Drinking cheaply: the demand for basic wine in Italy

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Abstract. The wine market has evolved dramatically over the last three decades. The premium wine segment has expanded significantly to the detriment of basic wines. Nevertheless, in traditional wine producing and consuming countries, inexpensive wines still account for a large market share, both in volume and value. Marketing strategies for such wines are changing in an attempt to tap this increasingly crowded market segment. Despite its importance, the basic wine segment has not been studied in depth, and is often assumed to have no product differentiation. This paper tried to ascertain the existence of a possible degree of heterogeneity within non-premium wines and to measure, by means of elasticity computation, the relationships among categories of wines aggregated with criteria that go beyond price. A demand system (censored QAIDS) was estimated, using a statistically representative panel of 6,773 Italian households, to see to what extent, if any, substitution occurs in home consumption of basic wines, which is the main channel of distribution of inexpensive wines in Italy. Although price is an important lever in supply policies, our results also suggest the importance of packaging, such as carton as an alternative to glass.

Keywords: censored demand system; elasticity computation; Italian wine sector; basic wine; QAIDS.

JEL: Q13; D12; C34
1. Introduction

In the past three decades or so, the world wine market has experienced dramatic upheavals. One of the major changes has involved the structure of wine demand (Labys & Cohen, 2006; Hannin et al., 2010; Anderson and Nelgen, 2011). In the larger traditional producing and consuming countries, Italy and France, the annual per capita consumption of wine was, until the 1970s, higher than 100 litres (Corsi et al., 2004) while, in the last three decades, it has declined to between 50 and 40 litres (OIV, 2012). During the same time span in the United States the increase in the number of wine drinkers, combined with a higher per capita consumption, has pushed the aggregate national wine consumption to the same level as Italy and France. Indeed, while during the ’70s wine consumed in France and Italy accounted for 40% of world consumption, nowadays the two countries account for about 25% (Anderson & Nelgen, 2011).

In traditional producing and consuming countries the dramatic change in wine quantity consumed has been accompanied by major changes in consumption habits: from a necessary component in the daily diet to non-essential to a meal (Mäkelä et al., 2006). Consumption habits in traditional and new consuming countries are converging. Expensive wines have gained a considerable market share, becoming an accessible good no longer confined to a restricted elite of consumers (Ritchie, 2009). At the same time, less expensive wines are reaching a place in the market similar to that of other Fast-Moving Consumer Goods.

In order to have a clearer overview of the wine market, its characteristic high price range also deserves mention. This peculiarity has called for the development of commercial terminology to define different product categories based on specific price ranges. In the wine trade it is common to distinguish wines into two broad classes according to price category: non-premium, less expensive wines with basic quality characteristics; and premium, more expensive wines with complex quality characteristics and a high-value image (Anderson & Nelgen, 2011). In light of the absolute increase and relative importance of more expensive wines, a more detailed classification has been made in
the wine business, dividing premium wines into sub categories (Ernst and Young Entrepreneurs, 1999; Rabobank, 2003; Costanigro et al., 2007). Nevertheless, a pan-national segmentation of the wine market is complex and any estimation of the market share in each category, in aggregate terms or per country, is no trivial task (Steenkamp & Ter Hofstede, 2002). However, estimation has been attempted according to a three-category classification of wine supply for 2009: non-premium, commercial premium and superpremium (Anderson & Nelgen, 2011). Non-premium wines account for only one-seventh of the global wine trade in value (US$7 billion) but almost half in volume terms. It seems evident that non-premium wines represent a sizeable part in the world wine market. Together with the search for increasing value for products, this is one of the main reasons why suppliers are still hugely interested in the market for non-premium wines (Ritchie, 2009).

Despite the importance of non-premium wines, very few studies have specifically investigated this segment (Torrisi et al., 2006). One possible reason explaining this lack of coverage could be the presumption that, in a wine category with a narrow price range, there is almost perfect homogeneity due to wines with simple intrinsic attributes, little quality complexity, and hence not much differentiation. However, observation of the current supply shows a wide variety of products and various supplier’s marketing styles. Therefore, in-depth investigation of basic wine is of paramount importance to better understand how key parameters combine. A study is thus called for to explore the needs and motivations sustaining the demand for non-premium wines. Beside a large number of studies concerning the demand side on premium wines, or alcohol in general (Gallet, 2007; Davis et al., 2008; Gil & Molina, 2009; Panzone, 2012), the literature on demand for basic wines appears to be almost completely lacking. In this perspective, the objective of this paper is to ascertain the existence of a possible degree of heterogeneity within non-premium wines and to measure, by means of elasticity computation, the relationships among categories of wines aggregated with criteria that go beyond price.
Studies of non-expensive wines have to be country-specific for two reasons. First, markets for non-premium wines have average selling prices that differ because of different import tariffs and consumer taxes (Anderson & Nelgen, 2011); second, consumer product perception varies on a country by country basis (Mäkelä et al., 2006). The focus of this study was Italy. Together with France, Italy has the largest traditional wine consumption market, and the variety of strategies adopted by suppliers is one of the widest: suppliers seek to capture customer interests by looking at all intrinsic and extrinsic product attributes and working on communication and distribution (Bernetti et al., 2006). Although all these aspects of supply are important (Fraser, 2005; Amadieu & Viviani, 2011), pricing in a market with very small margins assumes great importance and the availability of appropriate information to support price fine-tuning is therefore crucial.

