4thICAAAE 2013 SEPTEMBER 22-25, Hammamet Tunisia
4th International Conference of the African Association of Agricultural Economists
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Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia

The effect of food related personality traits and lifestyle orientation on consumer's behaviour related to extra virgin olive oil: estimation of an extended hybrid choice model.

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Abstract

Due to the increasing interest on understanding the formation of consumer's food choice process, the hybrid choice model (HCM) has been developed. HCM represents a promising new class of models which merge classic choice models with structural equations models (SEM) for latent variables (LV). Regardless of their conceptual appeal, up to date the application of HCM in agro food marketing remains very scarce. The present work extends previous HCM applications by first estimating a random parameter logit model (RPL) into panel data context (taking into account the heterogeneity around the mean) and second, estimating the relationships between latent variables. Furthermore, in order to ascertain the role of psychological factors in consumer's behavioural process of decision towards a traditional food, variables such as food related personality traits, purchase habits and lifestyle orientation were introduced. The model pretends to better understand Catalan consumer's behaviour towards extra virgin olive oil. The findings suggest that the incorporation of inferred LV for understanding individuals' food decision making constructions is needed. That is, some LV have indirect effects associated with consumer's purchase intention towards organic olive oil, and that almost all LV considered have a direct effect related to consumer's utilities associated with extra virgin olive oil. The results reveal a high and significant heterogeneity, highlighting the role of the housewife with high level school education as responsible of both household food purchases and preparation of familiar dishes.

Keywords: Hybrid choice model, extra virgin olive oil, personality traits, choice experiment

1. Introduction

Choice models have displayed to be of high value and importance in a wide variety of applied settings such as agro food marketing, public goods valuation, transport analysis, etc. (Van Loo et al., 2011; Greene and Hensher, 2010; etc.). The employment of experimental choice models has been motivated by the combination of two principal features: (1) realism: in real markets, consumers are faced with competing products and must choose among them, and (2) experimental control (Ashok et al., 2002). Discrete choice modelling defines individuals' utility function by means of explanatory variables such as the socio-economic characteristics of respondents and product attribute levels. However, in the last decade, many works have noticed that decision makers are conditioned by their psychological factors, personality traits, attitudes, etc. (Chen, 2007; Johansson et al., 2006; Yáñez et al., 2010). These last concepts cannot be directly measures but inferred from observed variables. Therefore, our work focuses on the incorporation of latent variables such as attitudes and perceptions as explanatory variables in discrete choice models.

The first attempt to integrate choice models with latent variable models has been done by Ben Akiva et al. (2002) who developed the hybrid choice model. In the last decade, some works have tested the performance of that model especially in transport

research (Bolduc et al., 2008; Yáñez et al., 2010). All agree on the fact that: 1) the inclusion of latent variables improve choice model fit and 2) illustrate how psychological data could be used in choice models to better capture consumer's preference heterogeneity. However, the principal obstacle for the lack of popularity of the hybrid choice model is due to both its conceptual approach and the fact that full information estimation of these models is rather implicated and researchers should develop their own programs for the analysis (Ben Akiva et al., 2002; Temme et al., 2008). The application of the hybrid choice model (HCM) in agro food demand setting to account full information estimation is the first contribution of this paper. Following the Yáñez et al., (2010), our second contribution is the application of the hybrid choice model in a panel data context constructed from repeated choice data taking into account the heterogeneity existent in the sample population.The conceptual framework of the hybrid choice model permits the inclusion of attitudes, perceptions and personality traits as psychometric latent variables in such a way that permits a better understanding of consumer behavior while improving the predictive power of the conventional models. Therefore, the latent variable model could be part of a set of structural equations which describe those relations in terms of observables exogenous variables (MIMIC model as specific case of the SEM) or allow for simultaneous relationships between the latent variables (SEM) (Jöreskog and Sörbom, 1996). The most of the work which have applied the HCM, treated the latent variables through the estimation of a MIMIC model, except Temme et al. (2008) and Rungie et al. (2011).

In line with Ben Akiva et al. (2002), attitudes can in fact be any latent characteristic of a decision-maker and can be specified to have dependence with any other attitudes and perceptions. In the same way, consistent with the theory of planned behavior, intentions as the unbiased predictor of decision-making (Bagozzi et al., 1989), are a function of three basic determinants. The first, personal in nature is the personal attitude towards the behavior, the second reflecting social influence is social norms, and the third pay attention on issues of control namely as perceived behavioral control (Ajzen, 2005). Our third contribution in this work is to test the performance of the theory of planned behavior output under the choice experimental setting.

Finally, few studies have investigated the potential effect of purchase habits, food-related personality traits and lifestyle orientation on consumer's behavior (Ajzen, 2005; Chen, 2007; Eertmans et al., 2005). However, neither work try to understand which effect they have on the consumers' behavior related to organic olive oil and to the extra virgin olive oil (EVOO) in general. With especial attention to the relationship between them and with the factors determinant of consumer's purchase intention, based in the theory of planned behavior (TPB).

The remaining part of the paper is structured as follows: the second section includes the conceptual framework and hypothesis definition. In the third section we illustrate the theoretical specification of the hybrid choice model. In the fourth section we explain the empirical setting followed by the results. We conclude by addressing some limitations and by providing recommendations for further research.

2. Latent variable model: conceptual framework and hypothesis

The main incentive for HCM is to better characterize the structure of choice process, (Rungie et al., 2011). The traditional discrete choice models considered an individual's choice process as a "black box". Therefore, to understand the behavioral process underlying the organic olive oil consumption in particular and the extra virgin olive oil consumption in general, a simple conceptual model has been developed based in the TPB theory.

