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Influence of Brand Equity on Milk Choice: A Choice Experiment Survey

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ABSTRACT

In the context of sustainable consumption buying local produce could support environmentally friendly production from the local economy. Our study estimates the preference weights that local consumers assign to some milk attributes including local origin and the influence on choice of a local brand of milk, which is traded by a local cooperative of producers in Umbria (Italy). Several preference segments are found amongst fresh and UHT milk buyers by employing a Latent Class model to analyze stated choice data. This specification allows us to verify whether consumers who have a better attitude towards local milk also prefer this brand to others, placing different values on the regional origin of milk.

Keywords: brand equity; milk, Latent Class Model; origin of milk

1 Introduction

Interest in sustainable production and consumption has increased at all levels of agriculture and the broader food chain, thereby increasing the potential influence of sustainability claims on consumer purchase decisions. Sustainable consumption is based on a decision-making process that takes social responsibility (environment, fair trade, animal welfare, etc.) into account in addition to individual needs (taste, price and convenience) (Meulenberg, 2003). In this context "buying local" has become an ethical issue, incorporating a range of civic concerns that include acknowledging local products as being environment friendly, respectful of animal welfare, good for the local economy and community and/or organically produced (Mintel, 2003). However, as for any other marketable product, consumer's acceptance is vital for the success of local products and their purchase is conditional upon how well the product is measured against specific choice attributes, such as price, convenience, accessibility and perceived quality (Weatherell *et al.*, 2003).

On the market organization side, the concentration of food retailing markets has sharply risen over the last few years and few leading players nowadays account for very large market shares. In addition, the tendency of store brands to extend their range of products from mass-consumption basic products to segment-specific more sophisticated products, including food products, has increased the market share of the so-called "private labels". These two tendencies can represent both threats and opportunities for safeguarding the existence of local products.

In this context the role of brand is strategic since brand can affect consumer purchase behaviour (Esch et al., 2006). Based on research evidence, marketing literature has coined the term *brand equity* when referring to "the added value which a brand endows a product" (Farquhar, 1989:24).

This study focuses on the influence of brand on choice of milk and specifically on how brand can affect the consumer's perception of milk's intrinsic and extrinsic attributes, including fat content, nutrient intake,

place of origin, price and point of sale. Data from discrete choice experiments are used to estimate the weights that the consumer assigns to such attributes when choosing milk.

Some studies have already reported estimates of the incremental value of the brand name to a consumer's utility as a measure of brand equity, after accounting for the contribution of other sources, such as functional characteristics and a mix of other marketing variables (Kartono and Rao, 2008). Such studies employ Conjoint Analysis (Srinivasan, 1979; Rangaswamy *et al.*, 1993) as well as Discrete Choice Modelling (Kamakura and Russel, 1993; Louviere and Johnson 1998; Park and Srinivasan, 1994). In the latter, brand is considered as an extrinsic attribute of the product, whose value can be represented by that portion of residual utility which the evaluation of the intrinsic attributes is unable to explain.

The present study contributes to this strand of literature by applying Latent Class Logit Model (LCL) (Wedel and Kamakura, 2000) one of the many specifications which accounts for unobserved taste heterogeneity across individuals, within the Choice Modelling framework. In this context, we propose the LCL specification in order to detect the different and prevailing forms of brand influence on the consumer's choice of milk. In particular, this influence is addressed assuming that brand equity is one of the latent variables which determines preferences heterogeneity towards milk's attributes, and the factors of brand equity, as defined by Aaker (1991), are considered its visible indicators.

In order to assess the influence of brand on milk choice, we elected to study the most important local brand in the market of milk in the region of Umbria (Italy). This milk is manufactured by a dairy cooperative, which is the regional leader for milk production. Several classes of consumers are identified in estimation for both ultra high temperature (UHT) and fresh milk, showing different preference patterns towards milk attributes. The results of LCL are compared with those obtained from a Mixed Logit Model (MXL) specification estimated on the same data so as to explore the robustness of the results to choice of specification.

The remainder of this paper is structured as follows. In the next section we provide the background to the study and state its objectives. In section three we cover the literature review on consumer-based brand equity measurement in the Random Utility Models and discuss the relevance of milk attributes on consumer choices. In section four, materials and methods are described, while section five discusses the results of the research and our final remarks are reported in the last section.

2 Background and objectives

The Italian milk market has not been exempt from the increasing trend of concentration that has involved all food retailing within last few decades. In the UHT segment, despite the fragmentation of the supply side, *Parmalat Group*, *Retailers* and *Granarolo Group* represent the three major players, holding together 55.2, 68.1 and 83.2% of the total market sales in whole, semi-skimmed and skimmed UHT milk segment, respectively (Pieri R., 2009). Among these players, retailers such as *Coop* and *Conad* follow a low-price policy with their private labels and offer frequent sales promotions. On the other side, manufacturer brands such as *Parmalat* have introduced new types of milk (such as lactose-free milk, long shelf-life milk, etc.) by investing a large amount of resources in advertising campaigns and by adopting new appealing packaging, with the aim to differentiate themselves from competitors and to keep up with modern buying trends.

In the fresh milk segment *Granarolo* is the leader in the *Alta Qualità* or "High Quality", enriched and reduced-fat milk (with 40.9, 28.7 and 87.3% respectively), while *Parmalat* is the leader in whole, non-fat, and micro filtered milk (20.8, 44.1, 34.9% respectively). *Private Labels* account for 32% in the micro filtered milk segment (Pieri, 2009). However, in the fresh segment there are still many brands of cooperatives that can count on strong consumer loyalty in regional markets (Rama D., Del Bravo F., 2006).

Grifo Latte brand is an example of a local milk brand, manufactured by the most important cooperative in the dairy sector in Umbria (Italy), which gathers more than 90% of the milk produced in the region. This cooperative is the leader of the regional milk market, in which it accounts for 39.8% of the total value (year 2008, *Iri-Infoscan*). Its major market is in Perugia, the capital of the Umbria region, where in 2008 it held respectively 54.8% and 47.1% of the market shares in UHT and fresh milk segments. However, this leadership is threatened by the increasing frequency of sales promotions for reduced price milk headed by *Parmalat*, *Granarolo* in addition to the *Every-Day-Low-Price* policy *(EDLP)* followed by *Coop*.

In light of this fierce competition and in order to understand the determinants of milk choice, the aim of this work is first to assess the preference weights that consumers assign to some intrinsic attributes of milk including fat content, nutrient intake, origin of milk, price and point of sale. Secondly, the study specifically assesses the influence of a local brand of milk on consumer choice. Particularly, we intend to

explore, in relation to the main competitor brands of milk, which factors of local brand equity can affect latent heterogeneity of taste across respondents.

For this purpose we employ the Latent Class logit model (LCL) since it is considered (together with Mixed Logit Model, MXL) one of the most promising specifications to address unobserved taste heterogeneity. Furthermore the LCLs, as the model's extensive application in food choice has demonstrated (Thiene *et al*., 2006; Hu *et al.*, 2004, Scarpa *et al.*, 2008), makes it possible to define specific marketing strategies for different consumer targets. Moreover, using variables like individual consumer characteristics (Ruto *et al.*, 2008, Hynes and Scarpa, 2008) or responses to attitudinal questions as determinants of the respondents' membership probability to preference segments (Morey *et al.*, 2006; Scarpa *et al.*, 2008), it is possible to understand the sources of systematic differences between preference groups.

In our study we assume that brand equity is the latent source of preference heterogeneity and brand equity factors are the visible effect of this heterogeneity. By including the effect of brand equity factors as proxies of individual attitudes towards local brand in choice modelling, we would expect that consumers who have a better attitude towards local milk will also prefer this brand among the alternatives proposed, placing different values to price and regional origin of milk.

