Individual profiles and wine consumption patterns in Tenerife. A multinomial logit model

M. C. Rodríguez Donate*, J. J. Cáceres Hernández,
G. Guirao Pérez and V. J. Cano Fernández

Departamento de Economía de las Instituciones, Estadística Económica y Econometría.
Facultad de Ciencias Económicas y Empresariales. Universidad de La Laguna.
Campus de Guajara, s/n. 38071 La Laguna (Tenerife). Spain

Abstract

The aim of this study is to analyze the decisions on the frequency of wine consumption to detect the individual characteristics of the potential consumer that influence the propensity towards each decision. Discrete choice models, and in particular, logit models have been seen as tools which are able to identify the way in which a specific combination of characteristics that define the residents of Tenerife conditions his decision on consumption frequency. In general, a regular consumption is not usual for women, which only do so occasionally. On the other hand, the ratio of occasional consumption probability to high frequency consumption probability falls as the age increases. In this sense, the identification of the combinations of individual characteristics associated with patterns of extreme consumption clearly indicates that women and young people are the two consumer segments which should be objects of specific marketing strategies. Any case, the design of such strategies requires investigating about individual preferences and goes beyond the scope of this paper.

Additional key words: consumption frequency, discrete choice model, individual characteristics.

Resumen

Perfiles individuales y patrones de consumo de vino en Tenerife: un modelo logit multinomial

En este trabajo se analizan las decisiones sobre la frecuencia de consumo de vino de los residentes en Tenerife con objeto de detectar las características individuales del potencial consumidor que determinan una mayor propensión hacia cada una de estas decisiones. Los modelos de elección discreta y en particular los modelos logit se han mostrado como una herramienta capaz de desentrañar el modo en que ciertas combinaciones de atributos que definen al individuo en cuestión condicionan su decisión sobre la frecuencia de consumo. En general, las mujeres no pueden incluirse en el grupo de consumidores de alta frecuencia y si consumen, sólo lo hacen ocasionalmente. Por otro lado, el ratio entre la probabilidad de consumo ocasional y la probabilidad de alta frecuencia disminuye a medida que aumenta la edad. En este sentido, la identificación de combinaciones de características individuales asociadas a patrones de consumo extremos muestra con claridad que las mujeres y los jóvenes constituyen dos segmentos de consumidores a los que convendría dirigir estrategias comerciales específicas. En cualquier caso, el diseño de estas estrategias requiere conocer las preferencias individuales y queda fuera del alcance de este trabajo.

Palabras clave adicionales: características individuales, frecuencia de consumo, modelos de elección discreta.

Introduction

According to data from the Canary Government, vineyards accounted for nearly 19,000 hectares of the Canary Islands in 2007 (Estadística Agraria de Canarias, 2007). This figure represents more than 35% of the total land area dedicated to farming, and confirms this activity as the most extensive in such a limited agricultural area. The importance of its productive impact in the archipelago is unquestioned. However the wine activity contribution to the islands economy can not only be measured in terms of agricultural production, which, incidentally have tripled in the last decade, even though it is much smaller than other crops such as the tomato or the banana. Wine activity must also be

considered in its role as an element that helps to maintain the population in the rural communities. The role of wine activity is especially important in how it consolidates the rich landscape which attracts tourists who are the actors of the main economic activity in the Canary Islands: the tourist trade. This circumstance helps to explain the reasoning behind some of the economic policy decisions adopted by local public agencies that impact the economy. These decisions, together with E.U. subsidies, have benefited the local grape growing and wine producing activity during its transformation. The commercialization of the island wine is perhaps the one aspect which has undergone the most evident modernization process, jointly with the creation of Advisory Boards of wine designation of origin and their corresponding wine cellars. Important transformations in grape production have also taken place.

Most of the vineyards in the Canary Islands are located in the province of Santa Cruz de Tenerife and, specifically, in the island of Tenerife, which accounts for 11,724 hectares (Estadística Agraria de Canarias, 2007), spread out among five areas with their own respective designation of origin[1]. Wine supply in Tenerife does not meet local demand, but this imbalance is satisfied by imported wines. The strategic geographical location of the Canary Archipelago as an intermediary point of international commercial traffic and the important role of importers influence the supply in the island wine market and make it especially competitive and dynamic[2]. Furthermore, the improvement in the quality of island wines is a given process that has begun and is absolutely necessary to be competitive. In spite of that, the result of this conflict between Tenerife wines and imported wines can be the expansion of either wine, especially if the heterogeneity of the product and the absence of loyalty are considered. Consumer demand is also in decline, as seen in the lower per capita consumption levels with respect to national levels (Martín, 2006).

