



## Italian Wine Demand and Differentiation Effect of Geographical Indications

Journal:	<i>International Journal of Wine Business Research</i>
Manuscript ID:	IJWBR-2009-0001.R1
Manuscript Type:	Research Article
Methods:	Econometric Model, Time Series
Topics:	Alcoholic drinks, Italy



Only

## 1.1 INTRODUCTION

Geographical indications (GIs) are aimed at differentiating the origin of wines and signal quality to consumers. Empirical and theoretical analyses highlight the effects of GIs on agro-food product demand. Landes and Posner (1987) stated that GIs reduce confusion and search costs, leading consumers to express strong preferences. Gil and Sanchez (1997), Loureiro and McCluskey (2000), Skuras and Vakrou (2002), and Schamel and Anderson (2003) have concluded that consumers are willing to pay more for a differentiated and traditional/regional product, while Ribeiro and Santos (2007) confirmed that the positive image/reputation of the region of origin generates strong preferences among consumers. Van Ittersum et al. (2007) concluded that consumers of regional products assign high importance to labels that contain regional certification. They reported that GI labels positively affect consumers' willingness to pay, relative to the protected regional product. Caporale and Monteleone (2001) indicated that origin information has a significantly positive impact on virgin olive oil acceptability. Roosen, Lusk, and Fox (2003) found that beef consumers prefer origin labels rather than private brands.

Empirical literature on consumers' wine preferences reports similar outcomes. Ribeiro and Santos (2007) showed that region of origin is the dominant cue when consumers and retailers select a wine for purchase. Scarpa et al. (2006) indicated that protected denominations of origin determine positive responses from consumers and reveal their willingness to pay, rather than reactions generated by brand, seller type, and suggestions from producers and acquaintances. Bonaria et al. (2006) analyzed consumers' preferences towards Sardinian wines, and results indicate that GIs are the most important attributes to Italian consumers when selecting Sardinian wines. Malorgio et al. (2008) studied consumers' preferences towards wine attributes and found that GIs positively affect the probability of choosing a certain wine and generates a willingness

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3 to pay. Martinez-Carrasco et al. (2006), Mtimet and Albisu (2006), and Perrouty et al. (2006)  
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5 showed that the designation of origin is, in most cases, the key attribute that affects wine price  
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7 and ranking among consumers.  
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11 The economic and marketing literature on the topic presents unanimous outcomes on the  
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13 effectiveness of GI in orienting consumers' preferences. Obviously, cultural/national context and  
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15 the type of product analyzed could be the source of the different quantitative outcomes. The  
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17 literature that was reviewed in conjunction with this research, therefore, permits one to form  
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19 clear expectations about the differentiation effect of GIs in the Italian wine market.  
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23 Despite the fact that GIs have been widely discussed, there is no empirical evidence nor  
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25 quantitative evaluation that concerns the differentiation effect of GIs in the wine market, in terms  
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27 of consumers' responsiveness to the price of GIs versus conventional products, the profitability  
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29 of the GIs, or the substitutability<sup>1</sup> among products of different GIs and their conventional  
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31 counterparts.  
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35 Although latent class models are becoming popular for estimating demand due to the  
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37 convenient property with which to reduce the parameters' dimensionality, they do not allow the  
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39 estimation of the whole set of substitution elasticities (Berry 1994). On the other hand, demand  
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41 estimation, although it could be econometrically cumbersome, has been largely applied for this  
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43 purpose.  
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47 International wine literature lacks Italian contributions in which a demand system related to  
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49 wine is estimated. The only known study was conducted by Torrisci et al. (2006), and it analyzed  
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54 <sup>1</sup> The measure indicates how much consumption would shift to another GI typology (label) if the market price of  
55 another GI type changes. In fact, when consumption switches easily from one category to another after a price  
56 increase, a natural consequence could be a weak product differentiation.  
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3 Italian table wine demand by estimating an LA/AIDS brand level model. They showed that two  
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5 of the main Italian brands are close substitutes, while private label and “higher” table wine  
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7 quality represent differentiated product on the market. Elasticities estimates also provide  
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9 information on consumers’ price responsiveness, and results are lower for higher quality wines.  
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13 Wine demand estimation relative to new world wine markets is a more common topic within  
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15 the international scientific context. In fact, Pompelli and Heien (1991), Buccola and Vander  
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17 Zanden (1997), Seale et al. (2003), and Carew et al. (2004) estimated source- and color-  
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19 differentiated wine demands. A result common to those studies is the presence of substitution  
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21 effects among wines of different nationality, while red and white wines rarely substitute each  
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23 another.  
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27 The analysis of the highlighted literature, which incorporates a hedonic pricing model and  
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29 conjoint analysis contributions, concludes that GIs are an important element/variable for wine  
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31 differentiation and quality signaling. Contrarily, the literature related to demand estimation has  
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33 never considered wines of different GI and non-GI wines as competing products or separable  
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35 goods. An analysis that considers that hypothesis would generate important implications for the  
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37 industry and policy makers, in terms of effectiveness of GIs in differentiating the wine market  
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39 and the profitability potential of various types of GIs.  
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44 The present study is contextualized in a noteworthy market situation in which the European  
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46 and Italian wine markets are facing a decrease in total consumption and a modification in the  
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48 preferences of consumers, who are moving towards higher quality wines compared to the past.  
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3 The shift in lifestyle towards a “metropolitan stereotype<sup>2</sup>” is resulting in a change in dietary  
4 habits. Wine, therefore, is perceived as an experience good rather than the typical beverage of the  
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6 Mediterranean diet. These changes characterize a particular and important economic framework  
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8 for analyzing wine demand and understanding how consumers’ preferences are shifting among  
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10 wines of different quality and different GI.  
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15 The article is organized as follows. After the introduction that highlights the most relevant  
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17 issues, reviews the literature, and proposes the objectives, the second section presents the Italian  
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19 wine market and the institutional context of the GIs. The third section describes the theory of the  
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21 quadratic almost ideal demand systems, while the fourth describes the data. The fifth section  
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23 illustrates the empirical analysis and the results and presents the relative discussion. Finally,  
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25 implications and suggestions for further research are detailed in the last section.  
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## 33 2. ITALIAN WINE MARKET