The empirical strategy adopted was based on two steps. The first consisted in collecting information directly interviewing key informants to delineate the driving factors of supply on Italian retail shelves. Such factors allowed us to classify wines within the non-premium category using wine business driven criteria (e.g. labelling, types of packaging, and price). The second step was to estimate a demand system on a statistically representative sample of Italian households provided by AC-Nielsen. Demand system estimates based on micro data may suffer several biases. The main risks come from the violation of theoretical regularity restrictions (Barnett & Serletis, 2008) and from sample selection bias due to only a fraction of the population that has nonzero consumption for the items under study. Our model explicitly avoids the latter drawback, estimating a two-step censored demand system (Shonkwiler & Yen, 1999) based on the quadratic AIDS (Banks et al., 1997).

2. The wine market in Italy

2.1 Essential data for the Italian wine sector

In order to illustrate the economic relevance of the overall Italian wine sector, a few essential figures are provided. Total Italian wine output has a value of nearly 8.2 billion euros: as a producer,
exporter and consumer, Italy is top of the world ranking. In 2011, Italian wine production was 44 million hectolitres, about 23 million of which was exported, for a value of 4.5 billion euros. Imports are rather small: in 2011 Italy imported about 2.3 million hectolitres, for a value of 300 million euros (Mediobanca, 2012)\(^v\).

Italian wine production represents about 15% of world supply in volume and 13% in value. Italian wine exports represent 24% of world exports in volume and 18% in value (Anderson & Nelgen, 2011; OIV, 2012). Considering only non-premium wines Italy contributes, in value terms, about 18% to global supply and 16% to world export; such percentages demonstrate to what extent the Italian wine industry has invested in the non-premium wine business.

Domestic consumption accounts for about 23 million hectolitres consumed by a substantial wine-drinking population, representing 54% of Italy’s total population (ISTAT, 2011; OIV, 2012). Wine purchased for at-home drinking (WAH) accounts for the largest slice of the wine market: about 70% of the total consumption in volume, and 30% in expenditure. WAH is supplied by many channels but the most important, in terms of volume, are the supermarket chains which sell about 70% of wine (Mediobanca, 2011; Pomarici et al., 2012). The remaining percentage is purchased in neighbourhood grocery stores and wine shops, while direct purchase at wineries occurs especially in rural areas. The difference between the consumption figures in volume (70%) and in value (30%) highlights the extent to which cheap wine consumption is concentrated at home.

### 2.2 Data description and categorization of WAH consumption of wine in Italy

Wine for at-home drinking can be investigated using scanner data from consumer panels. The data used in this study were provided by the AC-Nielsen home scan, a statistically representative panel of Italian households. Households involved in the Nielsen panel regularly record their purchases through a scanner (ConsumerScan). The data analysed thus consist of household wine expenditure at grocery stores (including neighbourhood and specialized grocery stores, convenience stores, small and large retail outlets), and are representative of Italian consumption of WAH\(^vi\). The
information collected concerns value (euro), volume (litres) and the main extrinsic attributes of WAH purchases made by 6,773 Italian households (for a total of 71,760 purchases of 6,251 different types of wines from 956 wine producers) during 2010 (from January to December). The 6,251 types of wines recorded in the AC-Nielsen database need to be aggregated in fewer categories. However, any aggregation of wines belonging to the non-premium wines needs the criteria to be identified as objectively as possible. This applies even more if one considers that this segment is of great complexity due, for example, to a broad variety of brands, packaging, production areas, possible origin labels and grape variety certifications. Nevertheless, the literature contains no indication on non-premium wine categorization. Our study attempts to identify criteria for aggregating non-premium wines which allow homogeneous categories to be obtained. The empirical approach used was to proceed according to the same principles with which the supply of more economical wines is structured on the shelves of large retailers, which is the main site of purchase of packaged economical wines. Interviews were carried out with wine marketing experts. The sales director of *Gruppo Italiano Vini S.p.A.* (top Italian group by sales) and the director of commercial relations with large retailers at *Marchesi dè Frescobaldi* (one of the top 15 companies in Italy by turnover) were involved in an in-depth semi-structured interview in autumn 2011. The interviews, carried out individually with each of the two interviewees, were preceded by sending out the subject of the interview. On the basis of the interview results we developed an aggregation scheme of the single non-premium products sold in Italy. The results of this scheme were submitted to a third expert for final verification, director of the *Gruppo CEVICO* of relations with large distributors (Cevico is one of the top 15 Italian companies by turnover). The results can be summarized as follows. Key informants indicated the threshold that defines non-premium wines as 3 euro/litre\textsuperscript{vii}. Starting from this information, the distribution of WAH consumption by price, divided into non-premium and premium, from AC-Nielsen home scan data, is shown in table 1. Wine sold under 3 euro/litre represents nearly 60% of the total value and about two-thirds of the total volume\textsuperscript{viii}. 
Table 1. Premium and non-premium Italian distribution of wines

<table>
<thead>
<tr>
<th>Price classes (€/litre)</th>
<th>Share on expenditure (%)</th>
<th>Share on volume (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-premium wines (&lt;3 euro)</td>
<td>58</td>
<td>67</td>
</tr>
<tr>
<td>Premium wines (&gt;3 euro)</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: authors’ calculations based on data from A.C Nielsen (2010)

