

Determinants of Sicilian Wine Consumption: Evidence from a Binary Response Model

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Abstract: The growing importance of Sicilian wines in the Italian market provides the context in which this paper is set. This study presents the results of a recent survey on Sicilian wine consumption in Italy. By means of a binary response model, this paper evaluates the main determinants (demographic profile, preference and attitudes) that influence Italian consumers' preferences for Sicilian wines. The estimates, based on the stated preference of 953 Italian wine consumers, emphasize that income and habits to purchase at wine shops and the habit to drink between meals significantly influence the willingness to consume Sicilian wines. Furthermore the sample propensity to consume the Sicilian wine increases for white wines and when the consumption takes place in public spaces.

Keywords: Regional Wine, Stated Preference, Willingness to Consume

Introduction

The Italian wine industry has experienced a strong renewal that has involved the structure, the organization and the management of grapevine farms (D'Amico *et al.*, 2013; Di Vita *et al.*, 2014a; Galati *et al.*, 2014). This trend has gradually involved the Sicilian wine system, which has gradually approached the issues linked to the development of "quality vine growing" as a strategic factor of differentiation through the widespread of Products of Designated Origin (PDO), Protected Geographic Indication Products (PGI) and bottled wine productions that has contributed to the increasing of the Sicilian wine agribusiness (Crescimanno *et al.*, 2014; Tudisca *et al.*, 2014). Furthermore there has been a growing process in Sicilian wine appreciation in the extra-regional markets as recently reported in several studies (Roma *et al.*, 2013). The success of Sicilian wines is in large part due to the several efforts put by manufacturers into obtaining quality products, both in the production and marketing phases (Di Vita *et al.*, 2013b; 2013c). The growing importance of Sicilian wines in the domestic and foreign market and the favourable forecasting of Sicilian wines to increase the market share in Italy (Caniglia *et al.*, 2008) have led us to consider them as an interesting case study to identify the determinants in choosing the Sicilian wines.

In recent years the increasing demand of the consumers for quality wines and regional brand in the international and domestic markets has been a relevant discussion topic among researchers (Orth *et al.*, 2005; Bruwer and Johnson, 2010; Onofri *et al.*, 2015; Dal Bianco *et al.*, 2015). At the same time a significant interest of Italian consumers towards "certified" as well organic products, has been observed (Crescimanno *et al.*, 2002; Di Vita *et al.*, 2013a; Cembalo *et al.*, 2014; Di Vita *et al.*, 2014b). Within this context, studies of Sicilian wine consumption are fairly limited and they are mainly circumscribed to specific protected designation of origin or geographical defined areas (Caniglia *et al.*, 2008; Caracciolo *et al.*, 2013; Lanfranchi *et al.*, 2014a). There exists a certain paucity of studies on Sicilian wine consumption in the domestic market.

With the purpose of gathering information on the potential interest in bottled wines, this paper-through an econometric analysis using the stated preferences of consumers-presents the results of a recent survey on quality Sicilian wine consumption in Italy. The aim of the present study is to investigate the effect of socioeconomic factors, individual attitudes and preference of consumers on the probability of buying Sicilian quality wine, identifying the profile of the ideal Sicilian wine consumer.

This paper is organized in four different sections. The first one describes the data collection process, the survey design, the methodology adopted in the study and introduces the econometric model and the estimation strategy. The second part shows the results of the survey discussing the main findings and the more relevant implication. The third section illustrates the main results of the research, while the last section concludes the paper.

Materials and Methods

Data

The data employed in this study consists of a cross-sectional wine consumption survey collected in 2011. A random sample of Italian consumers was interviewed face-to-face in four metropolitan cities and a questionnaire completed: It is worth noting that stores located in metropolitan cities provide access to a wide variety of different wines (including extra-regional). The four metropolitan cities were selected to provide coverage of north, central and south areas: Milan (Lombardy), Rome (Lazio), Catania and Palermo (Sicily). More specifically, the questionnaire investigated consumer attitudes and preferences towards the Sicilian wine. The survey involved a total of 1,200 consumers. However, after dropping observations for which there were inconsistencies or missing data, a total of 953 responses (slightly less than 80% of the starting sample) were used in the empirical analysis. The collected information included: (a) respondents' characteristics (e.g., socio-demographic characteristics, level of education, household income); (b) respondents' general attitudes towards wine consumption (type of wine purchased, description of the consumption modalities, including main factors that influence the choice and the consumption of wine, styles and places of purchase and consumption); (c) respondents' intention to purchase Sicilian wine (including consumer knowledge of Sicilian geographical indications and protected designation of origin).