3 Literature review

3.1 Brand equity and discrete choice models

A number of studies have explored various effects of brands on consumer behaviour, emphasizing the numerous advantages brought about from having created strong market leadership brands and their associated consumer loyalty (Leclerc *et al.*, 1994; Laroche *et al.* 1996; Chaudhuri and Holbrook, 2001; Krishnamurthi and Raj, 1991; Sethuraman, 1996; Sivakumar and Raj, 1997). It is widely recognized that brand as a product attribute has the power to communicate the positioning of a product and to reduce purchase risk. It is also an extrinsic cue that consumers consider predictive of a product's quality (Grunert, 2005), especially with reference to experience goods (Nelson, 1970, 1974; Darby and Karny, 1973). Importantly for firm revenue, brand can decrease price sensitivity of consumers who are more loyal (Bucklin *et al.*, 1995; Sivakumar and Raj, 1997). Based on this evidence the marketing literature has coined the term *brand equity* and much research has focused on conceptualizing this construct. The conceptualization often depends on the perspective on the study that is taken. Keller and Lehmann (2006) identify three principal perspectives from which brand equity has been studied: the consumer's, the company's and the financial perspective. According to a consumer's perspective "brand equity is part of the attraction to—or repulsion from—a particular product from a particular company generated by the 'non-objective' part of the product offering, i.e., not by the product attributes per se" (Keller and Lehmann, 2006: 745). Nevertheless when logos, colour and design are used without an association with unique benefits the brand success is curtailed (de Chernatony, 2009; Keller, 2008).

A more recent stream of research has focused on developing empirical methods for actually measuring brand equity. Following the classification scheme provided by Kartono and Rao (2008) in their review of brand equity measurement, some research has adopted an approach from psychological theories to examine how consumers perceive and process information about the brand and to develop the relevant measures of brand equity (Keller, 2002). Although the approaches for measuring brand equity differ, all these studies focus on brand knowledge structures in the minds of consumers, since they are considered the sources of brand equity (Keller and Lehmann, 2006). Among these psychologically-oriented studies the contribution of Aaker (1991) is particularly interesting. He defines brand equity as a four dimension construct including: brand awareness, perceived quality, brand associations and brand loyalty [*].

Under an economic approach, another stream of research has applied a consumer utility theory, assuming that brand equity is not observable. This approach assesses the incremental value of the brand name to a consumer's utility as a measure of brand equity. This is measured after accounting for the contribution of other sources, such as functional characteristics and marketing mix variables (Kartono and Rao, 2008).

[*] *Brand awareness* is "the ability for a buyer to recognize or recall that a brand is a member of a certain product category" (Aaker, 1991:61).
Perceived quality is the "consumer's judgment about a product's overall excellence or superiority" (Zeithalm, 1998). It therefore is based on consumer's or user's subjective evaluations of product quality.
Brand associations are defined as "anything linked in memory to a brand" (Aaker, 1991:109); this link becomes stronger when it is based on a consumer's frequent experience with a specific brand.
Brand loyalty is "the attachment that a customer has to a brand" (Aaker, 1991:39). It usually represents the core of brand equity, since it directly affects sales performance. Aaker identifies different levels of brand loyalty: from the very basic level which embraces consumers indifferent to brand to the last level consisting of consumers with strong level of involvement in product purchase.

These studies employ the methodology of Conjoint Analysis or Conjoint Choice.

In the choice modelling framework brand is considered as a product's extrinsic attribute, whose value can be represented by the portion of residual utility that the evaluation of the intrinsic attributes is unable to explain. Among the seminal studies, Kamakura and Russel (1993) proposed a scanner-based measure of brand equity that attempts to explain choices observed by a panel of consumers as a function of the store environment (actual shelf prices, sales promotions, displays etc...), the physical characteristics of brands and a residual term related to brand equity.

In the same year Swait *et al.* (1993) used the method of choice experiments to investigate for brand name, product attributes, brand image, brand usage and differences in consumer socio-demographic characteristics. The study determines the *equalization price* as a brand equity measure. That is, the price at which the brand's utility in a market with brand differentiation equals the utility in a market where no brand differentiation occurred, for three classes of non-commodities products.

More recently Morrison and Eastburn (2006) use choice experiment data to estimate willingness to pay for branded beef that had previously been introduced in the Australian market and to verify whether some sources of brand equity such as self-image, congruence, perceived quality and consumer involvement in the purchase can influence the choice of branded beef. The study is one of the first attempts to examine the link between the sources of brand equity for a food commodity to its outcome[†]. This issue was addressed by estimating the coefficient of the interaction variables between the Alternative Specific Constant (ASC) for branded beef and some indexes of brand equity sources, obtained using Likert-scale scores. The results of this study have shown that perceived quality influences both preferences for branded product and consumer price sensitivity.

In relation to the existing marketing literature assessing the influence of brand equity on consumer utility by Discrete Choice Modelling, this study applies Latent Class Model to identify different classes of consumers with a similar preference structure, assuming that brand equity is the latent variable which explains preference heterogeneity among the classes. Since brand equity is latent, responses to attitudinal questions represent the visible effect of the latent variable. These attitudinal questions refer to the four brand equity dimensions defined by Aaker's (1991) and reflect consumer attitudes toward brand. Moreover, among the numerous studies dealing with milk demand and milk attributes, this study is the first to apply LCL in order to investigate preferences of milk consumers.

3.2 Milk attributes and consumer purchasing behaviour

Consumer purchasing behaviour of milk, with respect to single attributes and the interactions among them, has been extensively explored in recent years through the use of several research methods, both qualitative and quantitative. Attitudes and willingness to pay (WTP) towards different cues related to healthiness of a product, such as level of fat or nutrient content (Bus and Worsley, 2003; Peng et al., 2006), local or foreign origin (Vandemersch and Mathijs, 2004), organic or conventional production process (Managi et al., 2008; Klöckner and Ohms, 2009), private labels or national brands (Zhuang and Dimitri, 2009; Dolekoglu et al., 2008), prices and promotion (Li et al., 2007) and their complex dynamics have been investigated.

Of particular importance to the aim of this research is the study carried out by Managi *et al.* (2008), in which choice models are used to explore consumer preferences towards organic milk in Japan. They consider the use of organic feed, the restrictions on the use of animal medicinal products, and livestock low-stress feeding as attributes of organic milk, which are considered the tangible expression of the consumer's latent demand for safeness and healthiness. The results suggest first that in the Japanese organic milk market safety, taste and environment friendliness are important factors influencing consumers purchasing decisions. Secondly, for consumers who perceive organic milk as safe, the attributes of organic feed and restrictions on the use of animal medical products increase the probability of purchase.

Thus, it is possible to assert that the importance and weight of milk attributes on consumer's choice varies across regions and consumer psychographic characteristics. In Italy, some recent studies have investigated consumer behaviour of milk at local or regional level (Coppola and Verneau, 2009). Through a choice based conjoint Mora et al. (2009) investigated the interaction between origin, brand, price and

[†] As stated in Kartono and Rao, (2008) the sources of brand equity are the constructs in the consumer's mind that drive consumer behaviour (e.g. consumers awareness, mental associations etc…) while the outcomes of brand equity are the consumer's response to the marketing of a branded product that can be measured in terms of the consumer's (stated or observed) behaviour or preferences after exposure to a (simulated or actual) marketing activity, and can be expressed in terms of utility, purchase intent or behaviour.

traceability in purchasing UHT milk. Estimation results based on a multinomial logit model evidenced the importance of the market leader brand and the origin and the scarce relevance of traceability certification for 203 people interviewed in Parma. Conversely, involving a representative sample of Italian consumers, Sckokai et al. (2010) have carried out a web-based stated choice experiment showing that a rather high WTP exists for "reduced micotoxin" in milk. More research is thus needed to thoroughly explore how the attribute "brand" and the interaction with others cues can affect the choice of milk products in other regional contexts.

