{aligned} \qquad (5)$$

[9] Note that under our specification for the Poisson distribution: $E[k_i \mid Z_i] = \mathrm{Var}[k_i \mid Z_i] = \theta_i = e^{\beta' Z_i}$

where y_i and WTP_i are the observed dependent variables; y_i^* and WTP_i^* are corresponding latent variables; W_i and X_i are vectors of explanatory variables; γ and β are the corresponding vectors of parameters; and u_i and ε_i represent the error terms in equation (2) and (3), respectively.

The Maximum Likelihood estimation of equations in (5) provides efficient estimates of the unknown parameters when the sample size is large enough. However, we have found impossible to implement such procedure as we did not arrive to convergence, even changing the starting values, as we have a relative small sample (120 observations) and the number of potential explanatory variables was relatively large. Then, we have implemented a two-step estimation procedure which consists of applying the probit estimator to the selection mechanism and then the method-of-moments estimator to an augmented WTP equation by including a correction factor obtained in the first step. Heckman's (1976) procedure has been extensively used in the empirical literature. Basically, it consist of obtaining the ML probit estimates of $\hat{\gamma}$ for the selection mechanism and then estimating with SUR the WTP equation augmented by an "inverse Mills ratio" defined as $\varphi(\eta_i W_i\hat{\gamma})/\Phi(\eta_i W_i\hat{\gamma})$, where $\eta_i = 2y_i - 1$ and $\Phi(.)$ and $\phi(.)$ are the standard normal cumulative and the density functions, respectively. However, Shonkwiler & Yen (1999) showed that in the Heckman's procedure there is an internal inconsistency, since it generates an incorrect expression of the unconditional expectation of the WTP. They proposed an alternative approach, which uses the whole sample and is based on the work by Wales & Woodland (1980). They assume that the error terms $(u,\varepsilon)'$ are jointly distributed as a bivariate normal with $Cov(u,\varepsilon) = \lambda$. Under this hypothesis the unconditional mean of WTP_i is given by (Amemiya, 1985):

$$E(WTP_i \mid W_i, X_i) = \Phi(W_i'\gamma)X_i'\beta + \lambda\varphi(W_i'\gamma) \tag{6}$$

Based on expression (6), the system in (5) can be written as:

$$WTP_i = \Phi(W_i'\gamma)X_i'\beta + \lambda\varphi(W_i'\gamma) + \xi_i \tag{7}$$

where $\xi_i = WTP_i - E(WTP_i)$; and $E(\xi_i) = 0.$

Equation (7) is estimated using a two-step procedure. In the first step the ML probit estimator is used to estimate the γ parameters. In the second step; $\Phi(W'_i\hat{\gamma})$ and $\varphi(W'_i\hat{\gamma})$ are calculated, and the following equation

$$WTP_i = \Phi(W_i'\hat{\gamma})X_i'\beta + \lambda\varphi(W_i'\hat{\gamma}) + \xi_i \tag{8}$$

is estimated by SUR, where:

$$\xi_i = \varepsilon_i + [\Phi(W'_i\gamma) - \Phi(W'_i\hat{\gamma})]X'_i\beta + \lambda[\varphi(W'_i\gamma) - \varphi(W'_i\hat{\gamma})].$$

This procedure guarantees consistent estimates of $\hat{\gamma}_j$ and $\hat{\beta}_i$ in the first stage, but the second stage ones are inefficient since error terms in equation (8) are heteroskedastic. To solve this problem, which affects the size of the standard errors, and hence the individual significance of the variables, the covariance matrix has been adjusted using the Murphy & Topel (1985) procedure.