### 34 35 36 2.1. WINE CLASSIFICATION THROUGH GEOGRAPHICAL INDICATIONS

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38 In 1963, the Italian legislation adopted the EU wine classification through GIs. The  
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40 development of GIs allowed the identity of quality wines of particular regions to be protected  
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42 from fraud and facilitated commercialization through wine classification and brand recognition.  
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44 In addition, the GI system is coupled with labeling regulations that allow GI wines to signal  
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46 quality with a higher level of labeled information in comparison to non-GI wines (subsequently  
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48 indicated as Table wines).  
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53 <sup>2</sup> Increasing number of meals consumed out; reduced time at each meal; wine consumed only in more relaxed meals  
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55 or important occasions, not at every meal as in the Mediterranean diet; more importance to the wine choice and  
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57 matching with food.  
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3 GI categorization includes the controlled origin denomination (DOC), or *Denominazione di*  
4 *Origine Controllata*; the controlled and guaranteed origin denomination (DOCG), or  
5 *Denominazione di Origine Controllata e Garantita*; and the geographic and typical indication  
6 (IGT), or *Indicazione Geografica Tipica*. The first two appellations are earned by adhering to a  
7 quality discipline. The designation of these appellations depends on recognition criteria of the  
8 wine as a traditional product, the adherence to strict regulations that establish the production  
9 area, the grape varieties for the blend, the wine/grapes' yield, and the alcohol content (DOCG  
10 criteria include bottling rules). The third GI, the IGT, was recently introduced in order to include  
11 several high quality wines that could not be designated as DOC. The remaining wines, which are  
12 not special or sparkling wines, such as *spumante* or champagne, are designated as table wines  
13 and do not follow any "collective" quality discipline.  
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## 32 2.2. ITALIAN WINE PRODUCTION

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34 Italian winegrowing is characterized by small-size, family-owned farms. In 2005, there were  
35 approximately 600,000 farms that produced grapes, with vineyards occupying an area of  
36 approximately 772,000 hectares. Two-thirds of the wine grape area concerns the production of  
37 table wines and IGTs, while the area for DOC or DOCG wines only accounts for 36%. DOC and  
38 DOCG wine grapes are mainly concentrated in northern Italy, where approximately 60% of the  
39 area is devoted to high-quality wine production. (Anderson 2004)  
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Table 1 – Italian Production of Wine per Area