4 Materials and methods

4.1 Qualitative analysis

The objectives of this research have been pursued in two separate but connected investigations, qualitative first and quantitative second. The qualitative study was performed by means of two focus groups (FGs). This technique aims at eliciting people's views, opinions, and concerns, and provides the opportunity for an in-depth understanding of choice mechanisms together with the reasons linked to consumer preference (Cavicchi and Corsi, 2010; Canavari *et al.*, 2008). A protocol for conducting FGs was prepared in order to identify the relevant attributes considered by consumers to be consequently used in quantitative research. Eight Umbria residents took part in each focus group, Umbria being the Region of origin of production of Grifo Latte. During the FGs some projective techniques were applied: *free associations*, *brand mapping* and *sentence completion*. The first technique was used at the beginning of the FGs to encourage subjects to think about personal factors related to milk consumption. With the *brand mapping* a variety of competing milk brands' logos where displayed in order to understand how subjects view market competition and the relations among competitors. After having recognized them, participants were asked to group the brands and then to present those groups explaining the common characteristics and the criteria for grouping. With the *completion technique* in the last part of each FG participants were asked to succinctly describe their concept of milk quality in the light of the arguments elicited by the discussion. With this technique subjects are given an incomplete sentence and are asked to complete it (Burns & Lennon, 1993). We used the partial sentence "Quality in milk is…". During the discussion some milk attributes were tested by asking participants to express a ranking from most to least important for each attribute presented and to their related levels. Every focus group lasted around 100 minutes. Qualitative analysis identified the attributes and levels necessary to build the choice experiment for the quantitative survey. The following were considered: fat content (levels: whole, semi-skimmed, skimmed) origin (levels: Italian, regional, not mentioned), point of sale (supermarket, hypermarket, discount, grocery store) and, concerning the fresh milk, the differentiation among nutrient intake (High Quality and standard fresh milk).

4.2 Quantitative analysis of qualitative milk choice

Choice Models

The Random Utility Model of McFadden (1974) underpins the theoretical framework that is often used to analyse qualitative choice data in a setting with several product alternatives and varying attributes. According to this approach the consumer utility can be decomposed into a deterministic component (V) and an error component (e). Formally, the utility of an alternative j for a respondent n can be expressed as:

$$U_{nj} = V_{nj} + e_{nj} \quad (1)$$

and assuming that the respondent chooses the alternative that provides the greater utility, the probability for the respondent *n* to choose alternative *j* is:

$$P_{ni} = Prob\,(U_{ni} > U_{nj} \forall\, j \neq i) \quad (2)$$
$$= Prob\left(V_{ni} + \varepsilon_{ni} > V_{nj} + \varepsilon_{nj} \forall\, j \neq i\right)$$

If the random error e_{nj} is independent and identically distributed across alternatives according an extreme value type I (or Gumbel) distribution and assuming that the utility is linear and additive in parameters $V_{nj} = \beta x_{nj}$, the choice probability in equation is expressed as:

$$P_{ni} = \frac{\exp(\lambda x_{in}\beta)}{\sum_{j\in J}\exp(\lambda x_{in}\beta)} \quad (3)$$

where λ is the Gumbel error scale parameter that cannot be separately identified and is normalized to 1, x_{in} is the matrix of attributes of the alternative *i* and β is the parameter vector associated with the matrix x_{in}. This formula gives the conditional logit selection probability, and (3) defines the most common and widely used discrete choice model.

A major drawback of this model is that all respondents are assumed to have the same tastes, as if they were "preference clones". Since in real life consumer preferences are characterized by heterogeneity, several approaches have been proposed to extend the basic conditional logit to account for taste variation. The first approaches have included interactions between individual specific socio-demographic variables and product attributes (Adamowicz *et al.*, 1997), or alternative-specific constants (Pollak and Wales, 1992). More recent approaches are based on Random Parameters panel Models (RPL), which generalize the Conditional Logit by allowing the coefficients of taste to vary randomly over people rather than being fixed. These include the Latent Class Models (LCLs) proposed by Kamakura and Wedel (2000), in which taste variation is discrete, and the Mixed Logit Model (MXLs) popularized by Train (1998), in which the variation is continuous.

The latent Class Model

The LCL assumes the existence of several classes such that individuals belonging to the same class have identical taste (preference clones within each class); however tastes can vary between classes. Assuming the existence of a latent construct, LCL determines several segments from discrete visible measures of the latent construct that inform membership probability into the classes (Boxall and Adamowicz, 2002). In this way, the model tries to explain the preference variation across individuals conditional on the probability of membership to a class. Besides socio-economic variables, membership probability can be informed by attitudinal scales (as in the case of Attitudinal Latent Class Model see Morey *et al.* 2006), expressing perceptions, social influences and past experience about product.

In contrast, the MXL model explicitly accounts for heterogeneity by allowing utility parameters to vary randomly and continuously over individuals (e.g. Layton 1996; Train 1997, 1998) but they are not well-suited for explaining the specific sources of heterogeneity. However, in a recent study by Hynes *et al*., (2008) pertaining to site choice decision for white-water kayakers, the attribute means have been estimated in the MXL model conditional on skill of kayakers, supposing kayaking skill levels affect heterogeneity of tastes in a systematic way.

In our study, both specifications have been applied in order to identify which one is superior in modelling consumers' preferences for milk attributes from our sample. Furthermore, the LCL allows us to investigate which factors of brand equity—as defined by Aaker (1991)—are able to explain latent heterogeneity towards attributes and alternatives of milk.

Formally, each segment in the LCL is characterized by particular preferences and the probability for a respondent *n* conditional on belonging to a specific segment *s* to select alternative *i* is:

$$P_{in|s} = \frac{e^{\mu_s\beta_s\chi_{in}}}{\sum_{j\in C_n} e^{\mu_s\beta_s\chi_{in}}} \quad (4)$$

Assuming that Y_{ns} is the brand equity latent variable that informs membership probability into *S* segments of *N* respondents and that its error term is identically and independently Gumbel distributed and α is a scale factor normalized to 1, the probability of membership in segment *s* is:

$$\pi_{ns} = \frac{e^{ay_sZ_s}}{\sum_{s}^{K=1} e^{ay_sZ_n}} \quad (5)$$

where y_s (*s*=1,2,...,*S*) are segment-specific parameters to be estimated that indicate the contribution of each brand equity factors Z_n (measured for each respondent) to the probability of segment membership. Positive y_s implies the corresponding brand equity factor Z_n, as expressed by respondent, increases the

probability that respondent *n* belongs to segment *s*.