The TPB considers that the intention to perform a behavior can be predict with high accuracy from attitudes towards the behavior, subjective norms, and perceived behavioral control (Ajzen, 2005). According to this model, attitudes inspired reasonably from the beliefs hold about the object studied and, hence reflect the degree for which a person has a positive or negative evaluation of the behavior in question. For example, organic foods are perceived as more healthy, natural, nutritious, and sustainable than conventional foods (Stolz et al., 2011). Hence a positive consumer's attitudes associated with organic foods could be developed, and normally it is believed to be positively related to the intention of purchasing organic foods (Ajzen, 2005; Chen, 2007).

Hypothesis 1. When consumer´s reveal more health and environmental concerns, a more positive attitude towards organic olive oil will be developed and therefore, his intention to purchase organic olive oil will be more likely to be positive.

Multitude of variables could influence people' beliefs such as personality traits, ethnicity, emotion, mood, etc (Ajzen, 2005). The personality traits play an important role in predicting and explaining human behavior. Chen (2007) showed that food related personality traits defined as food involvement, being as the level of importance of food in a person's life, exert positive effect on the consumer's attitude towards organic foods. Bell and Marshall (2003) commented that higher level of food involvement have been found to be discriminator factor between food items in the sensory evaluation.

Hypothesis 1a. A consumer with high level of food involvement is expected to have a positive attitude towards organic olive oil.

Food related personality traits commitment people in food related activities such as their procurement, preparation, cooking, etc. (Goody, 1982). Considering recent works, we can predictable that the importance of the cookery, cooking skills, foods preparing could be play as factors determinant of the dietary change and to promote healthy eating (Vanden Horsk et al., 2010; Wrieden et al., 2007). Hence, due the importance of extra virgin olive oil in both Spanish and Mediterranean diet, it is hypothesized that cooking skills, as a second variables under food related personality traits what identify the importance level of cuisine in a person´s life, could be affect the attitude towards organic olive oil.

Hypothesis 1b. Consumer with higher level of cooking skills is expected to have a positive attitude towards organic olive oil as a healthy product.

Our life styles are reflected in our personalities and self-concepts, in which our attitude and behavioral tendencies evolve. It is determined by consumer interests, opinions, activities, etc. Shaharudin et al. (2010) commented that consumer life style

has emerged especially in the attitude towards the purchasing of the organic food. Moreover, Krishnan (2011) confirmed that was a significant association between the lifestyle of the consumers and the brands of the products used by them.

Hypothesis 1c. Consumer with ordered lifestyle could be positive contributors to the consumer's positive attitude to organic foods.

Over the last decade, numerous food supply crises such as mad cow disease, Belgian dioxin scandal, Swine flu, etc. have affected consumers' behavior, for which have been more worried about the quality of food they eat (Chen, 2007). In other words, according with Chen (2009), there is a significant relationship among healthy consumption life style, attitude towards organic food, and purchase intention of organic food. Hence, the high healthy importance revealed by the consumers motives their consumption of organic food.

Hypothesis 1d. As more healthy the lifestyle of consumers is, more positive their attitude towards organic foods, will be.

According to TPB, the perceived behavior control is individuals' perceived easy or difficulty for performing the particular behavior. It is assumed that was determined by the total set of accessible control belief (Ajzen, 2005). Related to purchasing of organic food setting, this factor include the effects of external factors (such as time spent, availability, recognition (Labeling), confidence, etc.) and internal variables (such as, skills, knowledge, abilities, habits, etc.), which the consumers believe influence the judgment of risks and benefits of that products (Ajzen, 2005; Chen, 2007).

Hypothesis 2. When consumers perceive more behavioral control over the purchasing of organic foods, consumers will be more likely to have the intention of purchasing organic foods.

Hypothesis 2a. The sufficient and efficient knowledge related to the benefit of organic olive oil and his etiquette from the consumer, leads a more behavioral control.

In keeping with Ajzen (2005), respect to the effect of habits (persist in doing what you had become accustomed to do), many behaviors become routine to the point where they can be executed with minimal conscious control. However, not good measures are currently available of that factor (Ajzen, 2005). Therefore, under the attempt to assess the effect of "purchasing habits", we are explained the last factor under two factors "food purchase" and "quality involvement". The first implies the impact of the price and the promotions, and the second implies the impact of food quality in the consumers' purchasing habits, since the importance effect of price, promotions and quality in consumer buying behavior (Mann et al., 2012; Menapace et al., 2011).

Hypothesis 2b. With less sensibility related to price and promotions from the consumer leads a more behavioral control.

Hypothesis 2c. An acceptable o high perception associated to food quality from the consumer expressed in his purchasing habits, improve consumer's perceived behavior control.

Finally, the third determinant component of the consumer intention is the subjective norms. It is reflect the degree of social pressure (surrounding the consumer: family, friends, etc.) felt by the person with regard to the behavior (Chen, 2007). For

example, since organic foods are perceived as healthier and environmentally friendly, when the social environment of the consumer preferred more organic olive oil than conventional or other, they will have more intention of purchasing it.

Hypothesis 3. Social pressure could have positive effect in consumer's purchasing intention related to organic olive oil.