AREA	Wine (millions of liters)				% cultivated over the total winegrowing area			
	DOC & DOCG	IGT	Table wine	Total	DOC. & DOCG	IGT	Table wine	& DOCG & IGT
Italy	14.79	12.59	19.72	47.11	0.31	0.27	0.42	0.58
North	8.29	7.31	4.27	19.88	0.42	0.37	0.21	0.33
Center	3.49	2.02	1.91	7.44	0.47	0.27	0.26	0.12
South	3.00	3.25	13.53	19.79	0.15	0.16	0.68	0.13

Source: ISTAT (Istituto Nazionale di Statistica), 2006

### 2.3 WINE CONSUMPTION IN ITALY

During the period 2000-2004, the volume of household consumption of wine has decreased, on average, 2.4% annually, going from 9.65 to 8.57 million of hl. Table wine consumption registered the highest decrease, approximately 3%, while DOC and DOCG wines only decreased by 1%. Special wine consumption decreased 2.4%. Trends in expenditures are distinct. On average, aggregate expenditures on wine increased by 1% per year, going from EUR 1.63 to 1.71 billion. This increase is almost entirely due to the increase in expenditures for GI wines (approximately 4% growth). Expenditures for table wine and special wines registered a decrease of 0.3% (ISMEA 2005).

This information clearly indicates a dietary habit shift towards a more metropolitan lifestyle. Another factor that affects this modification of the market is the change in the consumption approach, which is becoming more experimental. Moreover, the increasing knowledge about

wine products and the increasing awareness about the beneficial effect of the antioxidants which wine contains may have oriented consumers towards higher quality and GI products.

### 3. THE MODEL: THE QUADRATIC ALMOST IDEAL DEMAND SYSTEM (QUAIDS)

While most of the literature that was reviewed in conjunction with this study applies the almost ideal demand system (AIDS) or its linearized version (LA/AIDS) that were originally introduced by Deaton and Muellbauer (1980), the possibility of testing for a quadratic specification oriented this research towards the use of the QUAIDS.

Arguing that, for many commodities, standard empirical demand models do not provide an accurate analysis of behavior across income or expenditure groups, Banks et al. (1997) elaborated a new demand model which is consistent with theory and accounts for different behaviors across income/expenditure groups. Inductively, their argument is based on the assessment of the Engel relationship. In fact, when finding a significant quadratic specification in the empirical estimation of Engel curves, they incorporated a second-order polynomial expenditure in the demand system which led to the so-called quadratic almost ideal demand system (QUAIDS).

In order to construct the QUAIDS, the following general form of demand is drawn:

$$w_i = A_i(p) + B_i(p) \log x + C_i(p)g(x) \quad (1)$$

for goods  $i = 1, \dots, N$ , where  $p$  is the vector of prices and  $A$ ,  $B$ , and  $C$  are differentiable functions. Expenditure shares are linear in log expenditure and in another smooth function of expenditure,  $g(x)$ . This last term allows nonlinearities in Engel curves (Banks et al. 2001). The quadratic specification begins by considering the Deaton & Muellbauer translog price index



$$\log P^* = \alpha_0 + \sum_k \alpha_k \log p_k + 0.5 \sum_k \sum_l \gamma_{kl} \log p_k \log p_l \quad (2)$$

$$\text{as well as a Cobb-Douglas price aggregator, } b(p) = \prod_{i=1}^n p_i^{\beta_i} \quad (3)$$

Finally, the share equation system is

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j \beta_i \log(x/P^*) + [\lambda_i/b(p)][\log(x/p^*)]^2 \quad (4)$$

Such is perfectly nested with the more commonly-used AIDS.

Theoretical calculation restrictions and homogeneity are imposed, as in Banks et al. (1997).

Elasticity calculations also follow, as specified in the article that originally proposed this approach.