The marginal probability that a respondent *n* chooses the alternative *i* is logit and it is found by integrating out the conditional probability of belonging to a taste segment *s*.

$$P_{in} = \sum_{s=1}^{S} \pi_{ns} P_{in|s} = \sum_{s=1}^{S} \left(\frac{e^{\mu_s \beta_s \chi_{in}}}{\sum_{j \in C_n} e^{\mu_s \beta_s \chi_{in}}} \right) \left(\frac{e^{a y_s Z_s}}{\sum_{s}^{K=1} e^{a y_s Z_n}} \right) \quad (6)$$

The optimal number of classes with different preference structures is not determined by the maximization process, from which the attribute parameters are derived. Therefore the common tests for nested restrictions being used for maximum likelihood estimators cannot be applied in this context. The literature suggests obtaining guidance from some information criteria. A general information criteria is specified as C= 2ln*L + kJ* where ln*L* is the value of the log-likelihood function at the convergence, *J* is the number of the estimated parameters and *k* is a penalty constant which takes different values depending on the type of criteria, but is generally linked to the number of estimated parameters and the sample size. For *k* = 2 we obtain the Akaike Information Criteria (AIC) while for *k* = ln(*L*) we obtain the Bayesian Information Criteria (BIC). As suggested in Scarpa and Thiene, 2005 the number of classes should also account for significance of parameter estimates together with the meaningfulness of parameter signs, since significance of parameter estimates tend to decrease as the number of classes increases.

The Random Parameter Logit Model

In the Random Parameter Logit Model (RPL) the probability for an individual *n* to choose a product *i* is logit and is given by the integral (4) of a multinomial logit model over a distribution of tastes

$$P_{ni} = \int L_{ni}(\beta) f(\beta) d\beta \quad (7)$$

where $f(\beta)$ is the density function of parameters β while L_{ni} is Multinomial Logit probability in (3). The mixed logit probability $f(\beta)$ must be specified by the analyst and therefore it can take several forms (normal, triangular, lognormal), the parameters of which researcher wants to estimate. (e.g. b and W in a N ~(b,W).

Since the integral in equation (7) does not have a closed form, in estimation the probabilities are approximated through simulation: for any given value of b and W, a value of β is drawn from f(β|b,W) and then a logit formula is calculated with this draw. After repeating these two steps many times the average probability is calculated, which approximates the value of the integral as the number of draws increases. Several methods of taking random draws from various kinds of densities have been developed. We used 120 Halton sequences (Halton, 1960), which provide both a better coverage of the distribution than pseudo-random draws and a smaller standard deviation of the distribution parameters.

4.3 Data Collection and the choice experiment

A quota sampling was used and the survey was initially stratified according to the number of family components (from 1 to more than 5 components) and the type of housing provided by *Istat*[‡], in order to consider the influence of living in urban and rural municipalities on milk consumption. A representative territorial spread quota sampling was applied to six different areas, which identify clusters of socio-economic districts[§]. The data were gathered by means of a questionnaire-based survey administered to local consumers of milk, who were interviewed at supermarkets and hypermarkets during the period February-August 2009. The survey gathered data on: milk consumption and purchase (purchase frequency, type of milk and packaging, place of purchase, brand of milk consumed, etc.); Grifo Latte brand (the respondent's knowledge of Grifo latte milk and his/her perception of milk quality of local brand); Grifo Latte brand equity factors, which reflect consumer attitudes toward local brand; responses to choice

[‡] In the Population and Housing Census of 2001 ISTAT divides the type of housing in three different groups: inhabited centre, inhabited nucleus and scattered houses. For simplicity's sake in the survey only inhabited centre together with the group of inhabited nucleus and scattered houses were considered.

[§] The six clusters are the following: 1) Valnerina-Nursino; 2) Appennine Ridge (including Eugubino-Gualdese, Umbrian Valley and Spoletino); 3) Tuscany Border (including High Tiber Valley, Trasimeno-Pievese); 4) Perugino (including Perugino and Middle Tiber Valley); 5) Ternano (Ternano and Narnese); 6) Orvietano (Orvieto).

experiments and socioeconomic characteristics of respondent and his/her family members.

The data referring to brand equity factors were collected by taking some specific items as a reference. These items reflect each brand equity factor and were already used by Yoo and Donthu (2001) in a study on multi-dimensional brand equity scale[**]. The items were evaluated by each respondent during the survey by means of a five-point Likert scale anchored at 1 that means "Completely disagree" and 5 that means "Completely agree". An example of one of the three items relative to loyalty towards local brand (Grifo Latte) is reported below:

On a scale of 1 to 5 where 1 means "Completely disagree" and 5 means "Completely agree" express your level of agreement to the following statement:

"*I consider myself to be loyal to Grifo Latte brand.*"

According to Morrison and Eastburn (2006) based on these responses five different indicators (one for each factor of brand equity) were obtained for each respondent by calculating the average of the agreement scores, resulting from attitudinal responses to Likert scale items. These indicators, which reflect consumer attitudes toward local brand, informed membership probability in the Latent Class models (LCLs).

The central part of the questionnaire was the choice experiment. In the survey each respondent was asked to indicate his/her preferred alternative in each of the choice tasks assigned to them. Alternatives consisted of the no-buy option and three experimentally designed alternatives labelled "local brand – Grifo Latte", "national brand – Parmalat, Granarolo", "supermarket brand – Coop and Conad". For each alternative non-monetary attributes were dummy coded (for each attribute with L qualitative levels L-1 dummy variables were created and each dummy was set to 1 when the qualitative level is present and set equal to 0 if it is not. For each attribute one level was chosen as reference[††]).

The overall survey design involved three separate waves because of the adoption of a sequentially efficient experimental design. These kind of designs are preferred because they can enhance the estimation accuracy at a given sample size, compared to the conventional fractional factorial orthogonal design (Scarpa *et al.*, 2007). Amongst the various available criteria (Scarpa and Rose 2008) we minimised the D_b-error computed on the basis of all prior information on the coefficients' values. The initial prior information was gathered from a pilot survey, which was based on a fractional-factorial design. Subsequently efficient Bayesian designs were employed in the second and in the third wave of sampling. Each respondent performed 4 choice tasks during the pilot survey and 9 choice tasks in the second and third wave of sampling.

At the end of the third wave the total sample included 409 completed consumer surveys, 278 of which relative to UHT and 131 to fresh milk. Despite our initial intentions, it was not possible to collect the same number of questionnaires both for UHT and fresh milk because of the higher frequency of consumption of UHT among local consumers.

5 Results

In this section we present summary statistics of the socio-demographic characteristics of the sample and the estimates of LCL and MXL models (Table 1). With regards to milk consumption habits, supermarket is the most common point of sale for both kinds of milk but UHT consumers mentioned also discounts (together with LRC) (11.6%) while fresh milk consumers prefer grocery store (12.3%).

[**] In this study the authors aimed at measuring the dimensions of brand equity by a multi-dimensional scale. The items are grouped as follows: five for perceived quality, three for brand loyalty, three for brand awareness and three for brand associations.

[††] The reference level are the following: skimmed for content of fat, not mentioned for origin of milk, grocery store for point of sale and standard fresh for nutrient intake attribute.

Table 1.
Summary statistics of respondents and their families

	Mean	Std. Dev.	Min.	Max.
Age in years	44.6	14.3	16	80
Education[a]	3.1	0.8	1	4
Income (€/monthly)	3,890.00	1474.7	625	6,700
Number of family members	3.1	1.1	1	6
Average age of the family	41.3	15.5	17	86

a: Education equal to 1 indicates primary school, 2 and 3 indicate secondary-levels education and 4 university education.

Regarding the purchasing habits of Grifo Latte, different levels of loyalty towards the local brand emerge between consumers coming from the two provinces: 26% of consumers who come from Perugia state that they buy only Grifo Latte brand, showing high level of loyalty towards local brand; on the other hand, less than 5% of consumers who come from Terni purchase only Grifo Latte. Strong differences are observed also in the level of brand awareness: 63% of consumers from Perugia answer Grifo Latte at the recall question compared to the 3.3% of those from Terni. According to Aaker conceptualization of brand awareness levels, Grifo Latte can be defined as the top-of-mind brand (Holden and Lutz, 1992), considering the high percentage of respondents who have first-named it at the recall task during the interview.