Wine consumption habits in society are clearly changing, and this evolution in individual preference towards wine consumption is determined by some of the transformations that are taking place in society. Changes in lifestyle, urbanization, limited free time, smaller families, or the integration of women into the labour market, among other factors, determine new consumption habits. The wine product that has been associated for such a long time with daily consumption, and its natural inclusion in the daily diet, has now become an occasional complement to meals[3]. Even though the beneficial effects of moderate wine consumption on health are known, it is also clear that the social perception of alcohol consumption and specifically the associated connotations to wine consumption can lower its intake.

In this saturated market with declining demand, the modernizing efforts by local wineries can not sustain the competitiveness of their product. Marketing strategies are also necessary to attract new clients to a marketplace which now offers a greater variety of products from different regions. The first step in this direction must be to study consumer demand in the main potential market of this island product —consumers from Tenerife—, and then identify market segment objectives and develop new products which fit specific demands. Some research has examined the incidence of specific factors in wine consumption. See, among others, Sánchez and Gil (1998), Angulo *et al*. (2000), Thomas and Pickering (2003), Bernabéu *et al*. (2004), Selvanathan and Selvanathan (2004), Martínez-Carrasco *et al*. (2006) and Guris *et al*. (2007).

Identifying the consumer profile of an individual goes beyond a simple confirmation of wine consumption and, evidently a more detailed description of the individual decision is reflected in variables such as the quantity consumed and its frequency. The social connotations and even moral ones associated with wine consumption are, inevitably, beyond the consumption statements included in our survey questions, especially

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[1] Although the red wines production is higher than the white wines production, the proportions of these types of wine depend on the designation of origin: Tacoronte-Acentejo, Valle de la Orotava, Abona, Ycoden-Daute-Isora and Valle de Güímar. In Tacoronte-Acentejo, the first designation of origin in Canary Island, most of vineyards produce red wine grapes. Wines in Valle de la Orotava are elaborated with white or black grapes in similar proportions. Finally, in Abona, Ycoden-Daute-Isora and Valle de Güímar, wine production is basically elaborated with white grapes.

[2] Mainland Spanish wines, specially from Rioja designation of origin, are the main competitors of local wineries (see, among others, EDEI, 2007).

[3] Bardaji (1994), while referring to Mediterranean countries, indicated that the disappearance of traditional lifestyles has resulted in the absence of daily wine consumption practice. Instead it has been relegated to more occasional situations in which its quality is more greatly appreciated. This same tendency towards quality wines has also been noted by Delgado (2001). Bernabéu and Olmeda (2002) found a relationship between the tendency towards occasional consumption and consumer attitude at the moment of purchase.

when quantity is concerned. Obviously there is a high correlation between quantity consumed and frequency, although the responses on this last category seem to be more neutral. At any rate, the range of alternatives which the individual faces is much more complicated than just a decision to drink or not. The aim of this study is to identify the consumption patterns associated with a group of characteristics that define the individual that consumes wine with a specific frequency among the residents in the island of Tenerife. The residents in Tenerife are expected to appreciate the local wine. However, the subjective evaluation between quality and price relation could lead residents to choose non local wines[4]. Therefore, from the perspective of local producers, general wine consumption patterns need to be identified in order to design commercial strategies which allow them to capture new clients. According to Canary Wines Strategy for 2008-2013 (ICCA, 2007) commercial strategies are designed leaving aside the consumers' demand. Of course, this is the weakness of Canary wineries.

Material and methods

This section presents a description of the population under study and allows some preliminary hypotheses to be deducted and tested through inferential analysis. The section also reviews multinomial response models that make up an appropriate econometric statistical tool to capture the complexity of the decision-making process behind the observation of the individual choice.

The proposed analysis was based on data from a survey carried out in April and May, 2001 which was addressed to a segment of the resident population in Tenerife, specifically those aged 18 or older[5]. The sample unit was the individual and not the household. Responses from 1,172 residents were considered. The residents in the survey were chosen by random sampling in the largest geographical areas which divide the island: the northern area (390 observations), the southern area (397 observations) and the metropolitan area (385 observations) (see Fig. 1). With a 95% confidence level, the number of sample observations provides a
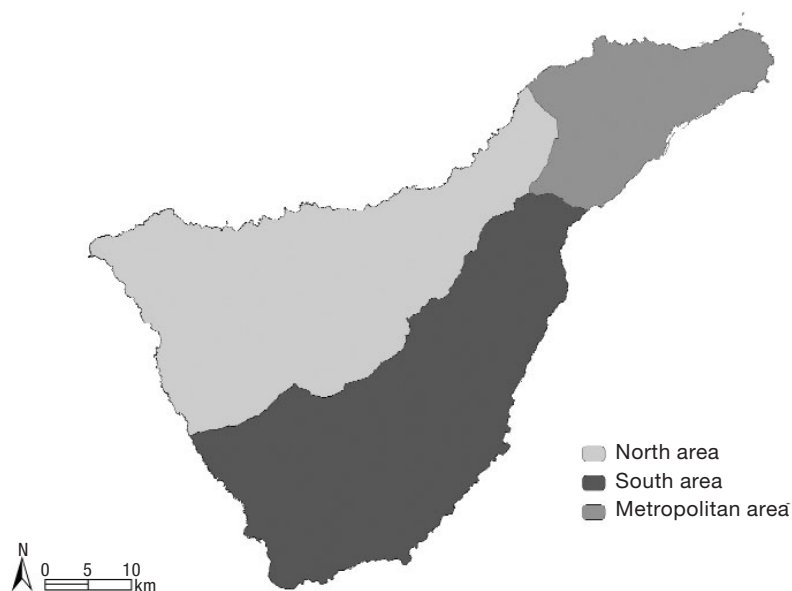