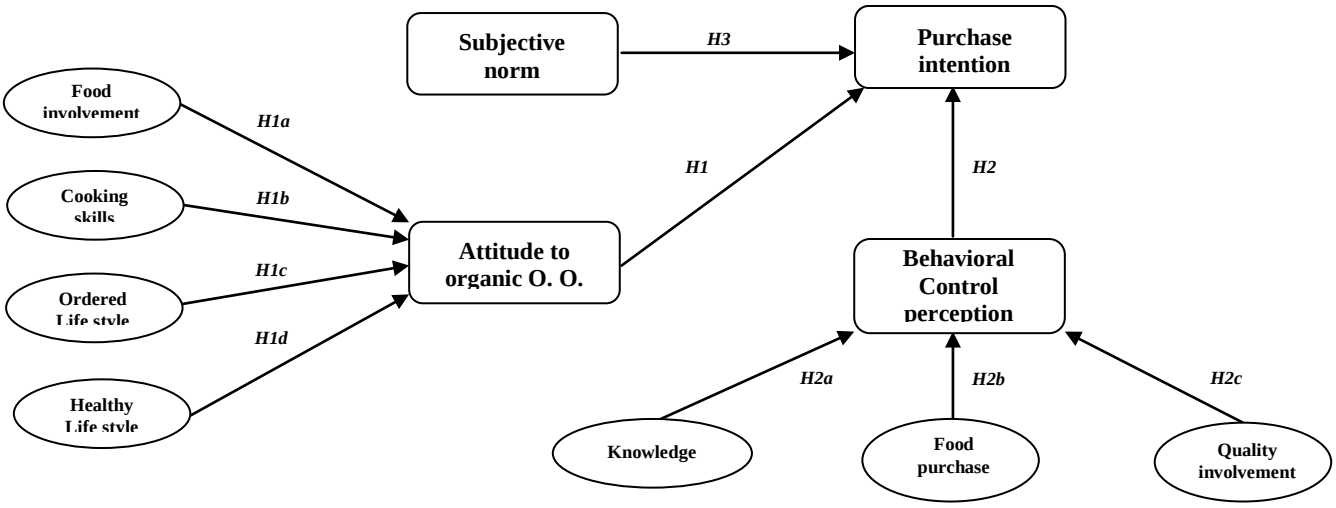

Figure 1: theoretical framework for organic olive oil purchase decision making process according to the TPB.

3. Hybrid choice model specification

3.1. Structural equation model specification

The SEM consists of three main types of relationships (Jöreskov and Sörbomm, 1996). First, the identification of latent variables requires the definition of several observed indicators as different questions within stated preference survey. Therefore, a measurement model is identified after performing confirmatory factor analysis. The outcome relates, on one hand, observed indicators with the exogenous latent variables:

$$x = \boldsymbol{\Lambda_x}\, \boldsymbol{\xi} + \boldsymbol{\delta} \qquad (1)$$

Where x is a q×1 vector of observed exogenous variable, $\boldsymbol{\Lambda_x}$ is a q×n matrix of coefficients of the regressions of x on $\boldsymbol{\xi}$, which is an n×1 random vector of latent independent variables and $\boldsymbol{\delta}$ is a q×1 vector of error terms in x. Furthermore, it is assumed that the $\boldsymbol{\delta}$ is uncorrelated with $\boldsymbol{\xi}$.

On the other hand, observed indicators are related with endogenous constructs:

$$y = \boldsymbol{\Lambda_y}\, \boldsymbol{\eta} + \boldsymbol{\varepsilon} \qquad (2)$$

Where y is a p×1 vector of observed indicators, $\boldsymbol{\Lambda_y}$ is a p×m matrix of coefficients of the regressions of y on $\boldsymbol{\eta}$, which is an m×1 random vector of latent dependent variables and $\boldsymbol{\varepsilon}$ is a p×1 vector of error terms in y. Furthermore, it is assumed that the ε is uncorrelated with η.

A third equation specifies the causal relations that exist among both exogenous and endogenous latent constructs.

$$\eta = \beta\,\boldsymbol{\eta} + \boldsymbol{\Gamma}\,\boldsymbol{\xi} + \boldsymbol{\zeta} \quad (3)$$

Where β is an m×m matrix of coefficients of the $\boldsymbol{\eta}$ vector of dependant variables in the structural relationships, $\boldsymbol{\Gamma}$ is an m×n matrix of coefficients of the $\boldsymbol{\xi}$ vector of independent variables in the structural relationship, and $\boldsymbol{\zeta}$ is a m×1 vector of errors.

In order to performing our SEM a version 8.8 of LISREL has been used. The estimation of the model done up through Robust Maximum likelihood (RML), due of the continuous non normal variables (SSI tutorial).

3.2. Integrating latent variables into discrete choice model specification

As mentioned before, the application of the hybrid choice model was done up in a panel data context constructed from repeated choice data. Therefore, hypothetical choice experiment (CE) was conducted. This methodology was in line with both the random utility theory (RUT) (McFadden, 1974) and Lancaster consumer theory (Lancaster, 1966).

The random utility theory assumption based on that the individual utility from a particular option is given by:

$$U_{ij} = V_{ij} + \varepsilon_{ij}, \quad (4)$$

where, V_{ij} is a deterministic component, which is a function of alternative product characteristics (X_{ij}) (Lancaster, 1966); and ε_{ij} is the stochastic or non observed component. The probability of consumer i choosing the alternative j out of the total set of options is:

$$P_{ij} = Prob\left[U_{ij} > U_{ik}\right] = Prob\left[V_{ij} + \varepsilon_{ik} > V_{ik} + \varepsilon_{ik}\right] \;\forall\, j \neq k \;\in C_n \quad (5)$$

Where C_n is the choice set and the observed component Vij is as follows:

$$V_{ij} = \sum_k \beta_{ik} * X_{kj} + \beta_{price} * P_j + \sum_l \beta_{il} * \eta_{il} \quad (6)$$

Where β_k the marginal utility of the attribute X_{kj}, β_{price} the marginal utility of the price P_j of alternative j, and β_{il} the marginal utilities of the latent variables for consumer i.