4.3. Results

To estimate the parameters of the above-mentioned model (equations1-3), the dependent variables have been defined as follows. In relation to participants' knowledge about organic food products, the questionnaire included seven definitions as to what an organic food product was. Respondents were asked to indicate whether the definition was true or false. The number of correct answers was taken as a proxy of the "objective knowledge" of the subject. The WTP variable was measured as the difference between the average bid provided by each participant in the last four rounds minus the reference price of the conventional product (independently of whether or not such information had been provided to the participant). If the difference is negative, a zero value was assigned. This means that the WTP variable is continuous but with a number of zeros (30% in this study). To tackle this issue the WTP model contained a bifurcation between equations (2) and (3) assuming that the consumer's decision is a two-step process. First, the consumer decides whether or not to pay a premium for the organic olive oil. Second, he/she decides how much to pay. Thus, the second decision is conditional on the first one. The first step could be considered as a decision to enter the market. The existence of a price gap between organic and conventional olive oil could be viewed as an entrance barrier for consumers. Given such a gap, only those participants who wish to pay a premium will enter the market and become potential consumers. If in the second step, the premium that the participants are willing to pay is equal to or greater than the actual gap prevailing in the market, the participant will purchase the organic product.

Four types of explanatory variables have been considered: 1) socio-economic characteristics of participants; 2) participant's experience with organic food consumption; 3) control variables used in the experiment: price references and information sources; and 4)

participant's attitudes. The first three groups of variables have already been described in Table 1 and Section 3. Participant's attitudes have been measured using five scales related to their awareness about the potential impact of agricultural production on the environment, price sensitivity, nutritional issues, food safety concerns and organic food attributes. Participants were asked to rate their agreement with several statements related to each of these issues on a five-point scale (1 = totally disagree; 5 = totally agree). These scales have been reduced by principal component analysis to extract the main dimensions of each aspect, which puts them in the form of explanatory variables in the model.

Results from the factor analyses are shown in Table 5. Participant attitudes towards the potential impact of agriculture on the environment have been summarised into three factors, which account for 61% of the total variance. The first factor, "preference for less intensive farming" is positively correlated with attitudes towards a monitored and less polluting farming system; the second factor, "demand for more 'natural' products", is related to an interest in eco-labelled products; the third factor, "higher price", refers to the statement that organic food should be more expensive than the conventional food.

(Insert Table 5)

Food safety concerns can also be represented by three main factors, which account for 54% of the total variance. The first factor, called "demand for food safety", includes consumer's awareness of food processing, although considering that food safety should not imply higher prices; the second factor, "no risk perception" is related to a general trust in the agrifood system, assuming that food scares are isolated cases; finally, the third factor has to do with concerns about the healthiness of food products and the idea that certified products with appropriate labels are a guarantee of food safety.

Attitudes towards nutritional aspects are summarised in two factors, which account for 51% of the total variance. The first factor, "nutritional concerns", is related to the participant's interest in nutritional aspects of food, while the second factor, "diet concerns", refers to different aspects related to nutrient intake. The sensitivity to food prices is summarised in three factors, which account for 57% of the total variance. The first one, "price sensitivity", refers to the importance of prices in the purchasing decision; the second factor, "price as a sign of quality", is related to the perception of a relationship between price and quality. The third factor, "price unawareness" is positively related to the fact that prices are not relevant when purchasing food.

Finally, participant's attitudes towards organic food attributes can be represented by four factors, which explain 66% of the total variance. The first factor, "post-purchase experience", is related to consumer's perception that organic food is more tasty and has better quality; the second factor, "positive image", emphasises the relationship between organic food and health; the third factor, "higher priced", is related to the assumption that these products are more expensive than the conventional counterparts; finally, the fourth factor, "negative aspects", is related to the negative perception that participants have about these products because either they are considered a fraud or they have a worse external appearance.

A summary of all possible variables to be included in equations (1) to (3) is shown in Table 6. In equations (2) and (3) the "knowledge" variable has also been included. The results from the estimation procedure followed in this paper are summarised in Table 7.[10] In the following paragraphs we will describe the main factors affecting both the participants' knowledge about organic food and their willingness to pay for an organic olive oil.

(Insert Table 6)

Participant knowledge about organic food

It is interesting to observe that the information provided during the market auction had no significant effect on the participant's knowledge about organic food. Neither the leaflet nor the oral presentations significantly increased participant knowledge, even though the information had been provided only one hour before! Participants have a very short memory or they weren't particularly interested in retaining the facts. This is not a surprising result since, first, organic food still is a relatively unknown product in the Spanish market and consumers usually take some time to process new information. Second, there exists some confusion in the consumer mind due to a relatively large number of competing products branded as "green", "natural" or "bio". As a new product, organically produced food products are best promoted by satisfied consumers who then convince their friends, following the traditional shape of the product life cycle.