Figure 1. Geographical areas in which the island is divided.

[4] As Duarte *et al.* (2008: 298) pointed out, «Canary wines are being internationally recognized for their quality... However,… Canary wines are more expensive to produce than many wines produced outside the Archipelago mainly due to terrain conditions and resulting need for manual labour. This issue is creating a disadvantageous situation for the successful positioning of the local wines». In fact, Canary consumers seem to be willing to pay high prices in comparison to other Spanish consumers. In spite of that, the per capita consumption of wine with designation of origin in Canary Islands is higher than the average consumption of this type of wine in Spain (Martín, 2006; Mercasa, 2008).
[5] The survey was carried out as part of the research project *Análisis de las preferencias de los consumidores y la demanda de vino en Tenerife* (see Guirao *et al.*, 2001). More recent surveys are not available for the authors.

Table 1. Percentage of population (survey) by gender and age in Tenerife in 2001

	18-29	30-39	40-49	50-59	60-69	> 70	Total
North area							
Male	12.1 (14.3)	11.2 (10.8)	8.5 (8.2)	7.0 (7.2)	5.7 (5.9)	4.7 (4.1)	49.2 (50.5)
Female	11.9 (13.1)	11.2 (9.7)	8.3 (8.5)	7.0 (6.9)	6.1 (6.4)	6.3 (4.9)	50.8 (49.5)
South area							
Male	13.2 (14.9)	13.2 (10.6)	9.2 (9.1)	6.5 (6.3)	5.0 (4.8)	3.7 (4.0)	50.8 (49.7)
Female	12.7 (14.8)	12.6 (12.1)	8.3 (7.5)	6.1 (5.8)	4.9 (5.3)	4.6 (4.8)	49.2 (50.3)
Metropolitan area							
Male	12.3 (14.5)	11.1 (10.9)	8.7 (7.5)	6.7 (6.5)	5.0 (5.2)	4.3 (3.9)	48.1 (48.5)
Female	11.9 (13.8)	11.1 (10.4)	9.2 (8.8)	7.0 (6.3)	6.0 (6.5)	6.7 (5.7)	51.9 (51.5)

sampling error lower than 5% for each one of the areas and lower than 3% for the whole island. At each one of the areas, sample units were chosen by stratified random sampling with proportional allocation in different groups of age and gender as indicated in Table 1.

The survey included questions concerning wine consumption habits and socio-economic characteristics of individuals. These characteristics have been suggested as having a possible relationship with decisions related to frequency consumption. Three categories were considered to define this frequency: non consumption, occasional consumption (less than once a week) and high frequency consumption (one or more times a week). In these terms, almost one-fourth of those surveyed (24.1%) never drank any type of wine, while 55.3% were in the occasional wine consumption category. The remaining 20.6% consumed with high frequency[6].

Understanding the characteristics of the individuals associated with each specific consumption pattern would allow wine producers to design commercial strategies adapted to homogeneous consumer groups and, in this way, attract clients for the island supply. Specific population segments that are less likely to consume wine have been identified, such as the young (see Gómez-Limón *et al.*, 2001) and the women (see Hidalgo, 2007)[7]. The cultural traditions present in

Tenerife suggest that residential area can also be associated with specific types of consumer behavior[8]. Individuals with specific occupations, such as students or housewives, possess life styles that are less associated with wine consumption than, for example, professionals. On the other hand, education level is increasingly converted into an influential trait in consumption frequency, given the interpretation of the occasional consumption of quality wines as a reflection of the cultural level of the individual. In this paper, the differences in characteristic consumption patterns of the individuals defined by gender, age, residential area, occupation, and education level are analyzed[9]. The categories of each one of these individual characteristics and its relative weight in the sample are indicated in Table 2.

A descriptive analysis, based on contingency tables, helped identify the main characteristics of the individuals that showed different consumption patterns and in this sense could help corroborate some pre-established ideas about wine consumption patterns, or at least serve as a starting point to formulate new hypotheses. Male wine consumer percentage in the sample group was higher than female (85.7% and 66.3%, respectively) and, in general, high frequency consumption was more common among males. Regarding geographical area, the first noteworthy event is that the percentage of non-

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[6] According to EDEI (2005), the last percentage is lower than 24%.