By assuming that the stochastic component ε_{ij} is distributed following type I Extreme Value, we get the familiar Multinomial logit model where the probability of consumer i choosing option j from a specific choice set (C_n) is:

$$P_{ij} = \frac{e^{\mu V_{ij}}}{\sum_{k=1}^{J} e^{\mu V_{ik}}} \qquad \forall\, j \in C_n \quad (7)$$

In general the HCM rely on tow way of estimations (Ben Akiva et al., 2002). Firstly, the sequential methods, which consist with two steps, in the beginning, the latent variables are derived from the structural equations model (SEM) and in the next step being incorporated into the discrete choice model as explanatory variables (Johansson et al., 2006; Yáñez et al., 2010). Secondly, the simultaneous method in which both steps were done jointly (Bolduc et al., 2008; Temme et al., 2008). Despite the last approach which estimates results are consistent and efficient and that the two-stage sequential approach results are consistent, but inefficient estimates (Ben Akiva et al., 2002), in our paper we applied the first approach. This decision was rely on; (1) in the econometric models we are more concerned about the consistency than the

efficiency of the parameters' estimators involved; (2) as commented before that the simultaneous method requires the development of news statistic programs which was high complexity task (Raveau et al., 2010); (3) notwithstanding the availability of fewer programs enable to estimate simultaneously hybrid choice models such as Mplus, but all these packages were unable to account for the correlation among responses of the respondents (Yáñez et al., 2010).

The sequential estimation method of hybrid choice model requires a proper procedure for estimation namely full estimation which accomplished by integrating over the variation of the latent variables within the basic framework of multinomial choice models (Ashok et al., 2002). Nevertheless, estimating a random parameter logit model considering the latent variables as random parameters solves these issues (Yáñez et al., 2010).

Under the RPL model the probability that individual "i" chooses the alternative "j" in a particular choice set C_n is given by:

$$Prob_i\{j\ is\ chosen\} = \int L_{ij}(\beta_{ij}) f(\beta_i/\theta)\, d\beta_i, with\ j \in C_n \quad (5)$$

where $f(\beta_i/\theta)$ is the density function of the coefficients β_i and θ refers the moments of the parameters distributions which can take any specified form such as normal, lognormal, triangular, uniform, etc., and

$$L_{ij}(\beta_{ij}) = \frac{e^{V_{ij}(X_{ij},\eta_{il},\beta_i)}}{\sum_{k=1}^{J} e^{V_{ik}(X_{ik},\eta_{il},\beta_i)}} \quad (6)$$

The RPL takes form by allowing individual parameter estimates β_{ij} writing as follow:

$$\beta_{ij} = \beta_j + \sigma_j \vartheta_{ij} \quad (7)$$

In this formulation β_j is the sample-mean for the alternative j, ϑ_{ij} is individual specific heterogeneity, with mean zero and standard deviation equal to one (Hensher and Greene, 2003). Furthermore, in order to capture additional alternative unobserved variation and better explain the heterogeneity achieved estimating deep parameters to account for heterogeneity around the mean of the distribution (Hensher, 2005). Hence, the equation (7) will be written as follow:

$$\beta_{ij} = \beta_j + \delta_j Z_i + \sigma_j \vartheta_{ij} \quad (8)$$

Z_i is a set of choice invariant characteristics that produce individual heterogeneity in the means of the randomly distributed coefficients such as individual-specific characteristic.

As the model is specified to include both fixed and random coefficients, and much latent variables, the simulated maximum likelihood technique is faster and easier to estimate the individual choice probabilities (Ben Akiva et al., 2002). According to Train (2003), the simulation done up in three steps for any given value of θ. Firstly, to draw a value of β_i from $f(\beta_i/\theta)$ and label it β_i^r with r = 1….R[1]. Then, calculate the logit formula $L_{ij}(\beta_i^r)$ with this draw. Finally, repeat steps 1 and 2 many times and average the results. This average is the simulated probability:

$$\widehat{P_{ij}} = \frac{1}{R}\sum_{r=1}^{R} L_{ij}(\beta_i^r) \quad (9)$$

[1] Halton draw are used because they have been shown to provide more efficient distribution of draws for numerical integration compared to random draws (Bhat, 2003; Train, 2003).

where R is the number of draws. The simulated probabilities are inserted into the log-likelihood function to give a simulated log-likelihood (SLL):

$$SLL = \sum_{i=1}^{I} \sum_{j=1}^{J} d_{ij} \, Ln\widehat{P_{ij}} \quad (10)$$

Where d_{ij}=1 if i choose j; and zero otherwise. The maximum simulated likelihood estimator (MSLE), is the value of the θ that maximizes SLL.

4. Empirical setting

4.1. Survey

The Data used here corresponds to a survey carried out on a representative sample of Catalonian population with quotas by postal code. The initial sample consisted of 425 face-to-face interviews from which 401 answered the choice experiment. Data were conducted in September 2009 at different shopping hours and different types of food retail stores. The questionnaire consists of four major blocks. The first block was designed to elicit information on respondents' purchasing and consumption habits about different types of olive oil. For the purpose of present study, the second block was reserved the measurement scales and the indicators related to the three main determinant of the TPB. The third block included the choice experiment. The last block was addressed to get information about socio demographic characteristics, consumers' personality traits and consumer's lifestyles. Parts of items are adopted herein from previous studies (Chen, 2007; Gil et al, 2000; Mtimet and Albisu, 2006). All indicators have been measured through eleven-point Likert scales (from 0 to 10 where 0 indicates total disagreement and 10, total agreement and 5 indicates indifferent)[2].

4.2.The choice experiment design

To implement CE, first, attribute and attribute levels were determined based on a three-step procedure: 1) Literature review regarding consumer behavior of extra virgin olive oil; 2) four focus groups of 8 people each to identify main consumption patterns and attitudes towards extra virgin olive oil, with special attention respect the organic attribute; and 3) observation in retails outlets to identify real prices and informal interviews about reasons of choosing a specific product. Therefore, four main attributes were identified: price, production system, origin of the product and origin of the brand (see Table 1).