In addition, the key informants all agreed that the critical factors behind the diversification of the supply of non-premium wines on the shelves are as follows: (i) packaging; (ii) branding; (iii) price. Packaging is currently an element of supply diversification as it is the field where many producers have explored the way to add value to wine with significant innovations able to improve the service delivered to the client and, at times, perception of sustainability. Such innovations have concerned the material of containers, mainly introducing the carton, as an alternative to glass bottles. As for the branding criterion, the key informants all agreed that a shelf must contain the market leader and the private labels, together with a set of wines with only locally recognizable brands. Concerning the third criterion, the shelf is formed to cover all price ranges in order to give any consumer the possibility of choosing a product based on his/her own preferences/budget. In particular, the range has to contain wines with a unit price ranging from 2 to 3 euro/litre, with characteristics that emulate premium wines, and wines with a unit price below 2 euro/litre, which typically have the profile of convenience products. The supply of non-premium wines on the shelves also appears diversified for other elements such as wine colour and certification category (e.g. Denomination of Controlled Origin or DOC, and Typical Geographic Indication or IGT). However, these elements were not indicated by the experts as being major factors in forming the assortment of wines.
has to be matched with, or confirmed by, the actual consumption data available in the AC-Nielsen dataset. Among the set of types/levels, the one that has to be explicitly identified in the AC-Nielsen dataset is the market leader. According to the market share in volume, Caviro can doubtless be considered the market leader with the highest market share in volume terms (12.5%); all other competitors show a market share lower than 1.51% (Table 2). Caviro mainly promotes two brands, Tavernello and Castellino, both sold in cartons, with an intense pull strategy, using TV and media advertising extensively. The main theme in advertising is the integrity and safety of the wine as a result of strict controls over every link in the supply chain, from vineyard management and winemaking through packaging and marketing, ensuring consistent quality throughout the entire process.

Table 2. Top four firms of the Italian wine-at-home market

<table>
<thead>
<tr>
<th>Wine brand</th>
<th>Market share in volume (%)</th>
<th>Mean price (€/litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caviro</td>
<td>12.48</td>
<td>1.42</td>
</tr>
<tr>
<td>Conad</td>
<td>1.51</td>
<td>1.39</td>
</tr>
<tr>
<td>Soldo</td>
<td>1.41</td>
<td>1.48</td>
</tr>
<tr>
<td>San Matteo</td>
<td>1.32</td>
<td>1.58</td>
</tr>
</tbody>
</table>

Source: authors’ calculations based on data from A.C. Nielsen (2010)

Private labels are those supplied by using the names of big distribution chains. The number of private labels available in the Nielsen database is 30, and the brands with the highest market share are Conad, Carrefour, COOP, GS, and LD. The 30 private labelled wines account for 7.89% in terms of market share (in volume terms) and are sold at an average price of 0.98 euro/litre, mainly in carton packaging. A summary of statistics from the AC-Nielsen dataset, organized by criteria
suggested by experts, is shown in table 3. Some categories of wines are represented in small
percentages. The criterion used to aggregate products was to consider, as a single category, those
products represented in at least 2% in terms of market share (in volume terms). Those categories
below that threshold were aggregated into the neighbouring category.

Tab. 3 - Summary statistics of wines organized by experts’
suggested criteria (volume %)

<table>
<thead>
<tr>
<th>Price categories (€/litre)</th>
<th>&lt; 2</th>
<th>2 &lt; .&lt; 3</th>
<th>&gt; 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARTON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caviro*</td>
<td>11.79</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Private Label</td>
<td>6.08</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>14.86</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>GLASS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caviro*</td>
<td>0.69</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Private Label</td>
<td>1.81</td>
<td>0.20</td>
<td>0.60</td>
</tr>
<tr>
<td>Other</td>
<td>24.10</td>
<td>12.64</td>
<td>27.19</td>
</tr>
<tr>
<td>Total</td>
<td>59.33</td>
<td>12.86</td>
<td>27.81</td>
</tr>
</tbody>
</table>

Source: authors’ calculations based on data from AC-Nielsen (2010)
* Caviro is the market leader that sells wines almost exclusively in carton packaging

From the merging of information collected from experts and the Nielsen data we aggregated the
products into categories. The outcome is an ex-ante categorization of the non-premium wine
market. The whole set of wines contained in the AC-Nielsen dataset was therefore subdivided into
six categories. Thus the WAH market becomes divided into the following categories:

wines sold in carton at an average price below 2 euro/litre:
- Market Leader (ML): Caviro wines;
- Private Labels (PL): private label brand wines;
- Other wines in Cartons (OC): wines with no specific or recognisable brand;

wines sold in glass (bottle of 0.75 litre), one for each of the price categories:
- Other wines below 2 euro/litre (BG: Basic Glass);
- Other wines between 2 and 3 euro/litre (TB: Top Basic);
- Other wines over 3 euro/litre (PW: Premium wines).

This categorization permits analysis of brand-specific relationships among basic wines while jointly evaluating the role of packaging and price. Table 4 provides volumes (litres) and expenditure (euro) of wine as grouped according to the above market categorization.

### Table 4. Consumption, expenditure share and purchase frequency by wine category

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean expenditure (%)</th>
<th>Household purch (%)</th>
<th>Mean litre consumption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Leader (ML)</td>
<td>12</td>
<td>32</td>
<td>14</td>
</tr>
<tr>
<td>Private Label (PL)</td>
<td>6</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>Other wines carton (OC)</td>
<td>12</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>Other wines glass below 2 € (BG)</td>
<td>16</td>
<td>41</td>
<td>18</td>
</tr>
<tr>
<td>Other wines glass between 2 and 3 € (TB)</td>
<td>12</td>
<td>40</td>
<td>12</td>
</tr>
<tr>
<td>Premium wines over 3 € (PW)</td>
<td>42</td>
<td>61</td>
<td>33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: authors’ calculations based on data from A.C. Nielsen (2010)

### 3. Empirical model specification

In this section we present the empirical model adopted to estimate the demand system. A Quadratic Almost Ideal Demand System (QAIDS) was implemented. The use of a model allowing a more general Engel curve shape than the popular Almost Ideal Demand System (AIDS) of Deaton & Muellbauer (1980) was required. The reasons are well rooted in the literature. In particular,
Banks et al. (1997) show that the demand for some goods, particularly alcohol and clothing, has a quadratic relationship with the logarithm of total expenditure at higher income levels. For the above reason, they propose a quadratic logarithmic expenditure share system (QUAIDS), directly derived from the AIDS. This specification is spreading rapidly and was used, for example, by Moro and Sckokai (2000) to estimate food expenditure in Italy, and by Blundell and Robin (1999) and Fisher et al. (2001) to estimate food consumption in, respectively, the UK and USA.