Second, participants who usually receive food information mainly through family and/or friends and newspapers showed a better objective knowledge about organic food. Personal communication has been shown to be the most efficient way to transmit information.

[10] Only main significant variables have been included in Table 7 after following a step-wise variable selection process. The complete set of results is available from authors upon request.

But, objective knowledge was lower for participants who principally rely on radio and television mass media to get food nutritional information.

Among the socio-economic variables, both income and education levels significantly affect the degree of knowledge about organic food. In relation to the income level, the relationship is negative, that is, participants with the lowest income level have less knowledge about organic food. Since organic food is generally perceived as more expensive, there is a lower incentive to be informed about unaffordable products.

The level of education is positively related to the amount of knowledge. However, the only significant differences have been found between participants with primary school and the rest. Participants with children under 16 living in the household are more worried about nutrition and so, independently of their sex or age, have more knowledge about organic food.

The final interesting result related to the degree of knowledge is the negative relationship found between "objective knowledge" and past experience in consuming organic food: more experienced consumers have less knowledge about these kinds of products. This surprising result can be understood as rooted in confusion in the Spanish market about what organic food really is. As Gil et al. (2000) showed, Spanish consumers mainly associate organic food with fruits and vegetables that are grown non-commercially in family gardens in rural areas[11]. Second, as already mentioned, many products are labelled in a confusing way[12]. Moreover, this result suggests two realities that should be dealt with by producers. First, consumers are not aware that government-controlled organic food certification exists, and they are unable to recognise the organic label producers and manufacturers must use. Second, the good news for this sector is that there exists a consumer segment willing to consume new organically produced food products. This potential market niche must be adequately informed, and could expand by word-of-mouth.

(Insert Table 7)

Willingness to pay

The estimated parameters for equations (2) and (3), corresponding to the two-step decision process, are presented in the last two columns in Table 7. But first, let us consider the results from exogeneity tests carried out on the "knowledge" variable in the two equations. In

[11] Results from their survey indicated that around 20% of the respondents' total consumption of fruits and vegetables was organic while their expenditure on organic food products hardly arrived to 15€ per month per household (less that 1% of total food expenditure).

[12] Since the beginning of 2006 claims on food labels such as "green", "natural" or "bio" are forbidden.

the first equation, results from the test indicated that the null of exogeneity of the knowledge variable was rejected (the estimated parameter of $\hat{v}_i$ was 0.35, which was significant at the 5% level of significance). In the second equation, results from the Grogger's test indicated that the null of exogeneity could not be rejected (the value of the statistic was 0.06, which was well under the critical value of a χ_1^2 at the 5% level of significance of 3.84). Moreover, as we show below, explanatory variables in both equations are substantially different. We will now explain the main results of these calculations.

When it comes time to decide whether or not to enter the organic olive oil market, knowledge about organic food has a positive and significant influence. The higher the knowledge, the higher the probability of participating in the market. This result is consistent with results in Blend & Ravensway (1999) and indicates that a correct identification of an organic product is a key factor for its future success and for overcoming some of the main obstacles limiting its development in these early stages of the product life cycle.

While participant socio-economic characteristics figure little, their attitudes are the main determinants that explain their decision to enter the market (to pay a premium). This is not a surprising result since many studies have pointed out the relevance of attitude and lifestyle variables as determinants of food consumption behaviour. Furthermore, these results are independent of both the reference price variable and the information provided; neither are significant variables in explaining the consumers' decision to pay a premium for an organic olive oil.

Among the psychographic variables, subjects' attitudes towards the potential impact of agriculture on the environment have a positive and significant effect. A consumer segment does exist that is looking for new consumption alternatives; they are aware of the negative impact of the abuse of chemical products in intensive production systems and that new and more "natural" food production methods are now available.