Taking into account the number of attribute levels a total 81 (3^4) hypothetical bottles of extra virgin olive oil were obtained. This leads to large number of choice sets. Therefore, an orthogonal factorial design was generated resulting in 9 product profiles and 9 choice sets. Each choice set consists of three alternatives plus the "none of them" option. We have followed the strategy proposed by Street and Burgess (2007) to get a 100% efficient main effects design. Figure 1 shows one of the choice sets offered to respondents.

[2] This scale is very easy to understand by respondents as in Spain the grading system at school is based on it.

Table 1 Attributes and attribute levels in the Choice Experiment for extra virgin olive oil

Attributes	***Levels***
Production system	Conventional Protected Denomination of Origin (PDO) Organic
Origin	Spain Catalonia Imported
Brand	Spanish manufacturer Catalonia manufacturer Private label
Price	**3.70 €/l** **6 €/l** **7.5 €/l**

	Alternative "A"	***Alternative "B"***	***Alternative "C"***	***Alternative "D"***
System of production	***Extra-virgin olive oil with PDO***	***Conventional extra-virgin olive oil***	***Organic extra-virgin olive oil***	***None of them***
Origin of olive oil	***Spain***	***Catalonia***	***Imported***	
Brand	***Spanish Manufacturer***	***private label***	***Catalonia Manufacturer***	
Price	***3.70 €/liter***	***7.50 €/liter***	***6 €/liter***	

Figure 2 Example of choice sets

5. Results and discussions

5.1. Sample characteristic

As mentioned above, the sample consist to 401 respondents, from which 40% came from Barcelona (the main town) while 60% came from the rest of the Catalan geography. All the respondents buy olive oil regularly. Consistent with Gil et al. (2002) and MARM (2008), approximately 80% of respondents were women, as those were responsible for shopping within the household. The average age of the sample was 49 years old (with a standard deviation of 15.39). Regarding to the education level, just 25.6% of the respondents achieved a university degree and the rest of the sample did not pass the secondary level school. (27.3% of respondents fulfilled just primary studies and 46.8% completed secondary studies or professional education). Finally, 70% of the sample was married and the average household size was about 3 members.

5.2. The latent variable model (SEM)

First a confirmatory factor analysis (CFA) for the whole set of constructs has been carried out. As a result we obtained first six "personality latent variables" named: ordered life style, healthy life style, food purchase behavior, food quality involvement, food selection involvement, cooking skills, and second five "behavioral latent factors" named: Attitude, Behavioral control perception, purchase intention, knowledge and subjective norms. Standardized factor loading estimates are all significant and above recommended value 0.7 (Hair et al., 1999). The main parameters to test the robustness of the construct, following Kline (2005), appear to show acceptable results for almost constructs. The internal consistency of reliability of each construct achieves an acceptable Cronbach alpha of over 0.7 and the composite reliabilities are greater than 0.7, except the factor "Healthy life style". Regarding the extracted variance, it is more than 0.5, except for "Behavioral control perception", "Healthy life style" and "Cooking skills" (See Appendix).

Next, a SEM has been developed. Table 2 summarizes the results of the estimation of the proposed SEM and the principals' goodness of fit measures. The model meets the accepted goodness of fit, according to Hair et al. (1999), Kline (2005) and Costa-Font and Gil, (2009), it must be pointed out that the Normed Chi-square NC is smaller than 3, the value for the RMSEA is 0.0658 inferior to 0.8 as absolute fit index. Respect to incremental fit index, we can mentioned that the CFI has a value of 0.952 which exceeds the value defined in the literature (0.90). Additionally, table 2 shows values superior than 0.90 for each NFI, NNFI and RFI, indicating that the conceptual model satisfactory fits the data. Moreover, Table 2 included the adjusted R^2, the statistic parameter gives light for the satisfactory explanation of the dependent variables' variance.

Table 2 the results of the main effects in the proposal model

Structural relationships	***Parameter Estimate***	***Std error***	R^2	***Goodness of fit statistics***
Attitude → Food Involvement	0.299***	0.0653	0.329	
Attitude → Healthy Life Style	-0.0784	0.0701		
Attitude → Ordered Life Style	0.384***	0.0825		$\chi 2 = 2021.270$
Attitude → Cooking Skills	0.033	0.0575		df = 741
Behavioural Control perception → Knowledge	0.248***	0.0655	0.318	NC = 2.727 < 3
Behavioural Control perception → Food Purchase	0.234***	0.0549		RMSEA = 0.0658 < 0.08
Behavioural Control perception → Quality Involvement	0.491***	0.0532		CFI = 0.952 > 0.90
Purchase intention → Subjective Norm	0.167***	0.0351	0.623	NFI = 0.926 > 0.90
Purchase intention → Attitude	-0.127***	0.0388		NNFI = 0.946> 0.90
Purchase intention → Behavioural Control Perception	0.772***	0.0559		IFI = 0.952 > 0.90
				RFI = 0.918 > 0.90

Notes : ***p<0.01;**p<0.05; *p<0.1

Table 2 shows that consumer's social pressure and the perceived behavior control respect to the purchase of organic olive oil significantly improve consumer's purchase intention towards organic olive oil. Therefore the second and the third hypothesis were supported. However, the first hypothesis was not supported. The

positive consumer's health and environment consciousness respect to organic olive oil production don't enhance the consumer's purchase intention. Furthermore, results show that respect to food related personality traits and consumer's lifestyle traits, only the variables "food involvement" and "ordered lifestyle" do have a positive effect enhancing consumer's attitude supporting the hypothesis 1.a, and 1.c . In contrast the effects of cooking skills and healthy lifestyle on consumer's attitude towards organic food were not supported (hypothesis 1.b, and 1.d). This could be due to the lack of reliability for the two factors (see Appendix). On the other hand, the variable consumer's perceived behavior control is noticed to be clearly and positively defined by "knowledge" and "food quality involvement" supporting hypothesis 2.a and 2.c However, although the standardized corresponding factor loading of "food purchase" was significantly different from zero, the positive coefficient involves obviously the contrary of his associated hypothesis 2.b.