The estimates of three model specifications for UHT and fresh milk data are presented in Tables 2 and 3; for each milk attribute we report coefficients' estimates, t-values, and marginal WTP which facilitates comparisons across classes in the context of LCL[‡‡]. The MNL specification with Alternatives Specific Constants for each type of brand (Grifo brand, National brand and Private Label) was considered the reference model.

Several MXL specifications have been searched for both datasets, with the aim of uncovering the heterogeneity across respondents. Being interested mainly in the pattern of tastes, we applied first random coefficient specifications that account for the effect of heterogeneity on the systematic component of utility, by treating coefficients as random (both milk's attributes and ASCs). Then we tested an error components mixed logit specification (MXL-EC), which captures heterogeneity of the stochastic component of utility (unobserved heterogeneity) by adding an error component associated with alternatives different from the no-buy option, as well as error components in which both the heterogeneity effects can be identified (Scarpa *et al.*, 2005). Since correlation was expected to be found, especially between levels of some attributes, the existence of a correlation pattern in the distribution of tastes has been investigated by also estimating various forms of the Cholesky matrix (see the Appendix).

According to the values of the sample log likelihood function at a maximum, adjusted R squared and AIB e BIC information criteria, the MXL-EC model which accounts simultaneously for the effect of systematic and stochastic heterogeneity, as well as for correlation in the distribution of tastes, emerged as statistically preferred for UHT and fresh milk datasets. This model supports the hypothesis that whole and semi-skimmed milk, regional origin, high quality (for fresh milk) and the ASCs are normally distributed random parameters. Among these, the attributes of whole milk have the highest standard deviation, suggesting the existence of different groups of consumers with very different taste intensities. This result is reasonable, especially for whole milk, since fat content strongly affects milk taste.

For the data on choices of UHT milk, the results of MNL and MXL show that consumers prefer local brand to national and retailer's brands as well as milk of regional origin to national origin. As implied by the negative mean of the coefficient (under the hypothesis of normality), most respondents dislike whole milk attribute, revealing that these consumers tend to associate higher content of fat to unhealthy consequences, such as weight increase or cardio vascular problems. On the contrary, semi-skimmed milk has a positive sign indicating that this kind of milk is preferred to skimmed milk, which represents the reference level for fat content attribute. Hypermarkets and supermarkets are favoured to discount stores as a point of sale, even though only hypermarkets are significant among the point of sale proposed. Price coefficient has the expected negative sign. It was assumed not to be random because this would complicate the derivation of the distribution of the marginal WTPs. The Cholesky matrix reported in Appendix (Table A1) confirms the existence of a correlation structure across taste intensities as the

‡‡ Direct comparison of coefficient values across classes is not very meaningful since in Discrete Choice Models only differences in utility matter.

significance (at 5% level) of many of its elements demonstrates[§§].

In the LCL models, the Akaike Information Criteria and the Bayesian Information Criteria were employed in order to decide the optimal number of classes with different preferences. Using these two criteria—and considering also the significance of parameter estimates together with the meaningfulness of parameters signs (Scarpa and Thiene, 2005) —5 classes were found in the UHT dataset (Table 2). In this model price, fat content and the cue "origin" seem to be the most important attributes since they are significant in all classes. On the other hand, the point of sale does not seem to be particularly relevant in influencing milk choice being significant only in class 4, which is the largest class (share of 29%). This result is not surprising as the wide variety of types of milk supplied nowadays by Large-scale retail stores; furthermore it is reasonable to think that for a consumer the choice of the point of sale in case of milk purchase, which is a repeat purchase product, takes secondary importance in the consumption process, if compared with other food products such as the so-called specialities (for example quality wines). All classes show a preference for a reduced content of fat (semi-skimmed milk in classes 1 and 4 and skimmed milk in class 2 and 3), with the exception of the smallest one (class 5 with a share of 9.8%), which prefer whole milk. Thus the classes are mostly characterized by the variation of intensity and significance of estimates relative to the coefficients of milk origin and ASCs. Classes are described on the basis of their share in the sample, which varies from 29% (class 4) to 9.8% (class 5).

In class 4 consumers favour semi-skimmed and regional milk and they prefer Grifo brand in relation to other alternatives (even though its coefficient is not significant), reflecting the preference pattern of the *average consumer* of milk in Umbria region. Instead, class 3 (share of 26%) includes consumers who prefer national brands but, unexpectedly, show higher WTP for regional origin of milk. From the cooperative's point of view we can define these as *competitive milk brands' consumers*.

Class 1 (share of 22%) has a pattern of tastes that is similar to class 4 including consumers who prefer semi-skimmed milk even though these consumers show almost the same appreciation for national and regional origin. They also prefer the "No buy" option to the other alternatives, since they tend to choose one of the purchase alternatives only when its combination of attributes and brand was as close as possible to the milk choice they usually make in the real market. We can speculate that this class represents *consumers of Italian milk*, for whom the regional origin makes little or no difference in relation to the national one.

Class 2 members (share of 13%) show a clear preference for Grifo Latte brand together with the lowest importance to price parameter. Contrary to expectations, the details concerning the origin of the milk do not seem to be appreciated by these consumers; the negative sign associated with the cue "national origin" seems to even decrease consumers' utility. We would hypothesize that these individuals represents the *consumers of Grifo Latte milk*, who probably are used to associate regional origin of milk to the name of the local brand. In this sense, the indication of origin may not necessarily influence consumers' choice.

[§§] The Cholesky matrix does not include the national level which has been estimated as a fixed parameter since its standard deviation was found not to be significant. However, during the specification search the correlation matrix was estimated also assuming all the parameters to be random. It shows a correlation of 0.89 between national and regional origin levels and of -0.80 between the alternatives Grifo brand/Private label.