Methodology

This section presents the methodological approach aiming to analyze the consumption and purchase determinants of Sicilian quality wines. The hypothesis which is the basis of the present research is that respondents' willingness to consume Sicilian wine can be considered as a function of the following explanatory variables:

- Respondents socio-demographic characteristics
- A set of variables expressing the respondents preferences towards the various attributes of the wine
- A set of variables reporting the respondents attitude towards wine consumption

- A set of variables indicating the preferences of the respondents for the different channels of purchase

The selection of the explanatory variables follows previous studies of consumers preferences for food products and for wine specifically (Verneau *et al.*, 2014; Cembalo *et al.*, 2014; Caracciolo *et al.*, 2015; Onofri *et al.*, 2015).

The methodology will statistically assess the influence of each of the above reported variables on the respondents "willingness" or "likelihood" to consume Sicilian bottled wine. Analytically, the statistical model used for the analysis is a binary response model. This class of models is widely used in social sciences and in agricultural and food economics in particular for analyzing consumers choice behavior (Train, 2009; Verneau *et al.*, 2014; Onofri *et al.*, 2015). In this particular model the probability of an event (e.g., consumption of Sicilian wine) is a linear function of the explanatory variables. The relationship subjected to empirical investigation can generally be expressed as:

$$\begin{aligned} \pi_i &= \text{Prob}(Y_i = 1) = \text{Prob}(Y_i^* > 0) \\ &= \text{Prob}(-\varepsilon_i < \alpha + \delta K_i + \beta X_i + \gamma Z_i + \tau W_i) \\ &= \Phi(\alpha + \delta K_i + \beta X_i + \gamma Z_i + \tau W_i) \end{aligned} \quad (1)$$

Where:

- π_i = Identifies the probability that the *i*-th respondent consumes a bottle of Sicilian wine
- Y_i^* = The non observable latent variable on which the statistical relationship with the explanatory variables is estimated
- Y_i = The observed binary variable that indicates the consumption ($Y_i = 1$) or the non consumption ($Y_i = 0$) of the Sicilian wine for the *i*-th respondent: This variable is associated to the latent variable according to the following rule $Y_i = 1$ if $Y_i^* > 0$ and $Y_i = 0$ if $Y_i^* \leq 0$
- K_i = Identifies the vector comprising the socio-demographic characteristics of the *i*-th respondent
- X_i = Identifies the vector including the variables accounting for the preferences of the *i*-th respondent towards different attributes of the wine
- Z_i = Identifies the vector reporting the variables concerning the *i*-th respondent attitudes towards wine consumption
- W_i = Identifies the vector containing the variables expressing the preferences of the *i*-th respondent for the different channels of wine marketing and distribution
- Φ = The cumulative distribution function of a standard normal distribution
- ε_i = The error term, independent and identically distributed (i.i.d.) according to a standardized normal distribution $\varepsilon_i \sim N(0,1)$

Table 1. Description and summary statistics of the explanatory variables

Variable	Description	Mean	Std.dev	Min	Max
K: Socio Demographic characteristics					
Age	Age of the respondent	48.008	12.669	18	82
Degree of education	0 no education; 1 primary; 2 secondary; 3 High school; 4 Bachelor	3.404	0.683	0	4
Income	Household income: 0 max 15,000 euros; 1 between 15,000 and 30,000 euros; 2 between 30,000 and 50,000 euro; 3 more than 50,000 euros	1.356	0.811	0	3
Gender	0 male; 1 female	0.274	0.446	0	1
South	1 lives in south Italy, 0 elsewhere	0.498	0.500	0	1
Z: Attitudes towards wine consumption					
Between meals	Importance of consuming wine between meals 1 not important, 3 very important	1.428	0.664	1	3
Restaurant	Relevance of wine consumption place, restaurant: 1 not relevant, 6 very relevant	3.336	1.410	1	6
Advertising	Relevance of advertising in encouraging purchases: 1 not relevant, 6 very relevant	2.454	1.305	1	6
Guides	1 if wine guides are used, 0 otherwise	0.243	0.429	0	1
X: Preferences towards attributes of wines					
Scent	Relevance of the scent: 1 not relevant, 4 very relevant	2.429	0.991	1	4
Taste	Relevance of the taste: 1 not relevant, 6 very relevant	3.228	1.004	1	5
Local	1 if local origin of wine is important, 0 otherwise	0.220	0.414	0	1
Price	Relevance of the price: 1 not relevant, 6 very relevant	4.162	1.654	1	6
White wine	Relevance of the colour, white: 1 not relevant, 6 very relevant	4.281	1.759	1	6
Rosè wine	Relevance of the colour, rosè: 1 not relevant, 6 very relevant	2.216	1.937	1	6
W: Wine distribution channels					
Large Retailers	1 wine is manly purchased in large retailers, 0 elsewhere	0.514	0.500	0	1
Web	1 wine is manly purchased using internet, 0 elsewhere	0.010	0.102	0	1
Wine shop	1 wine is manly purchased in specialized wine shops, 0 elsewhere	0.409	0.492	0	1