Estimates from the probit model also illustrate that the decision to participate in the organic market is unrelated to food safety issues (the variable "Demand for food safety" has not been found to be significant). Even though there exists a demand for increasing control and regulation of food production and transformation processes, this demand does not affect the organic olive oil market. Consumers seemingly do not purchase organic olive oil because it is perceived as safer. The decision stems mainly from health issues (the sign of the variable "Demand for labelled products due to health concerns" is positive and significant). Organic

products are perceived as more natural, healthier. However, it is also true that as consumer confidence in the overall agro-food system increases, the probability of participating in the organic food market diminishes.

Nutrition concerns are also one of the main determinants for entering the market. The relationship, as expected, is positive. A higher interest among consumers in the food composition and, in particular, in the presence of artificial additives increases the probability that they are willing to pay extra for organic olive oil. On the other hand, there does not seem to be any significant relationship between attitudes towards food prices and the willingness to pay factor for organic olive oil.

We have also found a significant relationship between the consumers' willingness to pay a premium for organic olive oil and the perceived characteristics of organic food. Those consumers, who have a positive image about organic food in terms of taste, quality, positive impact on health, etc, are more likely to participate in the market.

Results from the second-step willingness to pay equation (how much premium participants are willing to pay for an organic olive oil, once they have decided to enter the market) are shown in the last column in Table 7. We will focus our analysis on the signs and significance of the estimated parameters, as they cannot be interpreted in a straightforward way due to the fact that they are multiplied by the correction factor $\Phi(W'_i\hat{\gamma})$. As can be observed for the second-stage decision, the socio-economic characteristics of respondents play a more significant role.

The first interesting result is that respondents' price sensitivity is negatively correlated (although no significantly) with the premium they are willing to pay for an organic olive oil. As mentioned above, organic food is perceived to be more expensive. So, participants who declared that price was one of the most important attributes when shopping are only willing to pay a lower premium. Furthermore, in relation to prices, estimated results indicate a positive relationship between perceived value (variable "Higher priced") and the premium respondents are willing to pay. This perception has led consumers to increase the premium they are willing to pay for the organic olive oil. No other psychographic variables were found to be significant.

Among the socio-economic variables, income level did not have any significant effect on the premium participants were willing to pay. However, even though the effect was not significant, it is interesting to note that the poorest were willing to pay a higher premium for

organic olive oil. We think this result is the outcome of the economic incentive provided to participants at the beginning of the market experiment. Within this group of participants, who are not going to buy the product (as they are more price sensitive and have less knowledge about what a organic product is), the economic incentive generated a wealth effect, which gave a slightly upward bias to the premium this consumer segment was willing to pay.

We have also found a positive relationship between the premium consumers were willing to pay and their age,[13] but this effect only kicks in for the older group. We have shown in the previous equation that one of the significant factors affecting the decision to enter the market was health, which is clearly of great concern among the elderly. Since many other necessities are already satisfied, this group can afford to allocate a higher budget share to buy healthy products, among which organic olive oil could be perceived as an interesting alternative.

The presence in the household of children under 16 also increases the amount participants are willing to pay for an organic olive oil, although this effect is only marginally significant. This group is one of the better informed about what an organic food is.

Unexpectedly, the "knowledge" variable is not significant. Although better knowledge increases the likelihood to pay a premium for an organic olive oil, it is not significant in explaining the premium amount.

We conclude by noting to two interesting results. First, only those participants who have at some previous time bought organic products, perhaps out of curiosity, are willing to pay a significant higher premium. As they have already bought organic food, they have a clearer idea about organic food market prices and, if they are really interested in buying the organic olive oil, the premium they are willing to pay is the closest to the market price. Second, those participants who were exposed to the reference prices for non-organic olive oil, and for whom no information was provided during the experiment about what an organic food is, are willing to pay a higher premium. In relation to reference prices, this result is consistent with expectations since they had an exact reference price and did not have to remember the price they had paid the last time they bought olive oil. In relation to the information provided, results from this study are consistent with those found by Shogren et al. (2000) who argued that product novelty biases participants' bids upwards.

[13] Initially, we introduced three dummy variables to account for age differentials. However, only the dummy variable for people over 65 was significant.