Given the partial derivatives

$$\mu_i = \partial w_i / \partial \log x = \beta_i + [2\lambda_i/b(p)] \log(x/P^*) \quad (6)$$

$$\mu_{ij} = \partial w_i / \partial \log p_j = \gamma_{ij} - \mu_i (\alpha_j + \sum_k \gamma_{ik} \log p_k) - [\lambda_i \beta_j / b(p)] [\log(x/p^*)]^2 \quad (7)$$

$$\text{The expenditure elasticities are given by } e_i = \mu_i / w_i + 1 \quad (8)$$

$$\text{The Marshallian price elasticities are given by } e^u_{ij} = \mu_{ij} / w_i - \delta_{ij} \quad (9)$$

Where  $\delta_{ij}$  is the Kronecker delta, which equals 1 when  $i=j$ . The Hicksian price

$$\text{elasticities are calculated as } e^c_{ij} = e^u_{ij} + e_i w_j \quad (10)$$

Compared to the AIDS paradigm, the QUAIDS model presents higher flexibility, resulting in two-fold implications: better performance in explaining complex Engel curve phenomena, as expected for complex products such as wine, but cumbersome estimation. In addition, endogeneity issues are expected to negatively affect the outcome of the estimation if it is not corrected. In fact, in theoretical discussions, expenditure is usually intended to be equal to income, which is assumed to be imposed on consumers from outside. On the other hand, in empirical literature, when estimating a complete system of demand equations under a two-step

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3 budgeting assumption<sup>3</sup>, the total expenditure is intended to be the sum of prices times the  
4 quantities purchased, or the sum of the expenditure of the single goods. Clearly then, expenditure  
5 on the right-hand side is jointly endogenous with the expenditures in the denominator of the  
6 shares.  
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13 When consumers purchase products that are offered at a promotional price, or at a discounted  
14 price for club-card holders, a consumer's decision to accept the promotional activity or to use a  
15 club card does affect prices or consumer purchasing power (Torrise et al. 2006). Additionally,  
16 prices are also included in the share calculation on the left-hand side of the demand equation.  
17 These reasons lead prices to be intended as weakly endogenous. Those multiple sources of  
18 endogeneity, therefore, need to be considered in the estimation (LaFrance 1991).  
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28 A convenient tool that allows for the consideration of all those sources of complexity is the  
29 instrumental variable (IV) estimator, such as 2SLS or 3SLS, which uses the information  
30 contained in other variables, including the instruments, in order to remove the correlation  
31 between regressors and errors and provide consistent estimates. The 2SLS and 3SLS estimators  
32 and, in general, the maximum likelihood estimator, require strong and restrictive assumptions  
33 about the distribution of the error. Contrarily, the GMM<sup>4</sup> moves away from any sort of  
34 parametric assumptions and handles contemporarily multiple endogeneity, nonlinearity, and  
35 heteroscedasticity. For this reason, the GMM estimator, when the model is correctly specified, is  
36 asymptotically more efficient than 3SLS or FIML (Greene 2003).  
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50 <sup>3</sup> Under this assumption, consumers first choose how to allocate their income among all the categories of goods  
51 (e.g., housing and food), and then they decide how to allocate their budget within each category (Deaton and  
52 Muellbauer 1980).  
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56 <sup>4</sup> The GMM estimator follows the following specification:  $\left[ \frac{1}{N} \sum_{i=1}^N \varphi(x_i, \beta) \right]' W \left[ \frac{1}{N} \sum_{i=1}^N \varphi(x_i, \beta) \right]$   
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#### 4. DATA: ITALIAN HOMESCAN WINE PANEL DATA

The Italian homescan panel is the collection of weekly retail purchase records of 6,000 Italian households. The panel is stratified on demographic and geographic criteria. It is balanced on region, age of the head of the household, the age of the primary purchaser, the number of family components, income level, and the number of children. The number of households in the panel reflects the national demographic and geographic distribution. Because of the sampling design and properties, ACNielsen homescan panel data can be considered to be representative of the at-home national consumption.

Of all the products contained in the ACNielsen homescan panel, our subsample concerns only wine products. The subsample includes all the 6,000 households of the original panel. The information it contains pertains to the wine purchases of the sample from 2002 to December 2005. The total information consists of wine product characteristics, such as color, appellation, varietal characterization, organic or conventional production, region of provenience, the production firm, trademark, volume, packaging material, purchase date, retailer/shop, purchase amount, and the single-purchase expenditure amount.