The model parameters to be estimated on the basis of the sample observations are: α , the intercept of the model while δ , β , γ e τ are the unknown coefficients. Estimated coefficients (δ , β , γ e τ and τ parameters) indicate the direction and magnitude of the statistical associations between the explanatory variables (K X Z and W) and the probability that the *i*-th respondent consumes a bottle of Sicilian wine.

Table 1 reports the explanatory variables used in the estimate while in the next paragraph the estimate result of the binary response model will be presented and discussed.

Results

A preliminary exploratory analysis of the collected data, may outline the profile of the ideal consumer of Sicilian wine. By analyzing the sample average values it is possible to evaluate the statistical association between the decision to consume wine and Sicilian wine and some socio-demographic variables of the respondent, such as age, level of education, income and gender (Table 2). About 84% of respondents declare that they consume wine, while the remaining 16% were teetotal. The ideal wine consumer can be depicted as follows: He is a male, characterized by an age, an income level and a degree of education slightly above the Italian average. In regards to the consumption of Sicilian wine, about 62% of the respondents declared to consume wine; 73% of the

respondents in the South of Italy stated that they consume Sicilian wine, compared to the 58% in the North and the 44% in Central Italy (Table 3). The ideal consumer of Sicilian wine is a male and compared to the profile of the ideal wine consumer, he is slightly younger and with a higher degree of education and income level. In regards to the recorded level of consumption for the different types of wine, collected data show an annual consumption of about 50 litres per individual. Since this data excludes consumption of respondents under the age of 18 years, data reported in Table 1 seems to be consistent with that highlighted by (Dal Bianco *et al.*, 2013) which reported a consumption of 47 litres per capita for individuals older than 15 years. Wine consumption appears to be highest in the North and in the South compared to what was recorded in the Central region. As for the “quality” of the wine consumed in Sicily only 58% of the total consumed wine appears to be wine characterized by the certification of origin (PDO or PGI), while this percentage rises to 61 and 66% for wine consumed respectively in the region of Northern and Central Italy (Table 4).

Table 5 shows the results of the estimate of Equation 1 obtained through the maximum likelihood estimator. In particular, following other empirical studies (Petrucci *et al.*, 2014; Migliore *et al.*, 2014; Zuorro *et al.*, 2015), the estimated model coefficients, together with their standard errors and *p*-values, are reported.

Table 2. Socio-demographic characteristics of the sample

Variable	Description	Total Sample		Teetotaller		Wine consumers		Sicilian wine consumers	
		Mean	Std.dev	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev
Age	Age of the respondents	45.62	13.69	33.27	12.08	48.01	12.67	47.14	12.27
Degree of education	0 no education; 1 primary; 2 secondary; 3 High school; 4 Bachelor	3.40	0.66	3.36	0.52	3.40	0.68	3.52	0.57
Level of income	Household income: 0 max 15,000 euros; 1 between 15,000 and 30,000 euros; 2 between 30,000 and 50,000 euro; 3 more than 50,000 euro	1.31	0.80	1.08	0.73	1.36	0.81	1.48	0.81
Gender	0 male; 1 female	0.33	0.47	0.64	0.48	0.27	0.45	0.30	0.46
Relative frequency (%)		100.00		16.18		83.82		62.27	

Table 3. Relative frequency of wine consumers per geographic area

	Penetration Index (wine) (a) %	Penetration Index (Sicilia wine) (b) %	b/a ratio
Southern Italy	87	73	0.84
Northern Italy	90	58	0.64
Central Italy	72	44	0.61
Total	87	62	0.71

Table 4. Consumption of different typologies of wine (litres per month)