5. Concluding remarks

In this paper we report results from an experimental auction used to assess consumer willingness to pay for an organic olive oil at prices that are higher than the non-organically produced variety. The experiment was supplemented with a specific questionnaire administered to participants to get information about their knowledge on organic food products, as well as about their socio-economic characteristics, attitudes and purchase behaviour. Results from this survey allow us to analyse the relationship between participants' knowledge and their willingness to pay, and important factors affecting these two aspects of consumer behaviour. To achieve this objective a three-equation model is estimated.

Results from this study allow us to draw a number of conclusions. First, experimental market auctions are a very useful tool to assess consumers' WTP. They provide more reliable information compared to stated preference methods (contingent valuation and choice modelling) since participants are given the option to really purchase real products subject to a budget constraint. During the experiment two different effects were looked for. The first is "the reference price effect": what difference will it make in the bidding providing the consumer with the reference price of non-organic olive oil? No significant differences were found. The second effect is "the information effect": what difference will it make in the bidding if we provide information to participants about how the organic product had been produced? And, what is the most effective communication strategy for this information? In this case, oral communication displayed a higher influence on consumers' responses than written information.

In spite of these effects, the main conclusion is that, according to our results, the market for organic oil in Spain is still very limited. Although 70% of participants were willing to pay a premium for an organic olive oil, only 5% would be willing to pay the market price. This percentage may be considered rather small.

Organic food products in Spain are still in the earliest stages of their life cycle. Few Spanish consumers have a clear idea about what organic food really is! Our study reveals, on the other hand, that more and better information may make the market grow, since a positive relationship between knowledge and willingness to pay was found. Producers and manufacturers should design specific promotion and/or information campaigns addressed to target groups they consider open to organic, environment-friendly and healthy products. The

public sector should support these campaigns instead of allocating subsidies to support producers' incomes, which should be only kept at the early stages of farms transformation from conventional into organic agriculture.

Oral communication proved more effective in our sample. However, taking into account that our participants often forgot some attributes of the organic olive oil only one hour after the information was provided, we would suggest that instead of concentrated short-term public and private information campaigns, it would be more useful to design smaller, longer running campaigns. Up to now, no such promotion/information campaigns have been attempted. In most cases, promotions have been carried out at the point-of-sale, mainly in retail chains, and have tried to attract consumers to organically produced products based on their quality and environmentally friendly attributes.

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Table 1. Sample socio-economic characteristics (%) (N=120)

		This study	Population
Sex	Male	16.7	n.a.
	Female	83.3	
Age (years)	18-34	15.0	10.5[a]
	35-49	20.8	20.9
	50-64	50.0	39.2
	More than 65	14.2	29.4
Education level	Primary	45.0	47.8[a]
	Secondary	35.8	38.1
	University	19.2	14.1
Household size	1	9.2	14.9[b]
	2	28.3	26.7
	3	24.2	22.2
	4	26.7	21.5
	More than 4	11.6	14.8
Household monthly income	Less than 900 Euros	14.2	n.a.
	900-1500 Euros	35.0	
	1500-2100 Euros	37.5	
	2100-3000 Euros	10.0	
	More than 3000 Euros	3.3	
Children	No children	79.3	61.8[b]
	Children under 6 years old	6.6	15.6
	Children between 6 and 16	14.1	22.6
Consumption level of organic food	Regularly	1.0	n.a.
	When I find them	23.3	
	Curiosity	34.2	
	Never	32.5	

n.a. not available

Sourcea: [a] INE (2006)). Encuesta Continua de Presupuestos Familiares, 2004. www.ine.es

[b] MAPYA (2006). Consumo Alimentario en España, 2004. www.mapya.es

Table 2. WTP for an organic olive oil for the different groups of participants (average bid in the last four rounds after the information is provided) (Euros)