5.3. The hybrid choice model (HCM)

Once the expected values of latent variables (LV) were calculated for each respondent from the SEM model, a RPL model was estimated. The model includes all LV as random variables and the heterogeneity around the mean for a better explanation of consumer's preference heterogeneity existent associated to these LV, allowing it to be function of individual specific characteristics.

The utility function estimated includes all attribute levels defined with coding effect, except the attribute price which was introduced as a continuous variable. The socio-demographic variables gender (GEND), age (AGE) and size town (TS), where defined as dummy variables (1, represent the woman, age inferior than 50 and size town superior than 10000 habitants, respectively). The variable "level of study" was introduced by means of two levels, university school (UNIV) and secondary school (SECOND) defined with effect coding being the primary school the base level. Finally, all the random parameters were described by a normal distribution according to Wald test (Hensher el al., 2005).

The results (see Table 3) reveal both consumers' disutility related to organic olive oil and a slight preference towards the olive oil with protected designation of origin above the conventional. There are more than 32 extra virgin olive oil certified as DOP in Spain (Jiménez-Guerrero et al., 2012), fact than can influence consumer's positive valuation of these attribute (Scarpa et al., 2004; Menapace et al., 2011). In contrast, the negative perception towards organic olive oil could be explained because both Catalan and Spanish consumers are not enough concerned about environmental issues and therefore those are not determinant attributes in defining their food choices especially related to olive oil (Vega-Zamora et al., 2011).

Table 3 reveals the important price sensibility of respondents. That is the negative effect of the attribute price on the related extra virgin olive oil purchasing behavior (Menapace et al., 2011; Vega-Zamora et al., 2011). Apart from the price, in line with Jiménez-Guerrero et al. (2012), the local origin of the olive oil, is noticed as the second more relevant attribute in defining Catalan consumer's choice compared

with the imported or national (rest of Spain) product. This result makes sense with the already mentioned preferences for DOP. In contrast the origin of the brand was revealed as not significant.

Table 3 shows that almost all of these expected LV have direct effects on the respondents' utilities towards extra virgin olive oil in general. Related to consumer's lifestyle factors, the variable healthy lifestyle was significant and has as unexpected negative effect and the variable ordered lifestyle was not significant. Although the healthy lifestyle may be conducive of health food choices (Losasso et al., 2012), is not the case when talking about extra virgin olive oil. Moreover, Spanish consumer perceives the olive oil as a healthy product and this is a traditional component of the Spanish diet. Therefore, olive oil may not be a determinant factor for the choice of a healthy product because it is part of the traditional Spanish diet. In line with Losasso et al. (2012), the level of consumer's awareness respect to healthy lifestyle appears to be different between males and females. In fact, table 3 reveals that the younger women responsible about household and with higher school qualification level are more likely to have better quality diet. At the same time developed countries, and normally big town, face chronic diseases that are the result of unhealthy eating habits, which explain the negative effect of the size town factor.

Results suggest that food related personality traits play a significant role in the formation of consumer's utility towards extra virgin olive oil. Results reveal that the variable food involvement has positive effect, however the cooking skills have negative effect above the Catalan consumer's utility. In line with Eertmans et al. (2005), this result suggests that concerns towards olive oil as a healthy product mediate a positive relation between food involvements and healthy food choice. This result seems heterogeneous through the sample. Higher levels of food involvement are associated with females older and who attended high level school. On the other hand, a higher food involvement seems associated with a segment of consumer having regular meals and responsible for their own food provisioning (Marshall and bell, 2005). Results are consistent with Gil et al. (2002).

The negative effect of cooking skills can be explained due to the fact that the consumption of extra virgin olive oil in Catalonia is mainly related to salad intake and snack meals, for which not cooking skills are needed. This result it is very heterogeneous and is related with the young woman with high level school qualification.

The purchase habits defined through "food purchase behavior" and "food quality involvement" have a very significant and positive effect in consumer's utility associated to extra virgin olive oil. In Catalonia, consumers are segmented regarding to their olive oil purchase habits. 1) Some consumers make their olive oil purchase directly from cooperative buying it in bulk, for which increase their sensorial purchase experience for the olive oil, and therefore their quality perception (Jiménez-Guerrero et al. 2012). 2) The majority purchase of olive oil in supermarkets and buy small quantity. Consequently, their purchase habits will be influenced by the price offers and promotions.