Table 2.
Multinomial Logit, Mixed and Latent Class Model for UHT milk

Variables	Multinomial	Mixed		Latent Class				
		mean	st. dev.	Class 1	Class 2	Class 3	Class 4	Class 5
Grifo brand	1.038	2.92	2.683	-1.472	5.151	3.854	0.53	-1.896
	(5.23)	(8.511)	(11.731)	(-1.893)	-8.69	-13.275	-1.332	(-2.217)
				-1.04	*3.72*	*1.47*	*0.33*	*-0.9*
National brand	0.704	0.9638	1.898	-2.181	1.42	4.587	-0.322	-1.699
	(3.543)	(2.843)	(10.504)	(-2.695)	-2.579	-14.924	(-0.816)	(-1.931)
				-1.54	*1.02*	*1.75*	*-0.2*	*-0.8*
Private Label	0.092	-0.039	2.782	-4.018	2.309	3.557	-0.172	-3.306
	(0.452)	(-0.114)	(15.952)	(-4.512)	-4.518	-11.927	-0.43	(-3.855)
				-2.85	*1.67*	*1.36*	*-0.11*	*-1.56*
Semi-skimmed	1.084	2.996	3.299	2.865	-1.093	-0.027	3.249	2.209
	(15.993)	(13.286)	(16.618)	-8.259	(-5.486)	(-0.300)	-23.247	-3.625
				2.03	*-0.79*	*-0.01*	*2.04*	*1.04*
Whole	-0.057	-1.391	4.462	0.066	-1.938	-0.759	-0.344	5.043
	(-0.740)	(-5.317)	(20.06)	-0.16	(-8.776)	(-8.304)	(-2.270)	-8.025
				0.05	*-1.4*	*-0.29*	*-0.22*	*2.39*
Regional origin	0.555	1.237	0.883	0.725	-0.305	0.939	1.224	0.761
	(8.061)	(8.473)	(5.909)	-2.698	(-1.461)	-11.178	-8.536	-2.813
				0.51	*-0.22*	*0.36*	*0.77*	*0.36*
National origin	0.483	0.955	-	0.741	-0.708	0.654	1.108	0.911
	(6.754)	(7.85)	-	-2.836	(-3.153)	-6.493	-7.523	-3.319
				0.52	*-0.51*	*0.25*	*0.7*	*0.43*
Price	-1.376	-3.328	-	-1.412	-1.386	-2.619	-1.591	-2.114
	(-9.114)	(-11.902)		(-2.324)	(-3.288)	(-12.241)	(-5.270)	(-3.359)
Supermarket	0.198	0.182	-	0.151	-0.129	0.044	0.46	-0.32
	(2.569)	(1.199)	-	-0.559	(-0.479)	-0.417	-2.976	(-1.059)
				0.11	*-0.09*	*0.02*	*0.29*	*-0.15*
Hypermarket	0.182	0.341	-	0.308	0.018	0.127	0.189	0.236
	(2.281)	(2.219)	-	-1.189	-0.081	-1.12	-1.251	-0.787
				0.22	*0.01*	*0.05*	*0.12*	*0.11*
Discount	0.115	-0.432	-	-0.282	-0.254	0.098	-0.314	0.198
	(1.382)	(-0.297)	-	(-0.963)	(-0.865)	-0.81	(-1.283)	-0.68
				-0.2	*-0.18*	*0.04*	*-0.2*	*0.09*
Error component σ		2.64						
		(13.035)						
Class prob. (%)	-	-		0.221	0.127	0.263	0.289	0.098
Log likelihood	-2809.78	-2142.56		-2209.71				
R-sqrd adj	0.099	0.355		0.308				
AIC	2.43	1.8		1.95				
BIC	2.46	1.88		2.1				

Notes: Figures in parenthesis indicate t-statistics and figures in italics indicate marginal willingness-to-pay estimates for each milk attribute.

A different preference pattern characterizes consumers of fresh milk (Table 3) compared to UHT ones. Both the MNL and the MXL model estimates indicate that these consumers like high quality whole milk of national origin, even though no brand seems preferred among the alternatives included in the choice experiment. Moreover, the unexpected insignificance of price parameter suggests that these consumers give, in general, a lower importance to the monetary attribute compared to UHT consumers [***]. Among the points of sale, they found Large-scale Retailers and grocery stores more attractive than discount stores. These differences are consistent with the fact that in the context of household consumption habits, fresh milk is mainly for young children; we would hypothesize that the presence of children makes the relative

[***] Table 3 does not report WTP since in all models price coefficient was not significant.

importance of milk higher in relation to other foods, decreasing the weight given to price in the choice. Furthermore, it is not surprising that a better nutrient intake is preferable when consumers are younger. As for the UHT milk models, the estimated Cholesky matrix confirms the existence of correlation across taste intensities and the error component σ was found to be significant (Table A2 in the Appendix).

According to the values of AIC and BIC criteria the LCL with three classes is the best model to be estimated. The taste parameter of whole level is always found to be positive and significant in all classes, unlike UHT consumers.

The largest class (Class 2 with 45% of share) likes the local brand and High quality whole milk. Both regional and national origins influence positively the probability of choice with almost the same intensity, while discounts have a negative effect on the choice. This pattern of taste is similar to what we call *the average consumer of milk* in the UHT subsample.

Class 3 is the only class which includes consumers who appreciate semi-skimmed milk more; they consider the better nutrient intake of High quality milk attractive together with the cue "origin", though they show almost the same appreciation for regional or national origin. Unlike class 2, these consumers consider LRCs their preferred point of sale for purchasing of fresh milk. Apart from the preference for brand (it prefers the "No buy option"), this class shows a preference pattern that is somewhat similar to class 2 even though they can be considered more *health-conscious* as they prefer a fresh milk with a reduced content of fat.

Finally, class 1 (22% of share) shows indifference for all the attributes, with the exception of whole level, which is appreciated with great intensity. Though insignificant, this class does not like High quality milk, and price attribute has a positive sign, contrary to expectations. Because of the strong effect whole level has on choice, we can call these consumers *milk-flavour lovers*.

Table 3.
Multinomial Logit, Mixed and Latent Class Model for fresh milk

Variables	Multinomial	Mixed		Latent Class		
		mean	st. dev.	Class 1	Class 2	Class 3
Grifo Latte brand	-0.859	-1.421	1.044	-4.829	1.663	-3.68
	(-2.784)	(-1.748)	(2.361)	(-3.173)	(4.912)	(-4.685)
National brand	-1.215	-3.026	5.302	-5.639	1.381	-4.528
	(-3.913)	(-3.336)	(7.866)**	(-3.630)	(4.083)	(-5.635)
Private Label	-1.45	-3.743	5.569	-5.61	1.18	-5.59
	(-4.678)	(-4.023)	(8.171)	(-3.556)	(3.528)	(-6.895)
Semi-skimmed	0.926	2.06	4.333	0.625	0.077	4.842
	(8.115)	(4.992)	(8.334)	(0.469)	(0.795)	(8.882)
Whole	1.116	2.682	3.527	5.289	0.196	2.596
	(9.842)	(6.829)	(9.742)	(4.615)	(2.227)	(4.773)
Regional origin	0.368	1.264	1.138	0.263	0.58	0.437
	(3.585)	(4.429)	-3.155	(0.809)	(5.618)	(2.218)
National origin	0.382	1.379	-	0.279	0.551	0.481
	(3.720)	(4.839)	-	(0.871)	(4.819)	-2.505
High quality	0.398	1.049	1.371	-0.015	0.614	0.532
	(4.759)	(4.332)	(6.422)	(-0.056)	(7.982)	(3.015)
Price	-0.055	-0.845	-	0.339	-0.163	-0.724
	(-0.251)	(-1.466)	-	(0.397)	(-0.743)	(-1.596)
Supermarket	-0.013	-0.158	-	0.189	-0.312	0.918
	(-0.112)	(-0.464)	-	(0.530)	(-2.345)	(3.709)
Hypermarket	-0.066	-0.139	-	-0.183	-0.13	0.484
	(-0.560)	(-0.427)	-	(-0.507)	(-1.076)	(1.887)
Discount	-0.352	-1.262	-	-0.365	-0.581	-0.041
	(-2.743)	(-3.793)	-	(-0.913)	(-4.345)	(0.165)
Error component σ	3.71					
	(8.231)					
Class prob. (%)	-	-		0.265	0.444	0.29
Log likelihood	-1269.35	-869.82		-2209.71		
R-sqrd	0.069	0.371		0.313		
R-sqrd adj	0.065	0.363		0.308		
AIC	2.565	1.82		1.95		
BIC	2.624	2.02		2.10		

Note: Figures in parenthesis indicates t-statistics.

Heterogeneity of tastes and brand equity

Tables 4, 5 and 6 present the estimated parameters β_s of the segment-specific utility functions and the corresponding parameters (y_s) for the segment membership functions, related to perceived quality, associations and loyalty relative to local brand. These parameters' values are estimated by fixing class 5 as the baseline. They represent the effect of respondents' attitudes towards Grifo Latte brand, expressed by brand equity factors, on the probability of membership in the five classes.

Among the brand equity factors, only perceived quality, loyalty and brand associations are significant in the membership probability to some classes of consumers. In particular, the positive sign related to perceived quality and brand associations indicate that consumers with a good perception of Grifo Latte and a high ability to associate brand name to its packaging and logo are more likely to be represented in class 2 (tables 4 and 5), which includes consumers with a strong preference towards Grifo Latte brand, as described in the previous paragraph.