The QUAIDS stochastic representation of the system of equations for the budget share $w_i$ of the $i$th good (wine) is as follows:

$$w_i = \alpha_{i,+} + \sum_{j=1}^{J} \gamma_{ij} \ln P_j + \beta_i \ln \left( \frac{m}{a(p)} \right) + \frac{\lambda_i}{b(p)} \left( \ln \left( \frac{m}{a(p)} \right) \right)^2 + u_i \quad \forall i = 1, \ldots, I$$

where $\alpha_{i,+}$ is the intercept of the model expressed as a linear function of some socio-economic and demographic attributes (residence, age, income class). It serves to assess the potential differences in household preferences and behaviour (Deaton and Muellbauer, 1980):

$$\alpha_{i,+} = a_i + \sum_{k=1}^{K} \delta_{i,k} D_k \quad \forall i = 1, \ldots, I$$

where $\delta_{i,k}$ represents the contribution of the $k$-th characteristics of the households on the intercept of the $i$-th equation representing a category of wine.

$\gamma_{ij}$ are the parameters to be estimated of prices $P_j$ related to the $j$-th good (wine). $\beta_i$ are the total expenditure ($m$) parameters to be estimated, while $\lambda_i$ represent the quadratic terms of expenditure.

$\ln a(p)$ has the translog form:

$$\ln a(p) = \alpha_0 + \sum_{i=1}^{I} \alpha_{i,+} \ln P_i + \frac{1}{2} \sum_{i=1}^{I} \sum_{j=1}^{J} \gamma_{ij} \ln P_i \ln P_j$$

$b(p)$ is the Cobb-Douglas price aggregator:

$$b(p) = \prod_{i=1}^{n} P_i^{\beta_i}$$
Finally, $u_i$ are the error terms.

Information on prices paid by each household for the $i$-th wine is provided through unit values (€/litre) in order to generate a volume-weighted average of the category price. As suggested by Deaton and Zaidi (2002), the unavailable prices due to household non-consumption of the listed category were imputed by the median of the reported price by the purchasers, differentiating the value per region of residence and the household’s income class.

Due to incomplete information of household consumption and budget allocation in the data generating process (DGP), a consumer multi-stage budgeting process was considered. It implies home consumption of wine as strictly separable from the demand for other goods. This hypothesis justifies the exclusion of expenditure on other goods for which data are not fully available. The assumption is reasonable if the estimation objectives are restricted to understanding consumption substitutability in the same food category: in this case it is non-premium wines.

From an empirical point of view, according to the established consensus, demand system estimates based on household cross-sectional data can be cumbersome on several grounds. One of these is that household consumption variables are censored at zero. In demand studies using cross-sectional micro-data the zero-food consumption problem is a frequent issue; only a subset of households shows a positive consumption for the $i$-th good (wine) during the selected observation period. In the investigated wine demand system, percentages of zero-food consumption (censoring) are substantial: Private Label wines are consumed by 22% of households, Other Wines over 3 €/litre by 61%. Since the seminal work of Heien and Wessels (1990), several empirical procedures for censored data have been developed such as those suggested by Perali and Chavas (2000), Golan et al. (2001) and Shonkwiler and Yen (1999). The latter approach is that commonly used in the literature (Akbay et al., 2007). Shonkwiler and Yen (1999) modelled zero-food consumption for a demand system of $J$ equations as below:
\[ w_i^* = w_i(p, m; \Gamma_i)\Phi_i(z\theta_i) + \tau_i\phi_i(z\theta_i) + \epsilon_i \quad \forall i = 1, \ldots, I \]  

(5)

and

\[ e_i = u_i + w_i(p, m; \Gamma_i) \left[ \phi_i(z\theta_i) - \Phi_i(z\theta_i) \right] \]

\[ + \tau_i \left[ \phi_i(z\theta_i) - \phi_i(z\hat{\theta}_i) \right] \quad \forall i = 1, \ldots, I \]

(6)

where \( \Gamma_i \) is a vector containing system demand parameters, \( z \) is a vector of exogenous variables, \( \theta \) is a conformable vector of parameters, \( \phi_i(z\hat{\theta}_i) \) and \( \Phi_i(z\hat{\theta}_i) \) are the probability density function (PDF) and the cumulative distribution function (CDF), respectively. Estimation of equation 5 can be performed in two steps, where in the first step the maximum-likelihood probit estimates of \( \phi_i(z\hat{\theta}_i) \) and \( \Phi_i(z\hat{\theta}_i) \) are obtained using equation 7:

\[ y^* = (z\theta_i + \nu_i) \quad \forall i = 1, \ldots, I \]

(7)

with \( \nu_i \) the random errors and

\[ y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad \forall i = 1, \ldots, I \]