[7] Although individual data are not available, the general results of a survey of Canary residents in 2007 confirm these patterns. In this sense, the survey reveals that the wine consumption frequency rises as the age increases, whereas females are less prone to high frequency consumption (see, EDEI, 2007).

[8] Bernabeú *et al.* (2004) emphasize the importance of wine origin in consumer segmentation. See also Guirao *et al.* (2002).

[9] Earnings level was discarded because of its high correlation with education level. A similar occurrence is evident among civil status and age. For instance, it is common that single males and females are in the lower age categories, and that widows and separated adults belong to older age categories. In addition, specific behaviors are seen in certain age segments which suggest that commercial strategies should be created specifically with this segment in mind. Hence, consumer age as a relevant characteristic was kept.

Table 2. Consumption frequency according to socio-demographic characteristics[a]

	Non-consumption	Occasional	High frequency
Gender			
— Male	83 (14.3)	312 (53.7)	186 (32.0)
— Female	199 (33.7)	336 (56.9)	56 (9.5)
Age (yr old)			
— 18-29	87 (26.0)	225 (67.4)	22 (6.6)
— 30-39	42 (16.7)	163 (64.7)	47 (18.7)
— 40-49	37 (19.1)	100 (51.5)	57 (29.4)
— 50-59	31 (20.4)	74 (48.7)	47 (30.9)
— 60-69	40 (30.1)	54 (40.6)	39 (29.3)
— >70	45 (42.1)	32 (29.9)	30 (28.0)
Area			
— North	101 (25.9)	197 (50.5)	92 (23.6)
— South	99 (24.9)	206 (51.9)	92 (23.2)
— Metropolitan	82 (21.3)	245 (63.6)	58 (15.1)
Occupation			
— Employee	66 (18.0)	221 (60.4)	79 (21.6)
— Civil servant	5 (7.5)	45 (67.2)	17 (25.4)
— Student	60 (31.4)	120 (62.8)	11 (5.8)
— Housewife	96 (43.0)	111 (49.8)	16 (7.2)
— Businessman	16 (13.8)	55 (47.4)	45 (38.8)
— Professional	5 (7.6)	40 (60.6)	21 (31.8)
— Other	34 (23.8)	56 (39.2)	53 (37.1)
Education level			
— No studies	54 (45.8)	31 (26.3)	33 (28.0)
— Grade School	87 (24.0)	176 (48.5)	100 (27.5)
— High School	90 (22.4)	246 (61.2)	66 (16.4)
— College	51 (17.6)	195 (67.5)	43 (14.9)
Total	282 (24.1)	648 (55.3)	242 (20.6)

[a] The relative weight of consumption decisions is indicated in parenthesis for each of the individual characteristics.

consumers is lower in the metropolitan area and that the greater part of the individuals that reside in this area are characterized by occasional consumption, while high frequency consumption is found in the northern and southern areas.

High frequency consumption is most common among males older than 40, and their percentages are close to 30%. The lowest figures belong to the youngest group, which admit to occasional drinking the majority of time[10]. A simple correspondence analysis confirms that the youngest group (18-29) can be associated with occasional consumption, while those in the 50-59 and 60-69 age groups are characterized by the high weighting of daily consumption. Finally, the most relevant characteristic of the consumer profile of those older than 70 is the participation of non-consumers[11].

Employment status and education level seem to clearly affect frequency of consumption. The percentage of consumers is especially high among civil servants and professionals (92.5%), while the groups in the occupational status with highest percentages for non-consumers are students and especially housewives (31.4% and 43%, respectively). In addition, the consumption frequency seems to be inversely related with education level. Almost half of the individuals who did not finish grade school stated that they did not drink wine, while this percentage falls to 17.6% of those surveyed who had university degrees. However, high frequency consumption is seen in greater proportion of the cases among individuals with low education levels, while among those interviewed with high school or college education levels consumption was more occasional. Correspondence analysis confirms that the increase in education level favors occasional consumption while individuals with lower level of studies are prone to extreme consumption patterns, and therefore have greater weighting on non-consumption and high frequency consumption[12].

Discrete choice models provide a probabilistic jointly quantification of the effects described in the prior paragraphs. Such models are widely used in applied economics literature as a flexible instrument which is able to explicitly gather individual decision processes between a finite set of alternatives which is directly influenced by the characteristics of both the alternative and the agent who makes the decision (see

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[10] The high price of wine relative to other alcoholic beverages such as beer has a negative influence on consumption among younger age groups, who are characterized by their lower purchasing power. However, this behavior could also explain how wine and its consumption are seen as a symbol of social prestige, associated with individuals of a specific age. Indeed, a recent study by the Spanish Wine Federation on younger age groups and wine in Spain (FEV, 2005) carried out on a population between ages 18 and 35 during September and October, 2005, confirms the distant position of younger age groups with respect to wine and emphasized the link between its consumption at family and other social events. In EDEI (2007), the lower consumption of youngest people is also detected in Canary Islands.