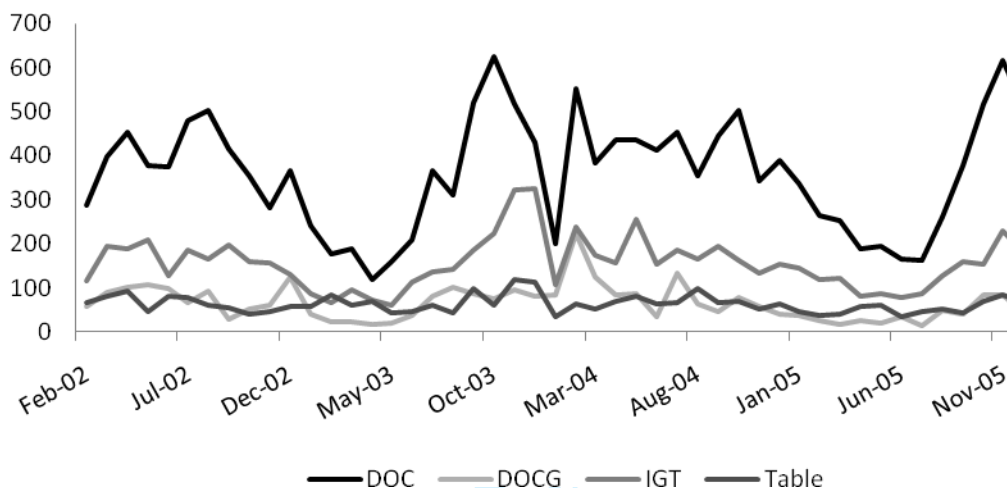
#### 5. EMPIRICAL ANALYSIS AND RESULTS

The estimation of wine demand, apart from other types of beverages or goods, is feasible when a two-step budgeting procedure is assumed. In this analysis, we assumed that Italian households begin by deciding how much of their income they would allocate to wine and in the second phase, they decide the quantity of each type of wine they would purchase.

Data preparation consisted of two phases: aggregation and data-mining. As for the first phase, we aggregated households' consumption into four categories: DOC, DOCG, IGT, and table wine

by calculating quantities and averaging prices<sup>5</sup>. Aggregation over time has also been carried out. In fact, in order not to have zero expenditure points, the original weekly data have been aggregated into two-week observations<sup>6</sup>.

Figure 1 – Wine Consumption Time Series



Referring to the second phase of the data preparation, the shape of the series has been checked in order to depict the seasonal patterns. Our analysis revealed that prices do not show any seasonal patterns or reflect a high variability, while quantities show a typical seasonal pattern and a high standard deviation. Since promotions are positively correlated with consumption, they

<sup>5</sup> A weighted average has been used in order to assign a heavier weight to those wines purchased more.

<sup>6</sup> Weekly data presents observations in which one or more of the selected categories present zero consumption.

When such a phenomenon occurs, demand estimation should consider the truncated nature of the sample. Lacking of explanatory variables in order to estimate a truncated model we have chosen to aggregate data into bi-weekly observations. Monthly aggregated data, on the other hand, would reduce enormously the variability occurring on a shorter time-period.

have been included in terms of proportion of wines purchased at each time<sup>7</sup>. Moreover, in order to account for the sawtooth behavior and the specific seasonal pattern of high values during Christmas and low values during the summer, the variables  $\sin(\pi/13)$ , the paycheck dummy at the end of each month<sup>8</sup>, and the Christmas holidays dummy were also included in the model.

Data show that the most-purchased wine is the DOC, followed by the IGT. Table wine is purchased least often. The proportion of wines sold under in-store promotional activities is substantially high for DOCG and table wines. As expected, table wine shows the lower average price, while the DOCG is the most expensive.