(8)

and then estimating \( \Gamma_i \) and \( \tau_i \) in the augmented system where

\[ w_i^* = y_i w_i \quad \forall i = 1, \ldots, I \]

(9)

Equation 1 therefore becomes:

\[ y_i w_i = \left[ \alpha_i + \sum_{j=1}^{J} \gamma_{ij} \ln P_j + \beta_i \ln \left( \frac{m}{a(p)} \right) + \frac{\lambda_i}{b(p)} \left[ \ln \left( \frac{m}{a(p)} \right) \right]^2 \right] \Phi_i(z\theta_i) + \tau_i\phi_i(z\theta_i) + \epsilon_i \quad \forall i = 1, \ldots, I \]

(10)

To estimate the above system of \( I \) equations, a non-linear Feasible Generalized Least Square (FGLS) (Davidson & MacKinnon, 2004) estimating technique was followed, following the recommendations of Tauchmann (2005): it efficiently manages the heteroskedasticity introduced in the model estimate by the error term when using Shonkwiler and Yen’s (1999) approach. For the
same reason, as in the single-equation case due to the downward bias of the population variance, standard errors were calculated by using the bootstrap method. Only socio-economic and demographic characteristics were included among the explanatory variables $z$ in the selection equations (eq. 7), as suggested by Yen and Lin (2006).

The economic theory provides a set of restrictions that are known as homogeneity, adding-up and symmetry. The symmetry and homogeneity conditions are respectively imposed by:

$$\gamma_{ij} = \gamma_{ji} \quad \forall \ i,j=1,\ldots, I;$$  \hspace{1cm} (11) \\
and

$$\sum_{j} \gamma_{ij} = 0 \quad \forall \ i,j=1,\ldots, I.$$  \hspace{1cm} (12)

Using the above specifications, the maximum-likelihood estimation of variance-covariance matrix of the residuals is not singular (determinant not equal to zero). Therefore the adding-up condition is not \textit{a-priori} imposed by the share format of demand systems as usually happens. Estimation of the complete system (without the deletion of an equation) was performed (Drichoutis \textit{et al.}, 2008).

4. Empirical results

The complete list of explanatory variables included in the demand system is reported in table 5. The average prices of wine categories have a limited variability (SD), expecting a considerable degree of substitutability or complementarity among wines of different categories, except for the Other Wines category insofar as it contains wines at over 3 euros/litre. The presence of the latter category in the model, though lying outside the specific objectives in this paper, ensures a higher degree of completeness in representing the demand system. In the model the purchasers are characterised by means of some socioeconomic variables ($\delta_{i,k:1999}$) directly obtained from information contained in the database used (income classes, age classes, place of residence) and behavioural variables constructed \textit{ad hoc} (tendency to purchase in discount stores and to purchase red wines, wines from the region of residency and certification of origin wines). These are important elements that directly
or indirectly reflect different consumption habits. Their introduction in the model thus allows the heterogeneity of wine purchasers to be represented in the analysis.

Table 5. Description of variables used in the food demand system

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma_{i,j:ML}$</td>
<td>Price of Market Leader (ML)</td>
<td>1.42</td>
<td>0.14</td>
</tr>
<tr>
<td>$\gamma_{i,j:PL}$</td>
<td>Price of Private Label (PL)</td>
<td>0.98</td>
<td>0.16</td>
</tr>
<tr>
<td>$\gamma_{i,j:OC}$</td>
<td>Price of Other Wines Carton (OC)</td>
<td>1.03</td>
<td>0.27</td>
</tr>
<tr>
<td>$\gamma_{i,j:BG}$</td>
<td>Price of Other Wines basic glass (BG)</td>
<td>1.59</td>
<td>0.40</td>
</tr>
<tr>
<td>$\gamma_{i,j:TB}$</td>
<td>Price of Other Wines top basic glass (TB)</td>
<td>2.47</td>
<td>0.36</td>
</tr>
<tr>
<td>$\gamma_{i,j:PW}$</td>
<td>Price of Premium Wines over €3 (PW)</td>
<td>5.22</td>
<td>2.00</td>
</tr>
<tr>
<td>$\beta_i$</td>
<td>Total wine expenditure of the household (€/year)</td>
<td>67.36</td>
<td>112.36</td>
</tr>
<tr>
<td>$\delta_{i,k:1}$</td>
<td>Share of household purchases in “discount” stores</td>
<td>0.10</td>
<td>0.25</td>
</tr>
<tr>
<td>$\delta_{i,k:2}$</td>
<td>Share of household purchases for local wine</td>
<td>0.25</td>
<td>0.32</td>
</tr>
<tr>
<td>$\delta_{i,k:3}$</td>
<td>Income class (1 low – 4 high)</td>
<td>2.51</td>
<td>0.98</td>
</tr>
<tr>
<td>$\delta_{i,k:4}$</td>
<td>Age class of the household head (1 young – 5 old)</td>
<td>3.09</td>
<td>1.21</td>
</tr>
<tr>
<td>$\delta_{i,k:5}$</td>
<td>1 if the household lives in North-East Italy</td>
<td>0.19</td>
<td>0.39</td>
</tr>
<tr>
<td>$\delta_{i,k:6}$</td>
<td>1 if the household lives in Southern Italy</td>
<td>0.28</td>
<td>0.45</td>
</tr>
<tr>
<td>$\delta_{i,k:7}$</td>
<td>1 if the household lives in North-West Italy</td>
<td>0.30</td>
<td>0.46</td>
</tr>
<tr>
<td>$\delta_{i,k:8}$</td>
<td>Share of household purchases for “red wine”</td>
<td>0.50</td>
<td>0.37</td>
</tr>
<tr>
<td>$\delta_{i,k:9}$</td>
<td>Share of household purchases for certificated wine</td>
<td>0.36</td>
<td>0.36</td>
</tr>
</tbody>
</table>