[11] The results from this analysis are not included here because of space consideration; however they are available upon request from the reader.

[12] Although the results are not included, the local wine consumption patterns are very similar. In fact, a very high proportion of wine consumers in the survey are also local wine consumers.

Train (2003), among others, for a detailed explanation of these models). Logit models are the most common among these discrete choice models and were considered in this study because of their facility for estimation and above all the interpretative richness of the obtained results.

Results

Since the stated objective in this study consists of identifying the differences in individual consumption decisions under clearly defined profiles in terms of individual characteristics, the only explanatory variables in the logit model are the decisor characteristics. Given the ordered nature of the choice group alternatives, it would seem reasonable to initially test an ordered multinomial specification. In fact, according to this insufficient criterion many empirical studies opted for this model formulation (see Rodríguez and Cáceres, 2007). However the ordered specification implies an underlying order of associated utilities to the decisions linearly connected with the explanatory variables. It is risky to assume that this is the principle that guides the decision-making process of the individuals in the observed sample. Notice, for instance, that contrary to the previous assumption, the increase in education level entails an increase of occasional consumption instead of producing effects of the opposite sign in the choice probabilities of the extreme alternatives, consistent with the expected linear effect. In fact, the estimation of the ordered specification was seen as excessively rigid to capture this type of effects.

Once an ordered specification has been discarded, is reasonable to compare the conventional multinomial specification with a nested specification. It is possible that the individual adopts his decision in two levels; that is, firstly, the decision about consumption or not consumption is adopted, and, in second place, the decision about the frequency of consumption is made. This being the case, it would be possible to include the variables that explain the decision made in each one of these two levels. However, given that the proposed model does not aim to gather all of the explanatory factors in the decision regarding consumption frequency, but instead is oriented towards the identification of the consumption patterns that correspond to different individual profiles, the traditional multinomial specification is, a priori, acceptable. At any rate, the results of the independence of irrelevant alternatives tests do not indicate that this last specification is incorrectly showing the decision making process[13].

The mixed model specification was also tested as an appropriate model which could show the heterogeneity in the associated consumption patterns to a specific individual profile from the decisor agent. However, the obtained results in the estimate suggest that model parameters do not reflect randomness. In fact, these specifications seem to be more reasonable when alternative attributes are introduced as explanatory variables that are perceived in a different way by decisor agents with individual characteristics that condition his decision.

Tables 3 and 4 show parameter estimates and predicted probabilities obtained for the following conventional multinomial specification.

Table 3. Estimates of the multinomial logit model

	$P(Y_i = 1)$	$P(Y_i = 2)$		$P(Y_i = 1)$	$P(Y_i = 2)$
Constant	−0.049	−1.787***	Employee	0.891***	0.821*
Female	−0.666***	−1.622***	Civil servant	1.585***	1.969***
30-39 yr old	−0.046	0.982**	Housewife	0.775**	−0.547
40-49 yr old	−0.179	1.523***	Businessman	0.953**	1.430**
50-59 yr old	−0.145	1.666***	Professional	1.772**	1.699**
60-69 yr old	−0.475	1.582***	Other occupation	0.730*	0.595
>70 yr old	−0.981**	1.459***	Grade School	0.855***	0.411
North area	−0.302	0.462*	High School	1.008***	0.212
South area	−0.270	0.449*	College	1.450***	0.588

$N = 117$; $LnL = -999.2308$; $R^2_{MCF} = 0.2339$; $\lambda_{RV} = 336.4931$; AIC $= 1.7666$

* Significant at 10% level . ** Significant at 5% level. *** Significant at 1% level. R^2_{MCF} is the measure of the overall fit proposed by McFadden (1974). λ_{RV} is the likelihood ratio test. AIC is the Akaike information criterion (Akaike, 1973).

[13] According to the Small-Hsiao test (Small and Hsiao, 1985) this hypothesis could not be rejected (p = 0.522).

$$P\left(Y_i = j\right) = \frac{e^{\beta'_j z_i}}{1 + \sum_{k=1}^{2} e^{\beta'_k z_i}} \qquad j = 1, 2, \qquad [1]$$

where the dependent variable is defined $Y_i = 0$, if the ith individual does not consume, $Y_i = 1$ if the individual drinks occasionally, and $Y_i = 2$ if the individual consumes with high frequency. The explanatory variable vector z_i is made up of a group of dichotomous variables associated with the individual characteristics.