	Southern		Northern		Central		Italy	
	Mean	std.dev	Mean	std.dev	Mean	std.dev	Mean	std.dev
Common wine	0.53	1.93	0.89	1.96	0.26	0.80	0.55	1.74
Bulk Wine	1.39	3.82	1.01	2.22	0.61	1.58	1.10	3.04
Wine (PGI)	1.00	1.61	1.19	1.88	0.48	1.12	0.92	1.60
Wine (PDO)	1.63	1.92	1.82	2.20	1.17	1.86	1.56	1.99
Total wine	4.55	4.19	4.91	3.81	2.51	2.60	4.14	3.87

Table 5. Results of the estimate of the willingness to consume Sicilian wine

	Sicilian Wine consumption		
	Coeff.	t-stat	p-value
Socio Demographic			
δ : Age	-0.008	-1.65	0.098
δ : Degree of education	0.263	2.74	0.006
δ : Income	0.304	3.89	0.000
δ : Gender	0.253	2.02	0.044
δ : South	1.157	8.45	0.000
Attitudes towards wine consumption			
γ : Between meals	-0.536	-5.82	0.000
γ : Restaurant	0.087	2.00	0.046
γ : Advertising	-0.120	-2.83	0.005
γ : Guides	0.377	2.66	0.008
Preferences towards attributes of wines			
β : Scent	-0.072	-1.25	0.212
β : Taste	0.062	1.06	0.289
β : Local	-0.125	-0.87	0.383
β : Price	-0.054	-1.44	0.149
β : White	0.072	2.10	0.036
β : Rosè	-0.042	-1.41	0.159
Wine distribution channels			
τ : Large retailers	0.401	3.18	0.001
τ : Web	0.727	1.37	0.170
τ : Wine shops	0.855	6.23	0.000
α : Constant	-0.540	-0.91	0.363

Notes: Number of observation = 953; Log likelihood = -1726; Wald $\chi^2(90) = 988.54$; Pseudo $R^2 = 0.458$

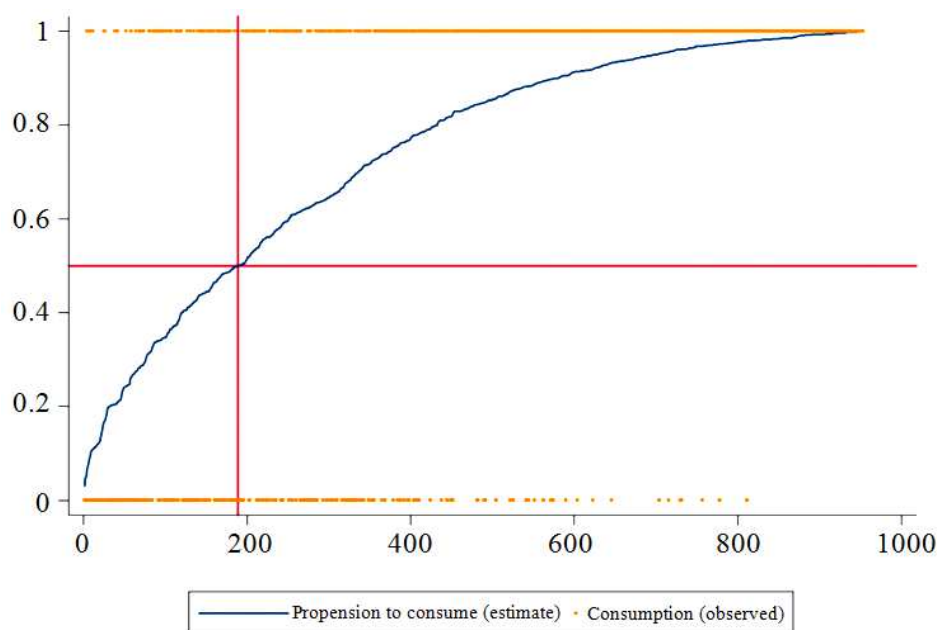


Fig. 1. Estimated function of willingness (or propensity) to consume Sicilian wine

Estimated model provided a reasonable fit to the data, with the majority of the parameters being statistically significant at 10% and a pseudo- R^2 of 0.46. Figure 1 illustrates the estimated willingness to consume Sicilian wine for the 953 respondents. The varies from 0 to 1: Values close to zero indicate willingness to consume, while values close to 1 indicate high willingness. A detailed analysis of the graph highlights that only 19% of respondents (189 respondents out of 953) has a propensity to consume Sicilian wine lower than 0.5. Only a small share of individuals is therefore less inclined to consume Sicilian wine. As discussed in the previous paragraph, the observed market penetration of the Sicilian wine is 71%. The combination of those two figures may indicate that a group of respondents exists, around 10% of the sample, that although it is not currently a consumer it is likely to become one in the future. The characterization of this group becomes strategic for marketing purposes.

