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Regional reputation as the price premium: estimation of a hedonic model for the wines of Castile-La Mancha

La reputación regional como el diferencial de precio: estimación de un modelo hedónico de precios para los vinos de Castilla-La Mancha

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Abstract

Wine is a multi-attribute product and one of great differentiation. Consumers do not know wines' intrinsic properties before its purchase; consumers need and look for extrinsic signals that allow them to infer those intrinsic properties. To evaluate those intrinsic wine properties, the article uses price as an extrinsic signal to express their value. The price used is a comparison between the prices suggested by the specialized guides and the ones proposed directly to the consumer at the on-line stores. With the hedonic price methodology, which relates price and attributes, the article shows the convergence between the value referenced (price) by the Spanish experts and the one paid (price) in the Spanish market, the former being independent of the interests of the economic agents and the latter not. Regional reputation is the only attribute that positively impacts the price of Castilian wine and is prioritized in the ranking of attributes.

Keywords
hedonic model • wine of Castile • denomination of origin • attributes • experts • on-line sales • Spanish wine market • price premium

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Resumen

El vino es un producto de atributos múltiples y de gran diferenciación. Los consumidores no conocen las propiedades intrínsecas de los vinos antes de su compra; los consumidores necesitan y buscan señales extrínsecas que les permitan inferir esas propiedades intrínsecas. Para evaluar esas propiedades intrínsecas del vino, este artículo usa el precio como una señal extrínseca para expresar su valor. El precio utilizado es una comparación entre los precios sugeridos por las guías especializadas y los que se proponen directamente al consumidor en las tiendas en línea. Con la metodología de precios hedónicos, que relaciona precios y atributos, este artículo muestra la convergencia entre el valor referenciado (precio) por los expertos españoles y el valor pagado (precio) en el mercado español, siendo el primero independiente de los intereses de los agentes económicos y el último no. La reputación regional es el único atributo que impacta positivamente en el precio del vino castellano y se prioriza en el ranking de atributos al momento de compra.

Palabras clave
modelo hedónico de precios • vino de Castilla • denominación de origen • atributos • expertos • ventas en línea • mercado del vino español • diferencial de precio

Introduction

The wine region of Castile-La Mancha (Spain) has the largest vineyard in the world, with an area of 580,000 hectares, representing 51% of Spain's vineyard, 17.6% of the European vineyard, and 7.4% of the world's vineyard (29). Its estimated production is, on average, usually more than 50% of the total of Spain, approximately 10% of the European Union-27, and 7% of the world (29). For comparative purposes, Castile-La Mancha produces the same amount of wine in hectoliters as the fourth world producer, the USA, 80% of what is produced in Australia or Argentina, and more than double of what is produced in Chile (29).

Castile-La Mancha has 13 wines within the category of Quality Wines Produced in Selected Regions, which represents 15% of the Spanish total production. 70% of the categories have acquired a level of protection of "Denomination of Origin" (Protected Designation of Origin), and those are: Almansa, Jumilla, La Mancha, Manchuela, Méntrida, Mondejar, Ribera del Júcar, Uclés, Valdepeñas. The remaining 30% of the categories have acquired a level of protection called Wine of the Land: Dehesa del Carrizal, Domain of Valdepusa, Finca Élez and Guijoso. Of all the "Denomination of Origin" (Protected Designation of Origin) in Spain, La Mancha is the largest surface with 187,000 ha, which is 29.33% of the total national surface for quality wines (29).

Wine in Castile-La Mancha is economically relevant; it is also an important part of its traditions, and its society. Over the last two decades in Castile-La Mancha and Spain, wineries have worked hard to market their wines appealing to their origin, creating certain entities of differentiation with links to land, and

its geographical origin. Therefore, it is necessary to know what qualities of the wine of Castile-La Mancha, how and to what extent they condition their price, as well as their competitiveness and their acceptance in the markets.

Determining which aspects condition the price of a product is not a simple task. Wine companies continually develop differentiation strategies, generating a large number of products with varying combinations of attributes which affect the final price. However, the intrinsic attributes of a product are not traded directly in the market and only present value within the product that contains them. Obviously, when a consumer acquires those attributes he must pay an amount to the seller, the question being whether what is paid by the costumer is close to the qualities of the wine.

This article is to compare whether the market price of a particular bottle of wine from the Spanish region of Castile-La Mancha converges with the value of its qualities, measuring these qualities using the prices presented in a reputed Spanish specialized guide and in several Spanish on-line stores as proxies. Research focused on wine products and markets are multifaceted and intricate, and for this reason it is difficult to ignore the role of context; as mentioned already the geographical context of this research is limited to Castilian wines being sold in the Spanish market.

Twenty on-line Spanish stores were chosen for this research, and the famous and well-known specialized guide Peñín (2010) was also selected: Alimentos de Cuenca, Catavinum, Cervezas y vinos, Elviwines, Enoteca Barolo, Intervinos, La Tienda de los Vinos, Lavinia, Pasión Vinícola, Quijote Vinos, Sibaritia, Torrevinos, Vegaval, Verema, Vinissimus, Vino Gusto, Vinos Checa, Vino Selección, Vinos en Casa, Vitivinos.

A consequent objective of this article is to study whether the difference in the prices of Castilian wine are associated with factors of quality and/or economic nature. Being that wine a highly differentiated product, the hedonic price model suits perfectly and allows the identification of attributes having the biggest impact in consumers' willingness to pay.

Different characteristics that make up a product, in this case Castilian wine, are reflected in its market price. It is therefore assumed that its price can be decomposed according to its attributes and, once the hedonic price model has been estimated, it would be possible to assign an implicit price premium to each of these characteristics.