The predicted probabilities show that the multinomial specification is able to capture the direction of the changes in alternative choice probabilities in a consistent way with regard to what the descriptive analysis pointed out. It should be noted that the observed percentage changes in the sample are not expected to coincide in magnitude with the changes predicted by the logit

Table 4. Predicted probabilities[a]

	$P(Y_i = 0)$	$P(Y_i = 1)$	$P(Y_i = 2)$
Gender			
— Male	0.164	0.560	0.275
— Female	0.313	0.567	0.120
Age (yr old)			
— 18-29	0.240	0.685	0.075
— 30-39	0.225	0.601	0.173
— 40-49	0.222	0.508	0.270
— 50-59	0.211	0.498	0.290
— 60-69	0.251	0.431	0.318
— >70	0.314	0.332	0.354
Area			
— North	0.250	0.513	0.238
— South	0.246	0.521	0.232
— Metropolitan	0.226	0.623	0.150
Occupation			
— Employee	0.206	0.574	0.220
— Civil servant	0.105	0.575	0.319
— Student	0.367	0.450	0.183
— Housewife	0.266	0.651	0.082
— Businessman	0.172	0.518	0.310
— Professional	0.114	0.610	0.275
— Other	0.234	0.562	0.203
Education level			
— No studies	0.390	0.361	0.248
— Grade School	0.251	0.520	0.228
— High School	0.238	0.576	0.186
— College	0.173	0.637	0.190

[a] The figures shown in the table correspond to the mean values of the predicted probabilities of choosing each alternative when each one of the individuals in the sample is assumed to take the characteristic in question.

model, given that these last changes jointly quantify the effects of the individual characteristics. A comparison of percent changes of the descriptive analysis to choice probability changes derived from the logit model especially reveal significant discrepancies in individuals older than 70, civil servants, students, housewives, or individuals dedicated to other professions and those without studies. However, the multinomial specification is able to capture discrete changes of the same sign in choice probabilities in the extreme alternatives. In this sense the effect of education level is properly captured.

An additional advantage of this specification instead of other more complex alternatives is that it can provide more valuable information regarding the substitution pattern change among alternatives when the individual characteristics of the decision maker are changed. In this regard odds ratios are useful, and are defined as the quotient of the ratios

$$\Omega_{j/k} = \frac{P\left(Y_i = j\right)}{P\left(Y_i = k\right)}, \qquad [2]$$

when one of the individual characteristics changes category. If we denote by $\Omega_{j/k}\,(x_{i,m} = p)$ the $\Omega_{j/k}$ ratio value when the individual characteristic $x_{i,m}$ takes on category p, then

$$\frac{\Omega_{j/k}\left(x_{i,m} = p\right)}{\Omega_{j/k}\left(x_{i,m} = q\right)} = e^{\beta^p_{m,j} - \beta^p_{m,k} - \beta^q_{m,j} + \beta^q_{m,k}}, \qquad [3]$$

where $\beta^p_{m,j}$, $\beta^q_{m,j}$, $\beta^p_{m,k}$ and $\beta^q_{m,k}$ are parameters for the *dummy variables* that take on value 1 when the individual characteristic $x_{i,m}$ takes on categories p or q in the logit model equations that determine the choice probabilities of alternatives j and k, respectively. This formulation specifically allows for the direct deduction of the changes in the substitution pattern among alternatives when comparing individuals whose profiles differ in various characteristics. Recall that

$$\frac{\Omega_{j/k}\left(x_{i,m} = p; x_{i,n} = r\right)}{\Omega_{j/k}\left(x_{i,m} = q; x_{i,n} = s\right)} = \frac{\Omega_{j/k}\left(x_{i,m} = p\right)}{\Omega_{j/k}\left(x_{i,m} = q\right)} \frac{\Omega_{j/k}\left(x_{i,n} = r\right)}{\Omega_{j/k}\left(x_{i,n} = s\right)} \qquad [4]$$

and, evidently, the prior property can be directly extended to the comparison of the $\Omega_{j/k}$ ratios when three or more individual characteristics are modified.

The calculation of these quotients (see Table 5) reveals that the ratio between the probability of high frequency consumption and the non consumption probability is 5 times higher among males than among females. With regard to age, the odds ratio of occasional

Table 5. Odds ratios $\Omega_{j/k}$ (multinomial *logit*)

	p\q		
	$\dfrac{\Omega_{1/0}(x_{im}=p)}{\Omega_{1/0}(x_{im}=q)}$	$\dfrac{\Omega_{1/2}(x_{im}=p)}{\Omega_{1/2}(x_{im}=q)}$	$\dfrac{\Omega_{2/0}(x_{im}=p)}{\Omega_{2/0}(x_{im}=q)}$
Male/female	1.946	0.384	5.062
18-29/30-39 yr old	1.047	2.795	0.374
18-29/40-49 yr old	1.196	5.488	0.218
18-29/50-59 yr old	1.156	6.118	0.189
18-29/60-69 yr old	1.608	7.825	0.205
18-29/≥ 70 yr old	2.668	11.472	0.233
North/metropolitan area	0.968	0.955	1.588
South/metropolitan area	0.763	0.487	2.052
Civil servant/student	4.881	0.681	7.162
Professional/student	4.815	0.880	5.472
No studiesgrade school	0.425	0.641	0.663
No studies/high school	0.365	0.451	0.809
No studies/college	0.234	0.422	0.555