The following analysis goes in this direction and the coefficients reported in Table 5 may provide statistical evidence on the role of consumer characteristics on the propensity to consume Sicilian wine.

More in detail: Regarding the socio-demographic characteristics, the willingness to consume a Sicilian wine increases if:

Age is decreasing, the degree of education is higher, the income increases, you are female and if you are residing in the South of Italy.

Concerning the attitudes towards wine consumption, the propensity to consume Sicilian wine increases when:

Consumers prefer to consume wine during meals and in public places and when the choice of wine is influenced by the wine guides rather than the advertising.

Looking at the preferences of the respondents towards the attributes of wines, the willingness to consume Sicilian wine increases in consumers:

Who prefer white wine to red wine.

The last part of the analyses focused on the respondents' preferences according to the different wine distribution channels. Results show that the willingness to consume Sicilian wine increases:

In consumers used to purchasing wine in specialized shops (wine shops) and supermarkets rather than discount and hypermarkets.

This last finding would seem to confirm the result of a previous study on market penetration of certified wines highlighting the importance of wine shops as the favoured distribution channel especially for premium wines (D'Amico *et al.*, 2014a).

Discussion

Sicilian wines are showing an increase of their relevance in the Italian and world market, fueled by the improvement in the quality of the supply mainly through the widespread of PDO and PGI and bottled wine

productions (Crescimanno and Galati, 2014; Di Vita *et al.*, 2013b; 2013c). Thus, the analysis of the consumers preferences towards the Sicilian wines represents an interesting case study for both practitioners and researchers in the wine sector. Despite several authors widely arguing the main research approach to the consumption of regional brand wines and regionally denominated products (Rasmussen and Lockshin, 1999; Skuras and Dimara, 2004; Johnson and Bruwer, 2007) empirical studies on Sicilian wine are fairly limited and circumscribed to limited geographical areas (Caniglia *et al.*, 2008; Lanfranchi *et al.*, 2014c). Our Results confirmed the relevance of the Sicilian wine image and corroborated the important role played by Sicilian wine in the Italian wine market. Estimates provided evidence that income and habits to purchase at wine shops and the habit of drinking between meals significantly influence the willingness to consume Sicilian wines. Furthermore the sample willingness to consume the Sicilian wine increased for white wines and when the consumption takes place in public areas. Furthermore, it is important to underline that according to the estimates, “being price-conscious consumers” seems not to affect the consumption of Sicilian wine. This last result can be interpreted as evidence of the relative price “inelasticity” of the demand for Sicilian wine. The main implication of the findings obtained in this study consists in providing useful insights for wine managers and policy makers, in order to better address marketing and policy strategies targeting the potential consumers. Their profile characterization could be useful to further increase the market penetration of Sicilian wines. This study illustrated that the employed model was appropriated to characterize the empirical analysis carried out. However, since our sample was mainly collected within urban areas in Italy, samples from a wider geographic range will be necessary to further investigate the determinants of the preference for Sicilian wine. While it is very likely that studies conducted in rural areas do not yield substantively dissimilar results, the consumption pattern of Sicilian wine, in both terms of frequency and quantity of consumption could not be compared at all since distribution and availability of Sicilian wine may differ significantly. Furthermore our variables does not include (time-related) information on consumption frequencies and on the general characteristics of the household and each household member. In order to enhance understanding of the preferences towards Sicilia wine, research in foreign markets could extend our results.

Conclusion

This study analyze the determinants of the preference of Italian consumers towards Sicilian wines, by means of

an econometric analysis performed on national sample of 953 consumers. A binary response model was employed to evaluate the most important variables (demographic profile, preference and attitudes) that influence the drinking wine choices of Italian consumers (Lanfranchi *et al.*, 2014b; D’Amico *et al.*, 2014b). Results emphasize that income and habits to purchase at wine shops and the habit to drink between meals significantly influence the willingness to consume Sicilian wines. Furthermore the propensity to consume the Sicilian wine increases for white wines and when the consumption takes place in public spaces.

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Author’s Contributions

This article is the result of the full and equal collaboration of all the authors.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of other authors have read and approved the manuscript.

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