The demand model estimation results are shown in Table 6. Starting from the bottom of the table, coefficients $\tau_i$ and $\lambda_i$ are respectively the probability density function estimated parameter and quadratic component of equation (10) estimated parameter.
Table 6. Demand system parameter estimation and \(t\)-ratios

<table>
<thead>
<tr>
<th>(i,j):</th>
<th>Market Leader</th>
<th>Private Label</th>
<th>Other Wines Carton</th>
<th>Other wines Basic Glass</th>
<th>Other wines Top B. Glass</th>
<th>Premium wines over 3€</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\alpha_i)</td>
<td>0.872</td>
<td>9.80</td>
<td>0.058</td>
<td>-1.784</td>
<td>-8.44</td>
<td>0.177</td>
</tr>
<tr>
<td>(\gamma_{i,j:ML})</td>
<td>-1.352</td>
<td>-4.99</td>
<td>0.231</td>
<td>2.87</td>
<td>-0.069</td>
<td>-3.75</td>
</tr>
<tr>
<td>(\gamma_{i,j:PL})</td>
<td>0.338</td>
<td>12.36</td>
<td>-0.154</td>
<td>-5.11</td>
<td>0.038</td>
<td>1.72</td>
</tr>
<tr>
<td>(\gamma_{i,j:OC})</td>
<td>0.369</td>
<td>2.81</td>
<td>0.127</td>
<td>8.00</td>
<td>-0.007</td>
<td>-0.41</td>
</tr>
<tr>
<td>(\gamma_{i,j:BG})</td>
<td>0.588</td>
<td>4.59</td>
<td>0.017</td>
<td>0.81</td>
<td>-0.247</td>
<td>-9.71</td>
</tr>
<tr>
<td>(\gamma_{i,j:TB})</td>
<td>-0.175</td>
<td>-25.89</td>
<td>-0.152</td>
<td>-1.72</td>
<td>0.032</td>
<td>-10.29</td>
</tr>
<tr>
<td>(\beta_i)</td>
<td>-0.028</td>
<td>-1.65</td>
<td>0.099</td>
<td>7.98</td>
<td>-0.222</td>
<td>-7.54</td>
</tr>
<tr>
<td>(\delta_{h,k:1})</td>
<td>-0.102</td>
<td>-1.81</td>
<td>0.101</td>
<td>2.37</td>
<td>-0.093</td>
<td>-1.93</td>
</tr>
<tr>
<td>(\delta_{h,k:2})</td>
<td>0.142</td>
<td>4.48</td>
<td>0.028</td>
<td>1.11</td>
<td>-1.176</td>
<td>-14.43</td>
</tr>
<tr>
<td>(\delta_{h,k:3})</td>
<td>0.030</td>
<td>3.18</td>
<td>-0.028</td>
<td>-3.35</td>
<td>-0.078</td>
<td>-5.69</td>
</tr>
<tr>
<td>(\delta_{h,k:4})</td>
<td>-0.044</td>
<td>-6.27</td>
<td>0.010</td>
<td>1.34</td>
<td>0.062</td>
<td>5.27</td>
</tr>
<tr>
<td>(\delta_{h,k:5})</td>
<td>0.151</td>
<td>5.10</td>
<td>-0.030</td>
<td>-0.95</td>
<td>-0.048</td>
<td>-1.29</td>
</tr>
<tr>
<td>(\delta_{h,k:6})</td>
<td>0.125</td>
<td>4.53</td>
<td>0.056</td>
<td>3.06</td>
<td>0.065</td>
<td>2.07</td>
</tr>
<tr>
<td>(\delta_{h,k:7})</td>
<td>-0.002</td>
<td>-0.11</td>
<td>-0.003</td>
<td>-0.17</td>
<td>-0.049</td>
<td>-1.51</td>
</tr>
<tr>
<td>(\delta_{h,k:8})</td>
<td>-0.101</td>
<td>-3.55</td>
<td>0.104</td>
<td>2.65</td>
<td>-0.170</td>
<td>-4.75</td>
</tr>
<tr>
<td>(\delta_{h,k:9})</td>
<td>0.223</td>
<td>2.28</td>
<td>-0.278</td>
<td>-8.14</td>
<td>-1.858</td>
<td>-12.22</td>
</tr>
<tr>
<td>(\lambda_i)</td>
<td>0.002</td>
<td>0.61</td>
<td>-0.013</td>
<td>-5.42</td>
<td>0.044</td>
<td>8.11</td>
</tr>
<tr>
<td>(\tau_i)</td>
<td>-0.081</td>
<td>-1.11</td>
<td>0.068</td>
<td>1.45</td>
<td>0.000</td>
<td>0.01</td>
</tr>
</tbody>
</table>
As for the latter, the statistical significance of the coefficient in five equations over six implemented confirms the appropriateness of a quadratic form of the demand system. Coefficients $\delta_{i,k}$ represent socio-demographic characteristics. They show the major importance of socio-demographics proved by the level of significance reached for the most part. From the sign of the estimated parameters we may also make an initial inference on the average consumer profile for each category of wine analysed. As regards the Market Leader wine (coefficients $\delta_{ML,k:1-9}$ reported in the first column to the left in table 6), it may be inferred that the typical consumer in this wine category is someone who has a low purchasing share at discount stores ($\delta_{ML,k:1} = -0.102$), who prefers regional wines ($\delta_{ML,k:2} = 0.142$), who tends to be in a higher income class ($\delta_{ML,k:3} = 0.030$), is younger ($\delta_{ML,k:4} = -0.044$), resides in north-east or southern Italy ($\delta_{ML,k:5} = 0.151$ and $\delta_{ML,k:6} = 0.125$), who prefers white wine ($\delta_{ML,k:8} = -0.101$), and who prefers certified wines ($\delta_{ML,k:9} = 0.223$). It is also worth pointing out the estimated coefficients of the variables “income class” ($\delta_{i,k:3}$) and “age class of the household head” ($\delta_{i,k:4}$) for the categories “Market Leader (ML)” and “Premium Wines over 3€ (PW)”. As regards the former ($\delta_{i,k:3}$) the sign is positive ($\delta_{ML,k:3} = 0.030$ and $\delta_{PW,k:3} = 0.003$) while it is negative for all the other wine categories. For the latter ($\delta_{i,k:4}$) the sign is negative (respectively $\delta_{ML,k:4} = -0.044$ and $\delta_{PW,k:4} = -0.010$) while it is positive for all the other categories. This allows us to state that the market leader (Cavirio), which invests significantly in marketing, and wines with a higher price than 3 euro/litre (PW) attract the same consumer type, who can be depicted as younger with a higher disposable income, geared to the purchase also of wines in a higher price bracket.