consumption to high frequency consumption falls as the age increased and, in fact, the ratio among these two probabilities is 3, 5, 6, 8 and 11 times lower for the youngest age group than for the respective segments of the following ages. Regarding residential area, the non consumption probability to high frequency consumption probability ratio is 60% higher in the metropolitan area than in the northern area and more than double the southern area. The most noteworthy results with respect to occupation correspond to the comparison of civil servants and professionals with students. The ratio between the non consumption probability and probability of high frequency consumption for these last groups is more than 5 and 7 times higher, respectively, than the ratio corresponding to professionals and civil servants. Finally, regarding education, the most outstanding effect is that the higher education level, the higher occasional consumption probability and non consumption probability. This ratio is approximately 2 times, almost 3 times, and more than 4 times lower for those that do not possess any level of education

than those individuals with grade, high and college education, respectively.

As indicated earlier, the specified model offers the possibility of carrying out multiple comparisons. In this sense, and given that the objective of the study is, as mentioned, to identify consumer characteristic patterns, it would be worthwhile to analyze which individual profiles possess the most extreme consumer patterns relative to some of the possible choices. A list of the individual characteristics which, in agreement with the model estimates, correspond to minimum and maximum probabilities of choosing a specific alternative is shown in Table 6. For these purposes we only considered the individuals whose characteristics coincide with some of those found in the sample.

Note that the categories, in agreement with discrete changes, identify those individuals with extreme choice probabilities, and do not coincide exactly with the combinations of characteristics that, among the individuals in the sample, correspond to these extreme situations. The explanation is consistent, on one hand, to the obtained combinations taking into account that discrete changes can not correspond to any of the observed ones, and, on the other hand, that calculated discrete changes approximate the average effect of a change in category for the group of individuals in the sample. It is especially important to note that the discrete change associated to the change in an individual characteristic can vary notably as a function of the remaining individual characteristics. Specifically, in agreement with Table 6, the maximum non consumption probability corresponds to housewives, even though according to the calculated discrete changes, this is not the occupation that we would expect to have the greatest non consumption probability (the student group). If a combination of other individual characteristics that makes the non consumption probability of students reaches its maximum were present in the sample, then this probability would be higher than the one indicated in the prior table. This

Table 6. Individual profiles with extreme consumption patterns

| $P(Y_i=0)$		$P(Y_i=1)$		$P(Y_i=2)$	
Minimum	**Maximum**	**Minimum**	**Maximum**	**Minimum**	**Maximum**
0.031	0.702	0.151	0.881	0.011	0.690
Male	Female	Male	Male	Female	Male
50-59 yr old	> 70 yr old	> 70 yr old	18-29 yr old	18-29 yr old	60-69 yr old
North area	North area	North area	Metropolitan area	South area	North area
Civil servant	Housewife	Other occupation	Professional	Housewife	Businessman
College	No studies	No studies	College	High School	Grade School
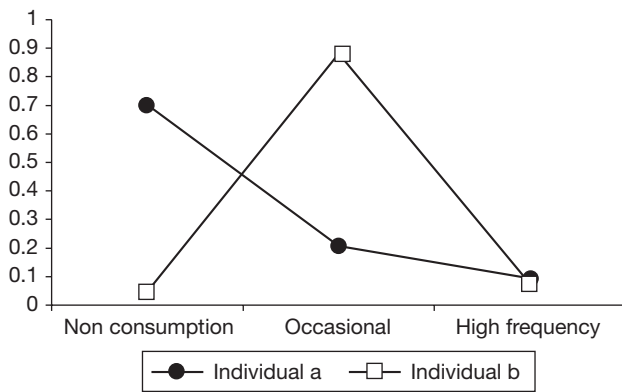
Figure 2. Predicted probabilities for the most distant individuals.

circumstance highlights the caution which is necessary when discrete changes are interpreted[14].

Two individuals in Table 6 are identified as the specific consumption profiles that are most distant from each other in terms of predicted probabilities for each one of the considered consumption alternatives[15] (Fig. 2). The distance between these two individuals is also apparent when examining the odds ratios that show that the distance between the two consumption profiles is basically due to the differences in the non-consumption and occasional consumption probabilities. In particular, the odds ratios of occasional and high frequency consumption to non consumption for one of the two individuals are 66 and 12 times higher than the same odds ratios for the other one.