	Last four rounds average bid			
	Mean	Median	Standard deviation	Percentile 90
Group 1(n=20): No information – No reference on non-organic virgin olive oil prices	3.99	4.17	0.83	4.95
Group 2 (n=20): No information – Has reference on non-organic virgin olive oil prices	4.15	4.13	1.09	6.64
Group 3 (n=17): Leaflet – No reference on non-organic virgin olive oil prices	3.07	3.23	0.52	3.83
Group 4 (n=23): Leaflet – Has reference on non-organic virgin olive oil prices	3.85	4.13	0.77	5.05
Group 5 (n=18): Oral presentation – No reference on non-organic virgin olive oil prices	3.64	3.61	1.28	4.67
Group 6 (n=22): Oral presentation – Has reference on non-organic virgin olive oil prices	3.60	3.63	0.55	4.53

Table 3. The reference price effect (Euros)

	Bid without information minus bid with information on non-organic virgin olive oil prices (mean values)
Round 1	-0.15
Round 2	-0.18
Round 3	-0.27 ***
Round 4	-0.31 ***
Round 5	-0.25 ***
Round 6	-0.32 **
Round 7	-0.31 ***
Round 8	-0.34 ***

*, **, *** Significant differences at 1, 5 and 10% respectively.

Table 4. The information effect (Euros)

	Bid differences between the 4th and the 5th rounds
Group 1: No information – No reference on non-organic virgin olive oil prices	0.07
Group 2: No information – Has reference on non-organic virgin olive oil prices	0.09
Group 3: Leaflet – No reference on non-organic virgin olive oil prices	0.16*
Group 4: Leaflet – Has reference on non-organic virgin olive oil prices	0.04
Group 5: Oral presentation – No reference on non-organic virgin olive oil prices	0.25*
Group 6: Oral presentation – Has reference on non-organic virgin olive oil prices	0.17**

*, **, *** Significant differences at 1, 5 and 10% respectively.

Table 5. Factor analysis of participant's attitudes

Attitudes towards the impact of agriculture on the environment			
	Preference for less intensive agriculture	Demand for more "natural" food	Higher price
Agriculture should reduced the use of chemicals	0.774	0.024	-0.054
Food production should be monitored	0.749	0.256	0.104
A non-polluting agriculture is possible	0.698	-0.264	-0.099
Food is less natural than in the past	0.09	0.704	-0.232
I am not interested in "green" or eco labelled products	0.236	-0.618	-0.142
I know potential effects of agriculture on the environment	0.453	0.590	0.131
Organic food is more expensive to produce than conventional	-0.008	-0.012	0.960
% of variance explained	28.4	18.5	14.6

Food safety concerns			
	Demand for food safety	No risk perception on food	Demand for labelled product due to health
Food processing should be monitored more	0.791	0.043	0.018
There is a lack of food safety monitoring	0.685	-0.369	0.167
Food safety does not necessarily imply higher prices	0.619	0.114	0.094
I am not concerned about food processing	0.033	0.680	0.155
Food scares are isolated cases	0.032	0.669	0.006
I fully trust the quality of what I eat	-0.097	0.633	-0.278
I try to buy brand-named products	0.001	0.130	0.813
Food is not so healthy	0.227	-0.171	0.702
% of variance explained	*24.4*	*17.2*	*12.7*

Nutrition concerns		
	Nutrition concerns	Diet concerns
I am concerned about food nutritional characteristics	0.782	0.06
Food has become less tasty	0.70	-0.107
Concern about the presence of food additives	0.643	0.389
I care about cholesterol and fat	0.251	0.759
I keep a strict diet	0.03	0.730
I eat everything	0.05	-0.476
% of variance explained	*32.6*	*18.8*

Price sensitiveness			
	Price sensitivity	Price as a quality signal	Price unawareness
I try to buy food items that are on sale	0.767	-0.018	-0.163
I pay attention to good deals	0.744	0.133	-0.152
I remember prices I've paid before	0.741	0.047	0.08
I compare food prices from different brands	0.639	0.053	0.244
I do not mind paying more for better quality	-0.021	0.875	-0.0008
I am willing to pay more for organic food	0.255	0.782	-0.032
Higher prices are associated with higher quality	-0.003	0.073	0.653
Name brand products are more expensive	0.092	-0.11	0.636
I do not worry about food prices	-0.209	0.405	0.605
% of variance explained	*25.5*	*18*	*13.2*