The effect of prices will be discussed after calculation of elasticities. From estimating the parameters of prices ($\gamma_{i,j}$) and expenditure ($\beta_i$) of equation (10) we obtained Marshallian elasticity values for prices (direct $\eta_{i,j}$ and cross $\eta_{i,j}$) using the procedure suggested by Yen et al. (2002):

$$\eta_{i,j} = \frac{\partial W_i}{\partial P_j} \Phi_i \left( z_i \hat{\theta} \right) / W_i - 1$$

(13)
The elasticities thus calculated are reported in table 7, where along the row we may read the effect on the quantity consumed of the $i$-th wine category of the change in price of the $j$-th wine represented in the column. The directly estimated elasticities reported along the main diagonal of the table show that demand for each of the six product categories considered in the analysis reacts to price variations in a different way, albeit within a limited range for all categories varying from -1.18 to -1.50. The only exception is the “Other Wines Carton (OC)”, a category which, with a value of -3.04, describes a particularly elastic behaviour of demand. At the same time, one product category –Market Leader– has a fairly low elasticity.

These differences show the effectiveness of being a market leader, which ensures a lower degree of vulnerability to price variations. The marketing implemented by Caviro is also effective with regard to basic wines sold in glass bottles (both BG and TB), although the latter benefit from a higher degree of market penetration (Tab. 4). The cross elasticities, in turn, show a very complex picture of substitution trends with rare cases of reciprocity. Brand cartons (Market Leader and Private Label) and non-brand cartons (Other Wine Cartons, OC) show a fairly differentiated demand behaviour in terms of substitution. Brand cartons are substituted by wine in glass: the Market Leader is substituted by more costly wines (PW), even if the opposite does not hold at the same magnitude; Private Label wines tend to be substituted mainly by top basic glass bottles (TB), also in this case without reciprocity. Other Wine Cartons (OC), whose demand is very price-sensitive, have various (fairly high) coefficients of cross elasticity, although the most frequent substitution is with Private Label wines. Basic Wines in glass bottles (BG) tend to be substituted mainly by Private Label wines (PL) - in this case one of the few cases of reciprocity occurs – or by more costly wines in glass bottles (PW).
Table 7. Price elasticities

<table>
<thead>
<tr>
<th></th>
<th>ML</th>
<th>PL</th>
<th>OC</th>
<th>BG</th>
<th>TB</th>
<th>PW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Leader (ML)</td>
<td>-1.18**</td>
<td>-0.05**</td>
<td>-0.24***</td>
<td>0.10*</td>
<td>-0.29*</td>
<td>0.60**</td>
</tr>
<tr>
<td>Private Label (PL)</td>
<td>-0.27**</td>
<td>-1.44***</td>
<td>0.18***</td>
<td>0.31***</td>
<td>0.94</td>
<td>-0.41</td>
</tr>
<tr>
<td>Other W. Carton (OC)</td>
<td>0.54***</td>
<td>1.92***</td>
<td>-3.04*</td>
<td>0.79</td>
<td>1.78</td>
<td>-2.13***</td>
</tr>
<tr>
<td>Other W. Basic Glass (BG)</td>
<td>0.13*</td>
<td>0.30**</td>
<td>-0.06</td>
<td>-1.38*</td>
<td>-0.20***</td>
<td>0.34***</td>
</tr>
<tr>
<td>Other W. Top Basic Glass (TB)</td>
<td>0.33*</td>
<td>0.04</td>
<td>0.39</td>
<td>0.18</td>
<td>-1.50**</td>
<td>-0.57*</td>
</tr>
<tr>
<td>Premium Wines over 3€ (PW)</td>
<td>0.13***</td>
<td>0.29*</td>
<td>0.02***</td>
<td>0.05***</td>
<td>-0.06***</td>
<td>-1.37***</td>
</tr>
</tbody>
</table>

The elasticities in the jth column indicate the change in the demand for all i goods as the jth good’s price changes.

Bootstrap estimate of the significance level: * p<0.10; **p<0.05; ***p<0.01

Top basic glass (TB) wines tend to be substituted by Market Leader (ML) or by non-brand cartons (OC), there being another example of reciprocity. Lastly, Premium wines (PW) show a moderate tendency to be substituted by all the other cheaper wines, with the exception of TB. Moreover, such wines tend to substitute only two product categories and are overall a rather isolated category.