None of the identified profiles from Table 6 represent even 1% of the individuals in the sample and, consequently, it seems difficult that a business strategy can be directed at segments which are hardly representative of the population. More important in practice is the

analysis of the homogeneity of the choice probabilities for those individuals in the sample that are characterized by a specific category of an individual characteristic when the other characteristics change. From this point of view, the cases of women and the youngest age group are illustrative cases. The probabilities of non consumption and occasional consumption for the individuals in the sample that belong to each one of these two groups (Fig. 3) reveal the presence of a market niche made up of potentially female consumers, but they still are not part of a regular consumption group or only do so occasionally. On the other hand, a segment of young occasional consumers is present, and is identified as a potentially high frequency consumer if appropriate marketing strategies are designed.

Furthermore, the study of the consumption patterns in terms of the place of consumption is also interesting. In this sense, an exploratory analysis was made from the available survey. One of the most salient features is that the preferent place of consumption is at home. This pattern is expected to be encouraged by the tightening of traffic laws related to alcohol consumption. On the other hand, the consumption in restaurants is more frequent for people between 30 and 40 years, but the preferences for this place are weaker as the age of people increases[16].

Discussion

This study has dealt with logit models as a useful tool to identify the characteristics that define the individuals that fit a specific wine drinker profile. The descriptive analysis offers empirical evidence to support
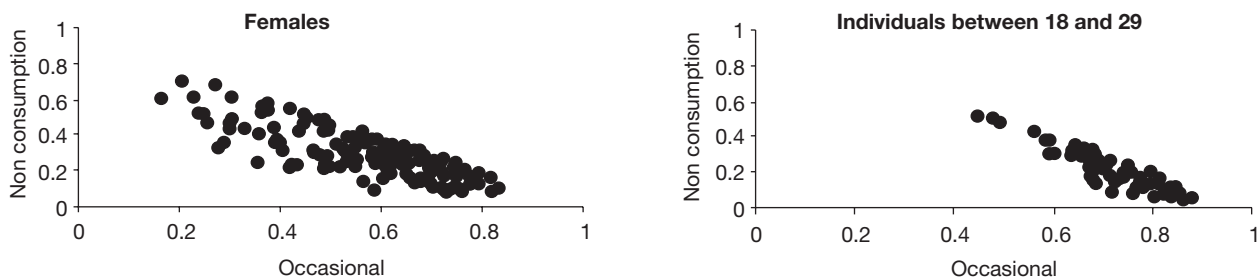

Figure 3. Distribution of predicted probabilities for women and for individuals between 18 and 29.

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[14] For instance, with regards to people younger than thirty years old, the increase on probability of high frequency consumption for people older than 70 years oscilates between 0.04 (minimum discrete change) and 0.51 (maximum discrete change).
[15] Euclidean distance squared was used.
[16] These results are not included to save space, buy are available upon request.

some intuitions about the sense and degree in which a specific socio-demographic characteristic conditions a certain consumption decision. Logit models have been seen as a useful tool to untangle the complex network of the effects that intervene in the decision making processes by consumers and non-consumers, since they allow joint probabilistic quantification of these effects as well as the simple evaluation of the changes in the substitution pattern among alternatives when the individual characteristics that define the individual decision maker are modified. Specifically, the odds-ratios quotients confirm, in inferential terms, the obtained impressions based on descriptive analysis. That is, the most favorable individual characteristics for the frequent consumption are male gender, older than 50, and working as a civil servant or professional. On the other hand, female gender or student status seems to dominate the characteristics that define the individuals that do not drink wine. Finally, the increase in education level favors occasional consumption and this same circumstance takes place among youngest members in the sample.

The identified consumer profiles can help to recognize the aspects which must be emphasized to maintain consumer's loyalty, as well as how to strengthen wine consumption among who are shown to be least likely to consume. For example, women are less likely to consume and, if they do, it is with less frequency than men. Consequently they make up a market with wide open expansion possibilities. In fact, the increasing incorporation of women into the labour market and the increase in their educational training, make up factors that agree with the obtained results in this study. They can also simplify the development of a consumption habit that, until just recently, is considered more appropriate for the masculine gender. Carefully planned marketing campaigns can intensify this tendency.

Furthermore, a margin seems to exist to increase the attractiveness of wine among younger generations, the least likely to frequently consume wine. In addition, the need to insist upon cultural aspects and associate wine to social prestige can also be effective in increasing the frequency of consumption among individuals with higher level educational studies, more likely to occasionally have a glass of wine. Even though it seems essential to communicate the properties of the island product and provide more information to the consumers in the most effective way, the specific design of commercial strategies are beyond the scope of this study. However the analysis carried out can contribute to avoiding strategies that destroy the long path traveled until now, which has at least given resident consumers an opportunity to perceive the authentic quality in the local product. Anyway, a more precise definition of the consumption patterns must be taken into account to define marketing strategies. In this sense, a detailed and more recent survey would be strongly useful.

Acknowledgements

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