Table 4.
Latent Class Model and perceived quality of Grifo Latte brand (UHT)

Variables	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**
Grifo brand	-1.275	5.898	4.099	0.202	-2.504
	(-1.565)	(-4.24)	(-17.309)	(-0.479)	(-2.989)
	-0.807	*2.83*	*1.535*	*0.134*	*-1.496*
National brand	-2.058	0.168	4.556	-0.578	-2.328
	(-2.538)	(-0.137)	(-18.149)	(-1.389)	(-2.724)
	-1.3	*0.08*	*1.71*	*-0.38*	*-1.39*
Private Label	-4.07	0.228	3.724	-0.433	-3.775
	(-4.533)	(-0.164)	(-15.392)	(-1.023)	(-4.468)
	-2.58	*0.11*	*1.39*	*-0.29*	*-2.26*
Semi-skimmed	2.98	1.088	-0.139	3.366	2.219
	(-8.403)	(-2.216)	(-1.863)	(-22.353)	(-3.545)
	1.89	*0.52*	*-0.05*	*2.24*	*1.33*
Whole	-0.098	-1.444	-0.821	-0.293	4.954
	(-0.229)	(-4.154)	(-10.406)	(-1.839)	(-7.653)
	-0.062	*-0.693*	*-0.307*	*-0.195*	*2.959*
Regional origin	0.7	-0.312	0.693	1.306	0.885
	(-2.529)	(-0.786)	(-9.854)	(-8.567)	(-3.358)
	0.45	*-0.15*	*0.26*	*0.87*	*0.53*
National origin	0.74	-0.811	0.463	1.186	0.956
	(-2.765)	(-2.007)	(-5.475)	(-7.63)	(-3.588)
	0.47	*-0.39*	*0.17*	*0.79*	*0.57*
Price	-1.58	-2.084	-2.67	-1.506	-1.674
	(-2.468)	(-2.132)	(-15.444)	(-4.743)	(-3.193)
Supermarket	0.166	0.125	-0.072	0.513	-0.345
	-0.581	-0.237	(-0.752)	(-3.156)	(-1.176)
	0.11	*0.06*	*-0.03*	*0.34*	*-0.21*
Hypermarket	0.3	-0.582	-0.021	0.248	0.1603
	(-1.121)	(-1.309)	(-0.207)	(-1.562)	(-0.555)
	0.19	*-0.28*	*-0.01*	*0.16*	*0.1*
Discount	-0.277	0.038	0.071	-0.291	0.046
	(-0.92)	(-0.063)	(-0.648)	(-1.616)	(-0.175)
	-0.175	*0.018*	*0.027*	*-0.193*	*0.027*
Class prob. (%)	0.215	0.09	0.306	0.28	0.103
Constant	-2.771	-9.313	1.011	-0.465	Fixed
Perceived quality	0.873	2.217	0.02	0.373	Fixed
	(-1.567)	(-3.261)	(-0.058)	(-0.957)	-
Log likelihood	-2,194.56				
R-sqrd adj	0.312				
AIC	1.944				
BIC	2.1				

Table 5.
Latent Class Model and brand associations of Grifo Latte brand (UHT)

Variables	Class 1	Class 2	Class 3	Class 4	Class 5
Grifo brand	-1.051	4.395	-31.518	4.73	-2.473
	(-1.929)	(-5.544)	(-0.00)	(-18.479)	(-4.483)
	-0.64	*6.889*	-	-	*-2.311*
National brand	-2.021	0.354	0.928	4.677	-2.492
	(-3.597)	(-0.472)	(0.911.)	(-17.920)	(-4.339)
	1.23	*0.55*	-	-	*-2.33*
Private Label	-2.879	0.848	-33.332	4.389	-3.497
	(-4.953)	(-1.041)	(-0.00)	(-16.776)	(-6.224)
	-1.75	*1.33*	-	-	*-3.27*
Semi-skimmed	3.818	-0.919	1.37	0.495	1.249
	(-13.775)	(-4.126)	(-3.434)	(-6.749)	(-3.769)
	2.32	*-1.44*	-	-	*1.17*
Whole	-0.259	-2.235	-0.796	-0.518	3.365
	(-0.706)	(-8.441)	(-2.057)	(-6.845)	(-12.062)
	-0.158	*-3.503*	-	-	*3.145*
Regional origin	0.851	-0.162	0.331	0.921	0.915
	(-4.305)	(-0.648)	(-0.744)	(-12.947)	(-4.363)
	0.52	*-0.25*	-	-	*0.86*
National origin	0.848	-0.5441	-0.196	0.82	0.992
	(-4.519)	(-2.087)	(-0.389)	(-9.846)	(-4.649)
	0.52	*-0.85*	-	-	*0.93*
Price	-1.643	-0.638	-0.378	-3.044	-1.07
	(-3.825)	(-1.140)	(-0.466)	(-16.250)	(-2.526)
Supermarket	0.596	-0.094	0.14	-0.029	-0.008
	(-2.702)	(-0.286)	(-0.287)	(-0.315)	(-0.034)
	0.36	*-0.15*	-	-	*-0.01*
Hypermarket	0.456	-0.136	0.442	0.043	0.005
	(-2.2038)	(-0.483)	(-0.879)	(-0.438)	(-0.022)
	0.28	*-0.21*	-	-	*0*
Discount	0.13	-0.241	0.521	0.024	0.618
	(-0.539)	(-0.679)	(-0.989)	(-0.221)	(-2.875)
	0.079	*-0.378*	-	-	*0.578*
Class prob. (%)	0.362	0.117	0.066	0.325	0.15
Constant	0.561	-6.365	1.308	0.045	Fixed
Brand associations	0.111	1.39	-0.518	0.207	Fixed
	(-0.454)	(-2.654)	(-0.861)	(-0.861)	-
Log likelihood	-2,213.81				
R-sqrd adj	0.306				
AIC	1.96				
BIC	2.12				

In table 6 the results from LCM informed by loyalty indicators are reported. Unlike perceived quality and brand association, this last segmentation failed to provide evidence of a class with a clear preference for the local brand Grifo Latte: the first three classes prefer the “No buy option” while the last two prefer national brands of milk. Loyalty significantly affects the membership probability of all the estimated classes. In Class 1, where the loyalty has the highest influence on the membership probability, consumers prefer regional milk and are characterized by a counter-intuitive positive coefficient estimates for price. This result seems to confirm that consumers with a high level of loyalty towards Grifo Latte exhibit lower price sensitivity, as can be seen from the positive sign of its coefficient; furthermore, consumers with higher level of loyalty show an appreciation for regional origin of milk, which significantly affects their

choices[†††]. Nevertheless the influence of loyalty on price sensitivity and regional origin cannot be generalized to classes 2 and 3 as they show different preference patterns relative to these attributes, even though loyalty affects significantly their membership probability.