5. Concluding remarks

The aim of this paper was to investigate the domestic consumption of wine, with the focus on non-premium wines. In order to do so, a censored demand system (QAIDS) was estimated using AC-Nielsen homescan data, statistically representative of Italian households in year 2010. Moreover, categorization of non-premium wines was necessary in order to synthesize a wide range of wines in fewer categories. It emerged that the market for non-premium wines, apparently showing thousands of products, can be aggregated into five categories. The results show a complex picture in which there emerge important specific details in the demand behaviour towards the various categories considered. Hence, some important considerations may also be inferred on the strategies to be implemented with a view to consolidating demand-supply relations and on the
possible evolution of the market for basic wines. Another result of our analysis worth noting concerns the categorization of basic wines proposed. As argued in section two, there is no single categorization of non-premium wines available.

Our empirical strategy was to interview some key informants of the Italian wine sector who described how the supply of wines takes place in the Italy’s big retail chains. Consumption data provided by AC-Nielsen was managed to fit that picture on the consumption side. The statistically significant level of almost all coefficients estimated by means of the demand system confirms that the categorization implemented seems to capture the key elements of that particular market side. We may thus confirm what was stated in the first part of the paper: the market for cheaper wines is complex and products, categorized as proposed, show a significant degree of heterogeneity.

Besides confirming our underlying hypothesis, the results obtained show a complex picture of the relations between the categories used in the analysis. Particular elements may be found which allow hypotheses to be postulated on the functioning of the market in the period in question and on its possible evolution. The most salient elements are low elasticities for carton wine of the market leader (ML) and high elasticity of non-brand wine in cartons (OC). Albeit with the necessary caution, on the basis of the results it may be stated that, also in the segment of more economical wines, brand is an effective instrument of diversification. The brand effect, though to a lesser extent, is also recognised in private label carton wines which, proposed with a similar price to that of carton wines without a recognisable brand, have a much lower elasticity than the latter. The high elasticity of products in cartons without a recognisable brand not only sustains the hypothesis of brand importance but also envisages the evolutionary dynamics of the market for non-premium wines which could be most accentuated, with a reduction in unbranded products and expansion of the weight and number of branded products. Examination of the cross elasticities allows further reflection on carton wine of the market leader and that with private label. The data show that as the price of the market leader grows, purchase of this product declines in favour of the premium wine;
as the price of private label wine, purchases are shifted towards other basic products, except for the
market leader carton. The two branded wines in the carton are not substitutable.

Hypothesising on the evolution of the market size for more economical wines, it may be noted that
only for two categories, the carton wine of the market leader and basic wine in glass, is a tendency
shown to shift purchases towards premium wines. Indeed, most of the substitutions of purchases
seem to remain within the circle of non-premium wines. Taken together, the results of our
investigation clearly indicate that the market for non-premium wines is complex. Although non-
premium wines may be considered convenience products, their supply shows well-defined
structuring. This encourages the launching of further studies, including those on the demand
structure, in line with that presented in this paper. New studies will require that the categorisation of
non-premium wines implemented herein be verified. In this sense, the experience of professionals
operating in the supply chain of non-premium wines is undoubtedly essential. This approach could,
however, be supplemented by surveys of consumers in order to analyse directly how the great
variety of the supply of non-premium wines is viewed and perceived.

References

Review of Agricultural Economics*, 34, 209-231.


The University of Adelaide press, Adelaide.

Banks, J., Blundell, R. and Lewbel, A. (1997). Quadratic Engel curves and consumer demand,

Econometrics*, 147, 210-224.


Rabobank *Wine is Business* (Rabobank, Utrecht, 2003).


Rabobank (2003), for instance, considers basic wines those sold at a price lower than 3 euro per standard 0.75 litre bottle. Rabobank also proposes to classify premium wines into four sub-categories according to the price of a standard 0.75 litre bottle: popular premium (price between 3 and 5 euro); premium (price between 5 and 7 euro); super premium (price between 7 and 14 euro); ultra premium (price between 14 and 150 euro); icon (higher than 150 euro).

Such estimation considers wines subdivided into three categories using prices measured as wholesale pre-tax prices per litre at the national border: non-premium, lower than US$2.5; commercial premium, US$2.5 – US$7.5; superpremium, higher than US$7.5.

From now on in this paper the authors have taken the liberty to use non-premium, less expensive and basic wines as synonymous.

The consumption and production pattern followed by Italy could be observed in all those wine producing and consuming countries showing the same structural characteristics.

Data about import and export come from the Global Trade Information Services Database.

Nielsen ConsumerScan data have been questioned in terms of accuracy. For a complete reference see Einav et al. (2008).

The cut-off price between non-premium (basic) and premium wines confirms the Rabobank classification which is substantially equivalent to that proposed by Anderson and Nelgen (2011).

It is worth noting that the data reported refer to the distribution within WAH consumption of wines in Italy, which is estimated to be 70% in volume and 30% in value terms by Anderson and Nelgen (2011).

No categorization was implemented based on “red – white” since, as experts pointed out, criteria that make consumers choose between red or white wines are the same within each of these categories. Put differently, consumers make a choice between red and white based on variables, or attributes, that is beyond the choice set of attributes available in a store shelf. As for legal category, this criterion is relevant to consumer choices almost exclusively for premium wines.

Although the level of significance of this coefficient is estimated at 5%, it is worth holding it in due consideration for the purpose of describing purchasing behaviour.