Table 3 choice model results

Parameters	*CL(SE)*	*RPL+HETER(SE)*
Conventional (CONV)[1]	**0.274 (---)**	**1.280(---)**
Denominated Origin Protected (DOP)	**0.0521 (0.0719)**	**0.251*** (0.039)**
Organic (ORG)	**-0.3261*** (0.0740)**	**-1.531*** (0.253)**
Spanish origin (OSP)[1]	**0.1939 (---)**	**0.178(---)**
Catalan origin (OCAT)	**0.3684*** (0.0757)**	**0.490*** (0.036)**
Imported origin (OIMP)	**-0.5623*** (0.0760)**	**-0.668*** (0.045)**
Spanish manufacturer (MSP)[1]	**-0.0202 (---)**	**0.074(---)**
Catalan manufacturer (MCAT)	**-0.0988 (0.0760)**	**-0.005(0.050)**
Private brand (PRB)	**0.1190 (0.1395)**	**-0.069(0.055)**
Price	**-0.5011*** (0.0140)**	**-0.868*** (0.027)**
No option (NOP)	**-3.2365*** (0.1050)**	**-3.265*** (0.818)**
Attitude (ATT)		**----**
Control perception (CP)		**----**
Subjective Norm (SBN)		**----**
Ordinate lifestyle (OLS)		**-0.240(0.515)**
Healthy lifestyle (HLS)		**-0.820** (0.282)**
Food purchase (FP)		**1.587*** (0.430)**
Quality involvement (QIN)		**1.505** (0.537)**
Food involvement (FIN)		**1.022** (0.463)**
Cooking-Skills (COS)		**-2.408*** (0.435)**
Derived standard deviations of parameter distributions		
N_DOP		**0.410*** (0.032)**
N_ORG		**0.733*** (0.049)**
N_OCAT		**0.765*** (0.034)**
N_Price		**0.794*** (0.030)**
N_ATT		**----**
N_CP		**----**
N_SBN		**----**
N_OLS		**0.261*** (0.024)**
N_HLS		**0.549*** (0.035)**
N_FP		**0.012(0.012)**
N_QIN		**0.504*** (0.041)**
N_FIN		**Fixed Parameter**
N_COS		**0.149** (0.049)**
Heterogeneity in mean, Parameter-Variable		
ORG-ATTIT		**0.276*** (0.039)**
ORG-CONT.PERC		**-0.093** (0.041)**
ORG-SBN		**0.190*** (0.033)**
OLS-SECOND		**-0.511** (0.239)**
OLS-UNIV		**-0.353(0.323)**
OLS-GEND		**-0.854* (0.469)**
OLS-TS		**1.804*** (0.449)**
HLS-SECOND		**0.661*** (0.155)**
HLS-GEND		**1.002*** (0.243)**
HLS-TS		**-2.070*** (0.284)**
HLS-AGE		**1.198*** (0.230)**
FP-UNIV		**-0.881** (0.290)**
FP-GEND		**-1.198** (0.375)**
FP-TS		**0.779** (0.347)**
FP-AGE		**-0.491* (0.278)**
QIN-SECOND		**1.820*** (0.287)**
QIN-UNIV		**-0.761** (0.382)**
QIN-GEND		**-1.646** (0.501)**
QIN-TS		**-1.072* (0.583)**
FIN-SECOND		**-1.635*** (0.247)**
FIN-UNIV		**0.730** (0.352)**
FIN-GEND		**0.964** (0.384)**
FIN-AGE		**-2.241*** (0.384)**
COS-SECOND		**0.405* (0.233)**
COS-UNIV		**1.425*** (0.298)**
COS-GEND		**1.009** (0.427)**
COS-AGE		**2.689*** (0.413)**
Measures of fit		
L-likelihood	**-3913.016**	**-2903.046**
R2 adjs	**0.1985**	**0.41527**
AIC	**2.17945**	**1.64391**

Notes : ***p<0.01;**p<0.05; *p<0.1

[1] level base

(SE): Standard Error

Table 3 reveals the effect of the socio-demographic variables on consumer's purchase habits. It is worth noting that men were less sensible than women respect to price sensitivity and that older respondents are more interested by offers and promotions. Additionally, the results reveal that respondents who live in a big town, have purchase habits more influenced by offers and promotion. According to Jiménez-Guerrero et al. (2012), it is important to note the effect of the modern life, where time pressure, business and convenience orientation dominate. However, the residents of a small town are less sensible respect to the tradeoff quality-price.

Finally, in accordance with TPB, the purchase intention is basically determined by the attitudes, perceived behavioral control and subjective norm. Unfortunately, the table 3 doesn't reveal comparative result respect to SEM results, directly related with these constitutes. This could be explained by that SEM and HCM results were based in two different methodological measures. SEM try to capture the relations exist entre these different determinant factors of the intention purchase through the respondents' answers about hedonic scales. However, the choice model tries to estimate the consumer's utility from the choice probability estimation based about their real or hypothetical product choice.

6. Conclusions

According to Ashok et al. (2002), the use of limited information models, such as conventional Choice models, would be problematic if the decision making process is strongly conditioned by consumer's personality traits and lifestyle orientation. This is the main motivation for the application of the Hybrid Choice models in this study.

The product selected for this study was extra virgin olive oil because is part of the Mediterranean diet and both traditional and part of everyday Spanish cuisine. In order to develop and understand Spanish consumer's behavioral process related to the purchase and consumption of extra virgin olive oil special attention has been addressed towards organic extra virgin olive oil, attitude, perceived behavior control as well as food related personality traits, purchasing habits and lifestyle orientation factors.

Unexpected finding proves that healthy lifestyle was not a significant explicative latent variable in forming consumers' attitude towards extra virgin organic olive oil. However, this factor is significant and with a negative associated utility when considering extra virgin olive oil in general. This can be due to cultural reasons, the extra virgin olive oil is a traditional component of the Spanish and Catalan diet and already perceived as a healthy food product. It is worth noting that kind of meals associated with extra virgin olive oil was the principal raison for the negative effect of cooking skills. On the other hand, the health and natural content of it could explain the positive effect of food involvement.

Moreover, when considering respondents' personal heterogeneity, it is interestingly to note a high association between women, food involvement and consumers' healthy lifestyle. This can be related to the role of the Catalan housewife as both responsible of the household food purchase and responsible of definition of family dishes. The role of the men appears when the relation change towards purchase habits, being less sensible respect to the price.

Our result support the contention that attitudes, personality traits and lifestyle orientation are helpful in food choice and important variables to reveal the ambiguity associated with consumer's behavioral process. However, the principal limitation of this work is the lack of available software tools enable to estimate simultaneously the hybrid choice model taking into account the introduction of correlation among the individuals. In addition, although the latent variables scales were defined from the literature review, few variables not attain the values' guidelines of the reliability or of the extracted variance. Therefore, this could affect the reliability of the results associated with these factors.