Table 3 – Sample Descriptive Statistics of Bi-Weekly National Data

Variable		Average	St. Dev.	Min	Max	
Quantity (liters/two-week)	G	DOC	318.2	143.4	103.2	976.2
		DOC	3	6	5	5
		DOC	54.03	34.08	10.50	166.50
		IGT	83.82	63.79	15.00	286.50
Price (Euro)	G	Table	19.49	18.28	1.50	80.00
		DOC	3.48	1.50	0.25	48.00
		DOC	5.92	2.79	0.61	50.67
		IGT	2.80	1.45	0.14	16.00
Promotions (proportion of wines purchased under promotional activities)	G	Table	1.46	0.89	0.04	21.30
		DOC	0.31			
		DOC	0.03			
		IGT	0.16			
		Table	0.49			

<sup>7</sup> Promotional activities have not been considered as price shifter because not all promotions reduce the price, most of them, in fact, consist of better display on the shelves or gadgets given with a bottle of wine.

<sup>8</sup> Italians receive their paychecks on the 27<sup>th</sup> of each month. Moreover, they receive a 13<sup>th</sup> pay period, in addition to monthly salary, in December.

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3 The instruments employed in order to correct for endogeneity include the contractual level of  
4 wages; the individual price indices for all goods, food, and wine; the lag version of prices; the  
5 lag of the logarithm of prices; and the monthly index for GDP and other endogenous variables  
6 uncorrelated with the error, such as the  $\sin(\pi/13)$ , the seasonal dummies, the Stone index, and  
7 various combinations of those in terms of cross-products.  
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10 Finally, we scaled price data to the median and established the estimation. Estimation has  
11 been carried out by means of an iterated version of the GMM in which the parameters obtained  
12 at the first run serve as starting values for the second run. Estimation concludes when parameters  
13 of the last step equal those estimated in the previous step, plus or minus a tolerance values.  
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16 Estimation has required eight iterations to reach the convergence. Endogenous regressors  
17 have been significantly over-identified (e.g., the J-test). The auto-correlation phenomenon does  
18 not occur in any of the series, as shown by the Durbin and Watson tests. Finally, the R-square,  
19 although just indicative of a system of equations, shows that the model specification has  
20 facilitated an explanation of the data variability well above 26%.  
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Table 4 – Estimation Results

Equations (Symmetry, Homogeneity and Adding-up Imposed)								
Dependent Vbl.	DOC-share		DOCG-share		IGT-share		Table-share	
Variable	Coef.	St. Error	Coef.	St. Error	Coef.	St. Error	Coef.	St. Error
Intercept	-	1.31	0.93	0.99	2.14	0.85	2.05	0.93
	4.139	5	9	9	4	7	6	8
log DOC price	-	3.22	*		*		*/**	
	5.872	2						
log DOCG price	0.95	0.50	-	0.01	*		*/**	
	6	5	0.074	1				
log IGT price	2.35	1.54	-	0.53	-	0.09	*/**	
	4	9	0.465	8	0.798	2		
log table price	2.56	1.59	-	0.22	-	0.70	-	0.74
	3	7	0.417	8	1.091	2	1.055**	6
Expenditure	1.34	0.33	-	0.19	-	0.24	-	0.23
term	9	1	0.230	9	0.562	7	0.558**	4
Seasonality	-	0.01	0.01	0.01	0.00	0.00	0.98	0.02
	0.010	4	6	1	2	9	6**	0
Christmas	-	0.02	0.05	0.02	0.00	0.01	0.98	0.02
Holiday	0.051	6	8	1	8	8	6**	0
Monthly	-	0.01	-	0.01	0.01	0.00	0.99	0.01
Paycheck	0.003	3	0.003	0	5	9	1**	0
Promotion	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
	1	0	1	1	3	1	5**	1
Quadratic	-	0.02	0.01	0.02	0.04	0.01	0.04	0.01
	0.097	2	5	2	1	8	1**	4
R-square	35.010		26.710		54.210			
Durbin-Watson	2.181		1.832		1.808			
test								
J-test			112.675 (D.F. = 78)					

\*Not estimated because of symmetry restrictions

\*\* Parameters retrieved through homogeneity and adding-up restrictions

Estimates of the system, although not directly interpretable for quantitative evaluations, provide a rough evaluation of wine demand differentiated by GIs through the interpretation of