Table 6.
Latent Class Model and Grifo Latte loyalty (UHT)

Variables	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**
Grifo Latte brand	-1.049	-1.802	-0.224	4.781	-1.08
	(-1.358)	(-2.776)	(-0.482)	(-18.479)	(-2.989)
	-	*-1.054*	*-0.177*	*1.67*	*-0.403*
National brand	-5.719	-1.889	-1.066	5.03	0.864
	(-5.669)	(-2.834)	(-2.329)	(-18.698)	(-1,557)
	-	*-1.11*	*-0.84*	*1.76*	*0.32*
Private Label	-7.159	-3.222	-0.965	4.337	-1.027
	(-6.049)	(-4.769)	(-2.081)	(-16.415)	(-1.979)
	-	*-1.89*	*-0.76*	*1.51*	*-0.38*
Semi-skimmed	2.71	1.695	3.657	-0.143	2.362
	(-6.174)	(-3.966)	(-21.21)	(-1.843)	(-13.25)
	-	*0.99*	*2.88*	*-0.05*	*0.88*
Whole	-0.648	4.131	-0.121	-0.742	-1.511
	(-2.446)	(-10.483)	(-0.689)	(-9.033)	(-4.307)
	-	*2.417*	*-0.095*	*-0.26*	*-0.564*
Regional origin	0.633	0.745	1.366	0.675	1.086
	(-2.375)	(-3.131)	(-8.228)	(-9.664)	-5.461
	-	*0.44*	*1.08*	*0.236*	*0.41*
National origin	0.227	0.997	1.294	0.571	0.505
	(-0.776)	(-4.212)	(-7.622)	(-6.594)	(-2.238)
	-	*0.58*	*1.02*	*0.2*	*0.19*
Price	0.84	-1.709	-1.269	-2.863	-2.677
	(-1.474)	(-3.550)	(-3.667)	(-16.223)	(-5.864)
Supermarket	0.639	-0.167	0.42	-0.073	-0.242
	(-1.938)	(-0.637)	(-2.322)	(-0.744)	(-1.065)
	-	*-0.1*	*0.33*	*-0.03*	*-0.09*
Hypermarket	0.397	0.115	0.363	-0.041	0.434
	(-1.205)	(-0.455)	(-2.114)	(-0.388)	(-2.069)
	-	*0.07*	*0.29*	*-0.01*	*0.16*
Discount	-0.004	0.219	1.736	0.094	-0.073
	(-0.013)	(-0.932)	(-0.094)	(-0.854)	(-0.27)
	-	*0.128*	*1.368*	*0.033*	*-0.027*
Class prob. (%)	0.19	0.113	0.255	0.292	0.15
Constant	-8.775	-2.161	-0.794	-0.528	Fixed
Loyalty	2.788	0.927	0.706	0.649	Fixed
	(-5.855)	(-3.016)	(-2.700)	(-2.500)	-
Log likelihood	-2155.45				
R-sqrd adj	0.324				
AIC	1.91				
BIC	2.06				

[†††] We would speculate that class 1 includes consumers who are more loyal to Grifo Latte brand, considering that during the survey most consumers who have declared themselves to be more loyal to Grifo Latte brand, have been very selective in choosing the alternative they preferred among those that we proposed them. In most cases, these consumers have chosen the local brand only when the name of this brand was associated with a combination of fat content and origin that reflected the actual consumption habits, opting for the "No buy option" otherwise.

6 Final remarks

In this paper, results from a study based on Discrete Choice Modelling on the effect of some intrinsic attributes on choice of milk were reported. We applied Mixed Logit and Latent Class Models with the aim of capturing taste heterogeneity across consumers of UHT and fresh milk in regards to the attributes of fat content, origin, nutrient intake, price and point of sale.

The influence of a local brand on choice was addressed by applying Latent Class Model with the aim of verifying whether brand equity could be considered as a latent variable that influences class membership, determining preferences heterogeneity for some specific attributes. The classes estimated by LCL have shown differences in preferences related especially to brands and fat content. In both segments, the largest class prefers the local brand reflecting the real market share composition. Moreover, our results demonstrate a general appreciation for the cue of origin, either regional or national. The same specification indicates that some factors of brand equity were found to play a statistically significant role in explaining class membership, although this evidence cannot be extended to all brand equity factors and to both milk segments. In particular, when perceived quality and brand associations are included in the model, a class with a strong preference for local brand was found. Contrary to expectations, this class does not seem to get benefits from the indication about the regional origin of milk. Based on these results we can hypothesize that this class includes customers of local brand who have a good perception of the quality of local milk as well as familiarity with its packaging and logo, but, at the same time, used to associate the regional origin of milk to the name of local brand so much that the indication of origin does not affect their choice.

From the point of view of marketing managers, the survey results highlight that Grifo Latte represents the so-called *top-of-mind* brand in the category of milk, though wide differences still exist among consumers of the two Umbrian provinces. This evidence suggests constructing communication campaigns aimed at increasing the number of consumers who include the local brand among the brands of milk purchased (especially in the market of Terni) and, at the same time, to preserve its customer base from the competition (in the market of Perugia), thereby strengthening the perceived value of regional origin.

The general appreciation that emerges for the cue "regional origin" could be functional to this aim. Based on this appreciation the dairy cooperative's communication should continue to emphasize its relationship with the territory, in order to stress the environmental and social consequences related to local production. Furthermore, the appreciation of regional origin can justify brand extensions in other product categories belonging to local tradition, which can help to attract nonusers of the core product (Swaminathan, 2003).

In regards to the methodology employed, two further improvements can be identified. Following Hynes *et al.,* (2008), the first one consists of making milk attribute average estimates in the Mixed Logit Model conditional on brand equity factors with the aim of comparing the results from Mixed Logit with those already obtained by Latent Class Model.

The second improvement aims at estimating how individual WTP for regional origin varies according to several socio-economic characteristics in the context of Mixed Logit model. These results may provide insight to cooperative marketing managers into the socio-economic profile of consumers who are found to appreciate more the regional origin of milk as well as of those consumers who are more vulnerable to competitors' actions.

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Appendix

Table A1.
Estimates and Asymptotic t-values for Cholesky matrix in UHT milk dataset

	Grifo brand	National brand	Private Label	Semi-skimmed	Whole	Regional origin
Grifo brand	2.684	0	0	0	0	0
	(11.731)					
National brand	1.045	1.585	0	0	0	0
	(4.572)	(9.022)				
Private Label	-0.729	-2.562	0.803	0	0	0
	(-2.68)	(-15.281)	(5.601)			
Semi-skimmed	0.039	2.536	1.842	0.775	0	0
	(0.169)	(12.851)	(9.733)	(4.366)		
Whole	1.417	1.076	-1.332	-3.718	1.073	0
	(5.427)	(5.021)	(-6.258)	(-15.257)	(4.754)	
Regional origin	0.166	0.038	0.216	0.254	-0.714	0.362
	(0.909)	(0.278)	(1.420)	(1.757)	(-5.115)	(2.122)

Table A2.
Estimates and Asymptotic t-values for Cholesky matrix in fresh milk dataset

	Grifo brand	National brand	Private Label	Semi-skimmed	Whole	Regional origin	High quality
Grifo brand	1.044	0	0	0	0	0	0
	(2.361)						
National brand	4.323	3.069	0	0	0	0	0
	(6.831)	(6.536)					
Private Label	5.510	-0.101	0.800	0	0	0	0
	(8.272)	(-0.195)	(1.848)				
Semi-skimmed	-0.918	-0.293	-3.821	1.802	0	0	0
	(-2.565)	(-0.685)	(-7.155)	(4,856)			
Whole	-1.902	0.570	2.015	-1.162	1.758	0	0
	(-4.995)	(1.252)	(4.986)	(-3.906)	(5.260)		
Regional origin	0.010	-0.561	0.284	-0.662	0.620	0.279	0
	(0.030)	(-1.647)	(0.932)	(-1.765)	(1.757)	(0.614)	
High quality	0.141	-0.076	-0.215	-0.253	0.781	-0.282	1.027
	(0.415)	(-0.239)	(-0.667)	(-1.054)	(2.620)	(-1.267)	(4.689)