Attitudes towards organic food attributes				
	Post-purchase experience	Positive image	Higher priced	Negative image
No quality difference	-0.748	-0.025	-0.049	0.106
Organic food is more tasty	0.626	0.285	-0.022	-0.01
They are fashionable products	-0.578	-0.132	0.367	0.235
Good for health	0.201	0.779	0.127	-0.231
Do not have bad secondary effects	-0.07	0.768	0.059	0.236
Higher quality	0.432	0.715	-0.073	-0.058
More expensive	-0.076	0.126	0.874	-0.125
They are a fraud	-0.228	0.016	-0.13	0.832
Worse external appearance	0.528	-0.033	0.483	0.538
% of variance explained	*28.1*	*15.1*	*12.4*	*11.4*

Table 6. Explanatory variables definitions

Variable	*Description*
Income	Dummy variable which takes the value 1 if the respondent's per capita income is below 900€/month, and 0, otherwise
Age over 65	Dummy variable which takes the value 1 if the respondent is older that 65, and 0, otherwise
Education	Dummy variable which takes the value 1 if the respondent's level of education is primary school, and 0, otherwise
Children	Dummy variable which takes the value 1 if there are children under 16 in the respondent's household, and 0, otherwise
Experience	Dummy variable which takes the value 1 if the respondent buys organic food regularly, and 0, otherwise
Curiosity	Dummy variable which takes the value 1 if the respondent has bought organic food some time as a curiosity, and 0, otherwise
Newspapers	Dummy variable which takes the value 1 if the respondent has information on organic food through newspapers, and 0, otherwise
Friends	Dummy variable which takes the value 1 if the respondent has information on organic food through friend or family, and 0, otherwise
TV	Dummy variable which takes the value 1 if the respondent has information on organic food through TV, and 0, otherwise
Leaflet	Dummy variable which takes the value 1 if a leaflet has been provided to the respondent during the auction, and 0, otherwise
Oral presentation	Dummy variable which takes the value 1 if an oral presentation has been provided to the respondent during the auction, and 0, otherwise
No information	Dummy variable which takes the value 1 if no information was provided to the respondent during the auction, and 0, otherwise
Reference prices	Dummy variable which takes the value 1 if a reference on non-organic virgin olive oil prices was provided before the experiment, and 0, otherwise
Preference for a less intensive agriculture	Continuous variable from factor analysis (see Table 5)
Demand for more "natural" food	Continuous variable from factor analysis (see Table 5)
Higher price	Continuous variable from factor analysis (see Table 5)
Demand for food safety	Continuous variable from factor analysis (see Table 5)
No risk perception on food	Continuous variable from factor analysis (see Table 5)
Demand for labelled product due to health concerns	Continuous variable from factor analysis (see Table 5)
Nutrition concerns	Continuous variable from factor analysis (see Table 5)
Diet concerns	Continuous variable from factor analysis (see Table 5)
Price sensitivity	Continuous variable from factor analysis (see Table 5)
Price as a sign of quality	Continuous variable from factor analysis (see Table 5)
Price unawareness	Continuous variable from factor analysis (see Table 5)
Post-purchase experience	Continuous variable from factor analysis (see Table 5)
Positive image	Continuous variable from factor analysis (see Table 5)
Higher priced	Continuous variable from factor analysis (see Table 5)
Negative image	Continuous variable from factor analysis (see Table 5)
Knowledge	A count variable from 1 to 7 correct answers