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3 their signs. Price increases for IGT and table wines correspond to increases in DOC wine shares  
4 and decreases in DOCG, IGT, and table wine shares. This result confirms the strong  
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6 diversification among DOCG, IGT, and table wines, but also the scarce differentiation of DOC  
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8 wines, which could show strong substitution with the other categories. Substitution among GIs is  
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10 expected, especially between DOC and DOCG and DOC and IGT, because they could be closely  
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12 related in terms of quality. Substitution between DOC and table wines, on the other hand, could  
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14 correspond to a reduction in DOC reputation. In fact, the increase in the number of DOC wines  
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16 on the market could have influenced consumer perceptions of those wines as being niche and  
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18 high quality products.  
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24 A certain degree of consumption sensitivity to price variations was noted. Generally, demand  
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26 is downward-sloping for all the four wine categories which were analyzed. This result indicates  
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28 that price promotions or heavier taxation<sup>9</sup> could effectively modify the level of wine  
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30 consumption.  
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34 As the total expenditure for wine increases, the DOC market share increases. Contrarily, IGT  
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36 and table wines are consumed less when consumers allocate more money to wine in general.  
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38 This last result confirms the big scale trends that reveal an increase in total wine expenditure but  
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40 also a reduction in lower quality wine consumption, opposed to the increase in DOC/DOCG  
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42 wine demand.  
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46 Estimates show that, with the exception of DOC wines, consumption generally increases at  
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48 Christmas. Furthermore, the monthly paychecks elicit an increase in IGT and table wine  
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54 <sup>9</sup> There is an ongoing debate at the European level about the imposition of excises on the Italian market. Excises are  
55 volume-based taxes, so expensive wines are, in proportions, less levied than cheap wines. The taxation should  
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57 reduce consumption and abuses of alcoholic beverages.  
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consumption. As expected, in-store promotional activities generate an increase in consumption for all of the selected categories. Finally, the significance of the quadratic term confirms that the QUAIDS is the preferred specification against the AIDS or the LA/AIDS models.

Quantitative implications could be depicted by interpreting the own- and cross-price elasticities, which are calculated using the estimated parameters and referring to a base situation<sup>10</sup>. Hicksian elasticities have been calculated since they provide estimates that are purified by the income/expenditure effect, compared to Marshallian elasticities<sup>11</sup>. Therefore, they could be considered reliable measures for drawing quantitative implications about price responsiveness of demand, substitution among the GIs, and GI-related profitability and differentiation effects.

The elements on the main diagonal presented in Table 5 are own-price elasticities, which represent the percentage variation of the market share of a specific wine as a consequence of a 1% increase in its price. For instance, a 1% increase in table wine price elicits a 7.7% decrease in market share. Similarly, a 1% increase in DOCG price elicits a 0.8% decrease in DOCG share.

Table 5 – Hicksian/Substitution Elasticities at the Base Situation (St. Error<sup>12</sup>)

		<i>Price</i>			
		DOC	DOCG	IGT	Table
<i>Quantity</i>	DOC	-5.418 (3.814)	*	*	*
	DOCG	1.019 (0.026)	-0.844 (0.368)	*	*
	IGT	2.732	-2.827	-2.317	*

<sup>10</sup> Promotions=0; Christmas holidays dummy=0; paycheck dummy=0; log scaled prices=0.

<sup>11</sup> Marshallian and expenditure elasticities are available under requests to the authors.

<sup>12</sup> St. errors have been calculated through the delta method.

	(1.369)	(4.774)	(1.891)	
	2.722	-2.229	-2.454	-7.769
Table	(0.906)	(1.743)	(1.359)	(2.704)

\*Symmetric demand at base prices consists of symmetric price responses and elasticities

Own-price estimates show that DOC, IGT, and table wine demands are elastic, while DOCG wine demand is inelastic. Generally, own-price elasticities could be related to the quality perceived by consumers. When quality is perceived as low, a price increase would lead to many consumers reducing or ceasing to consume that product or switching to higher quality products. The demand of this kind of product would be elastic. High quality and highly differentiated products, on the other hand, satisfy specific consumers' needs. As consequence, we expect those products to show inelastic demand and generate a high level of loyalty.