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Appendix
Factorial analysis: personality traits

Índ	Factores and ítems	Mean (SD)	Standarized Factor loadings (SE)	Varianze	Cronbach 's Alpha	Composite Reliability (variance extracted)
	Ordered Life style			74.40%	0.82	0.819(0.602)
OLS_1	I try to reduce stress.	6.888 (1.892)	1.372*** (0.108)			
OLS_2	I try to lead an order life and methodically.	7.308 (1.571)	1.325*** (0.0674)			
OLS_3	I try to equilibrate between my work and my personal life.	7.317 (1.679)	1.304*** (0.104)			
	Healthy life style			56.75%	0.57	0.559(0.302)
HLS_1	I try to control salt intake.	6.720 (2.74)	1.097*** (0.157)			
HLS_2	I eat frequently fruits and vegetables.	7.312 (2.180)	1.062*** (0.117)			
HLS_3	I try to not eat precooked foods.	8.180 (1.621)	1.489*** (0.121)			
	Food purchase			75.68%	0.88	0.885(0.663)
FP_1	I usually buy more products in promotion	7.040 (2.159)	1.995*** (0.0906)			
FP_2	I usually pay attention to the promotions.	7.135 (2.177)	2.072*** (0.0929)			
FP_3	I remember the price paid the last purchase.	6.343 (2.397)	1.415*** (0.126)			
FP_4	I compare the prices of different available brands.	6.723 (2.160)	1.696*** (0.104)			
	Food Quality involvement			77.64%	0.83	0.840(0.636)
QIN_1	I buy the product independently to their price.	5.535 (2.433)	1.656*** (0.117)			
QIN_2	It is relevant for me paying more if the product has more quality.	6.553 (1.813)	1.635*** (0.0851)			
QIN_3	I Pay more if the product has a guaranteed/certificated quality.	6.683 (1.793)	1.578*** (0.0927)			
	Food involvement			68.08%	0.83	0.846(0.584)
FIN_1	Mainly, I eat to have good health.	7.947 (1.599)	0.942*** (0.0804)			
FIN_2	Eating is a pleasure.	8.248 (1.404)	1.065*** (0.0754)			
FIN_3	The food accounts as a significant part of my family's traditions.	8.190 (1.486)	1.334*** (0.0664)			
FIN_4	The food is a link to get information from other cultures.	8.015 (1.651)	1.314*** (0.0981)			
	Cooking skills			58.87%	0.76	0.767(0.456)
COS_1	I like to cook	6.697 (2.430)	1.522*** (0.120)			
COS_2	I like to watch food programs on TV.	6.082 (2.797)	1.895*** (0.126)			
COS_3	I like to be subscribed to cooking magazines.	3.750 (3.091)	2.191*** (0.125)			
COS_4	I like to offer food as a gift.	5.650 (2.531)	1.69*** (0.128)			

Notes : ***p<0.01;**p<0.05; *p<0.1

Factorial analysis: behavioral factor

Índ	Factor	Means (SD)	Standarized Factor loadings (SE)	Varianze	Cronbach 's Alpha	Composite Reliability (variance extracted)
	Attitude			81,96	0.97	0.948(0.755)
ATT_1	The consumption of organic olive oil reduces human exposure to chemical residues.	6.867 (1.764)	1.502*** (0.110)			
ATT_2	Organic olive oil is healthy for children.	6.862 (1.660)	1.178*** (0.0678)			
ATT_3	The product is suitable for a healthy diet.	7.088 (1.636)	1.324*** (0.0666)			
ATT_4	The production of organic olive oil helps indirectly to reduce water pollution by waste chemicals and pesticides.	6.923 (1.680)	1.553*** (0.0579)			
ATT_5	The production of organic olive oil helps indirectly to conserve agricultural soil.	6.933 (1.716)	1.648*** (0.0563)			
ATT_6	The production of organic olive oil improves environmental sustainability	6.893 (1.809)	1.662*** (0.0626)			
	Behavioral Control Perception			69,79	0.87	0.816(0.443)
CP_1	I trust the product because of its certification by an organization or regulatory board of organic farming.	6.447 (1.601)	1.306*** (0.108)			
CP_2	I trust the product because it is sold exclusively in specialty stores.	6.668 (1.646)	1.293*** (0.0840)			
CP_3	I have confidence in the information provided on the product label.	6.202 (1.710)	1.35*** (0.0930)			
CP_4	I have confidence that a product certified as organic really is organic.	6.103 (1.866)	1.441*** (0.109)			
CP_5	The product is not available in the usual supermarkets where I normally do my shopping.	7.270 (1.843)	0.758*** (0.124)			
CP_6	To Search for the product, generates me a high cost in terms of time and money.	6.728 (1.862)	0.622*** (0.114)			
	Purchase intention			76,91	0.858	0.875(0.701)
PI_1	If I have more information and confidence, I buy organic olive oil.	5.923 (2.179)	1.938*** (0.221)			
PI_2	I buy more if the product is cheaper.	5.770 (2.219)	1.856*** (0.100)			
PI_3	If organic olive oil is more readily available, I most often buy it.	5.655 (2.246)	1.912*** (0.116)			
	Knowledge			87,63	0.861	0.876(0.780)
KN_1	Lack information about the benefits of organic products.	6.905 (1.834)	1.586*** (0.118)			
KN_2	Lack of information about the label that identifies products as organic.	6.872 (1.889)	1.705*** (0.116)			
	Subjective norms			86,61	0.926	0.934(0.825)
SBN_1	My kids prefer organic olive oil.	2.342 (2.475)	2.059*** (0.104)			
SBN_2	My family prefers organic olive oil.	2.465 (2.422)	2.382*** (0.0710)			
SBN_3	Persons who are important to me prefer organic olive oil.	2.578 (2.436)	2.215*** (0.0885)			

Notes : ***p<0.01;**p<0.05; *p<0.1