Table 7. Estimated parameters

	Knowledge	*Willingness to pay*	
		To pay or not to pay	*How much to pay*
Constant	1.65 (26.14)	-0.05 (-0.11)	65.83 (1.12)
Income	-0.26 (-3.75)	-	18.42 (0.49)
Age over 65	-	-	84.25 (2.6)
Education	-0.318 (-0.75)	-	-
Children	0.07 (1.85)	-	45.23 (1.43)
Experience	-0.24 (-2.66)	-	-
Curiosity	-	-	43.96 (1.54)
Newspapers	0.08 (2.02)	-	-
Friends	0.09 (1.98)	-	-
TV	-0.04 (-0.48)	-	-
Leaflet	0.07 (1.39)	-	-
Oral presentation	0.003 (0.07)	-	-
No information	-	-	89.33 (3.52)
Reference prices	-	-	74.02 (3.00)
Preference for a less intensive agriculture	-	0.21 (2.96)	-
Demand for more “natural” food	-	0.29 (3.30)	-
Higher price	-	0.32 (3.69)	36.27 (2.59)
Demand for food safety	-	-	-
No risk perception on food	-	-0.10 (-1.84)	-
Demand for labelled product due to health concerns	-	0.38 (6.02)	-
Nutrition concerns	-	0.14 (2.50)	-
Diet concerns	-	0.13 (1.90)	-
Price sensitivity	-	-	-7.99 (-0.70)
Price as a sign of quality	-	-	-
Price unawareness	-	-	-
Post-purchase experience	-	0.10 (2.73)	-
Positive image	-	0.18 (4.76)	-
Higher priced	-	-	23.27 (1.85)
Negative image	-	-	-
Knowledge	-	0.15 (1.90)	-11.56 (-1.11)
$\hat{v}_i$	-	0.35 (6.25)	-
$\phi(w_i'\gamma_i)$	-	-	176.78 (2.51)
Log. Likelihood	-227.84	-582.54	
N	120	120	88

Note: t-ratios in parentheses

Figure 1. Consumer's willingness to pay for an organic olive oil (average bid in the last four rounds after the information is provided)

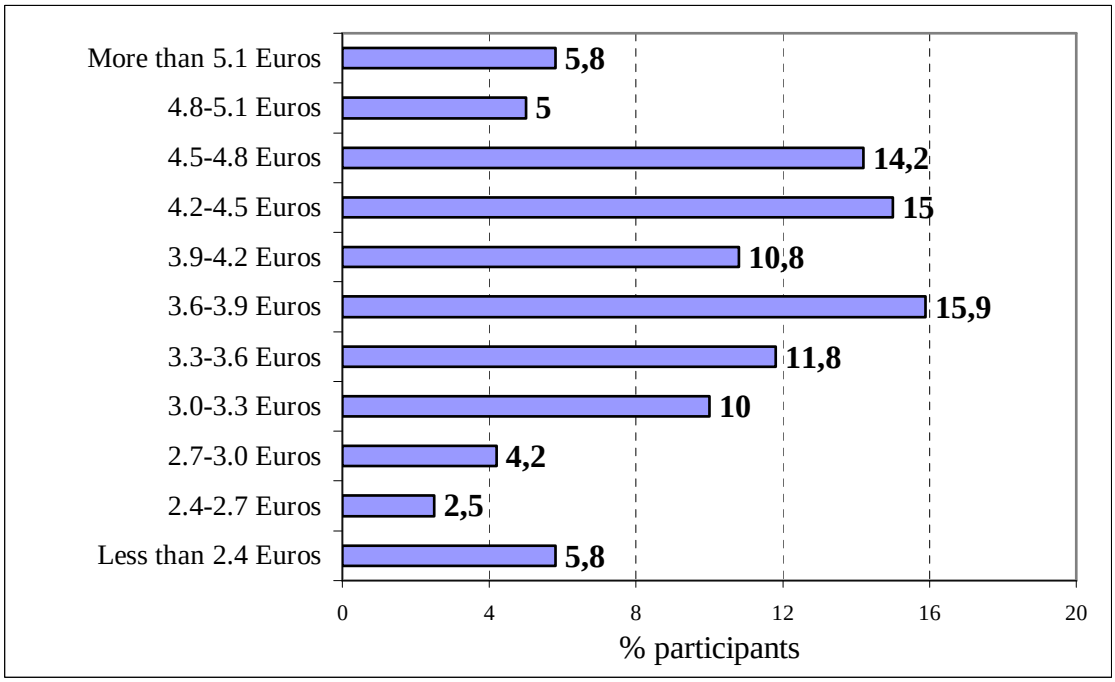

Figure 2. Evolution of the average group WTP for organic olive oil (Euros)