DOCG wine demand, in fact, is inelastic. A price increase, in this case, would elicit a less than a proportional reduction in market shares. This result leads to the conclusion that DOCG wines are highly profitable because producers/sellers could increase their prices above marginal costs without having significant and negative effects on their market shares. Being demand-inelastic, price promotions on DOCG wines do not generate significantly higher sales. This result justifies the higher incidence of promotions for this category in order to sell out the stocks.

Contrary to DOCG wines, the demand for DOC, IGT, and table wines are own-price elastic. An increase in their price would more than proportionally reduce their consumption. In consequence, those wine categories show low margins of profitability because, in order to maintain a high level of sales/consumption, prices should be set as low as possible. Conversely, a decrease in their own-price would generate a more than proportional increase in their demand. Clearly, prices could be reduced to the extent of marginal costs being lower than prices. Among the wine categories that could be advantaged by a price reduction or a promotion, as for our

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3 results, table and DOC wines would exploit this opportunity the most because of their highly  
4 elastic demand. In fact, contrarily to DOC wines, the high level of table wine sold under  
5 promotions is a sign that producers of table wine are already using this strategy.  
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10 Looking at cross-price estimates, represented as out-of-diagonal elements in Table 5, we  
11 noticed that there are clear and significant substitution effects among DOC and other wines,  
12 especially IGT and table. Substitution indicates a scarce differentiation among DOC wines and  
13 other GIs, but also between DOC and table wine. In fact, an increase in DOC price would elicit a  
14 reduction in DOC consumption and direct consumers towards other GIs or table wines. While  
15 the DOC and other GIs could effectively cause confusion among consumers which, in turn, could  
16 result in substitution effects that indicate a scarce differentiation, the substitution between DOC  
17 and table wines could be associated with the ongoing loss in reputation of this typology of wines.  
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29 Complementarity, which is opposed to substitution, has been found for the DOCG, IGT, and  
30 table wine categories which result in high differentiation from one another. This outcome,  
31 contrary to the hypothesized confusion of consumers when facing different types of GIs,  
32 confirms the effectiveness of GIs as a differentiation tool and justifies the segmentation of the  
33 market into these categories for policy and managerial purposes.  
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41 Finally, the changes in consumers' tastes towards higher quality and more expensive wine  
42 products could be justified by the demand price responsiveness. As prices increase, consumers  
43 tend to keep consuming high quality wines, such as DOCG, and avoid presumably lower quality  
44 wines, such as table varieties. For the same reason, those results are consistent with the increase  
45 in total wine expenditure that is currently happening in the market.  
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## 6. DISCUSSION AND CONCLUSIONS

This research shows the usefulness of demand system estimation in providing market information, offering a relevant investigation tool for marketing in the agro-food business and for food-policy analysis.

This study assesses that, indeed, appellations generate a strong differentiation effect. As a result, wines of competing GIs generate independent demands and consumers' preferences within the Italian wine market. Another result of the GI system is that non-GI wine demand remains differentiated from the rest of the market. The obvious conclusion concerns the effectiveness of the GI differentiation system, which allowed consumers to develop independent demands. In such a differentiated market, producers of a specific GI are able to develop their strategy without taking into account the strategies of the other wine typologies. With access to this information, producers and marketers could draw important implications because they would use at their advantage the information of operating in a differentiated market. As different wine typologies show independent demands, promotional activities could also be decided independently. When two products substitute each other, promotional activities of one player clearly negatively affect the market shares of the others.

A different behavior concerns DOC wines. The growing number of wines belonging to this group probably moved consumers to consider those wines from niche products to "quasi" commodities, with negative effects on the image/reputation of this wine typology. Policy makers, in this regard, should promote a set of activities aimed at the re-evaluation of DOC wine reputation or a reconsideration of the wines that affect the image of the DOC branding strategy into this category.

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Future research should provide a more in-depth view in which wines are differentiated by price ranges and by color as well as GI. Moreover, the relationship between foreign wines and Italian GIs should be understood in order to evaluate whether domestic and imported products are differentiated from one another. More disaggregated data could be used in order to understand regional differences. Data concerns retail level demand. Thus, the whole market that includes the Ho.Re.Ca.<sup>13</sup> sales, should be considered for providing implications relative to the entire market.

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