For the case of wine, objectively measured attributes considered in hedonic price models are, to mention a few, grape variety, vintage, alcohol content, other technical quality attributes, the landscape or reputation of a particular wine region such as Castile-La Mancha, Bordeaux, or Mendocino and the jury grade received by a wine (11). Hedonic pricing theory, which is well known in the field of economics, has broadly been used to scrutinize and examine prices and consumer preferences for numerous products including wine (14, 25, 26, 27, 28, 38, 39).

The article is structured as follows. section one presents the literature review. section two describes the database and the method, and the results are discussed. Finally, the conclusions and references are presented.

Literature review

The basic idea of the hedonic valuation methodology is that in the price of some goods, the price of each one of its attributes is implicit. These goods give utility to the consumers based on the characteristics that compose them. But these features are not traded separately but transferred into

a package when you buy a good. Different studies point to Court (1941) as the first investigator to coin the term hedonic model, although the origin of its applications is more controversial. There is no doubt that the theory of hedonic models has been shaped over time, Lancaster (1966) developed the fundamentals to estimate the value of utility generated by the characteristics of a good, and Rosen (1974) established the theoretical support of the hedonic price model.

Hedonic pricing has broadly been used in economics and marketing literature as a theoretical model to examine consumer preferences for different product attributes. Lancaster (1966) presented the idea that consumers value attributes of products rather than whole products. This idea has been prolonged by consumer researchers in various ways contributing to a large number of theories and has been made accessible to practitioners and the public (*e.g.* Kotler and Keller (2009). In a comparable stream of literature, and as previously mentioned, economists also built on Lancaster's (1966) ideas along with others in the development of hedonic pricing theory, which was formally posed by Rosen (1974).

Hedonic pricing theory describes the aggregate preferences consumers have for product attributes in a particular market. This is done by examining the relationship between these attributes and prices. Attributes which attract price premiums are believed to be valuable to consumers while those which attract lower prices are considered as less attractive.

Early studies which used hedonic pricing theory to explain consumer standards associated to wine focused on the role of various types of attributes on wine prices (2, 6, 8, 14, 21, 25, 26, 40). Oczkowski (2001) summarized these attributes into four key categories: chemical, climatic, sensory, and objective. "Chemical attributes are measurable properties of the wine relating to its chemical composition such as sugar and acidity levels" (Oczkowski, 2001). "Climatic attributes relate to the weather in the time and place where the grapes were grown; by influencing grape quality and characteristics, these can have an influence on the taste and quality of wine" (Oczkowski, 2001).

However, "chemical and climatic attributes have been deemed unsuitable for inclusion in hedonic pricing studies because consumers are usually unable to access or understand this type of information when making wine purchase decisions" (Oczkowski, 2001). Further, "their influence on wine quality and taste is often poorly understood beyond wine makers, hence sensory attributes are also unlikely to affect the price consumers pay" (Oczkowski, 2001).

Objective attributes are those which can easily be obtained by consumers, by reading the information included on the wine bottle labels, such as: grape variety, vintage year, and wine region (27, 37). Aggarwal (2004) referred to these attributes not as 'objective', but as 'objectively measured'. This is because consumers often build complicated and subjective relationships with attributes such as brands or regions (1), and hence they are not always considered to be objective within consumer behavior and marketing literature (1). Previous research has established the importance of a number of objectively measured wine attributes, which may have a relationship with the price consumers pay for wine. These attributes, such as grape variety, vintage or wine age, and region of origin will be the main focus of this article and will be considered individually below.

Grape variety

The relationship between grape varieties and price has been considered previously in the hedonic pricing literature (2, 4, 26, 35, 36, 39). These studies have noted that "grape varieties which are fashionable at the time of the study tend to attract higher prices than those which are old fashioned or out of trend" (26).

Vintage

Numerous hedonic pricing studies have considered the influence of either vintage or age on the price of wines (7, 26, 36, 37, 39). These studies have largely noted that older wines tend to attract higher prices. This is likely because "consumers value the prestige of wines" (22), which has already aged and are ready to drink. Alternatively Steiner (2004a) noted that "the higher prices may also reflect storage costs which are worn by retailers and saved by consumers in the case of purchasing older vintages".

Region

"Region of origin covers aspects of the reputation and brand of the geographical area where the wine is produced" (Easingwood *et al.*, 2011). It is a different idea from "terroir" which relates to the impact of the physical features such as soil conditions on the grapes (10). "Marketing wine by region allows for the development of a 'regional brand' which can create a sustained competitive advantage for all producers within that region" (12). Consumer focused studies in numerous contexts have found region to be a significant factor for many consumers (17, 37) and "its absence from a wine label may lead to negative perceptions of quality" (16). In addition, numerous hedonic pricing studies have examined the influence regional reputations have on wine prices (4, 35, 38, 39). Schamel and Anderson (2003) and Bicknell *et al.* (2005) suggest that region of origin does affect the price that consumers pay for wine. Hence, for place of origin or region, a strong consensus (23, 34, 38) has risen over the fact that the more specific the labelling of the place of origin, the higher the price. "Moreover, a positive trend has been distinguished toward more regional differentiation" (Estrella *et al.*, 2012).

Prices

For recommended prices to use in the hedonic pricing studies, two different sources have been used through literature: specialized guide prices and retailer prices. The most widely used source has been prices from wine guides or wine publications (11). This choice has been generally explained by the data's accessibility to the wine consuming public at large. Moreover, as sustained by Ortuzar-Gana and Alfranca-Burriel (2010) these recommended prices could be useful because they do not take into account the seasonal discounts and are independent of the retailer characteristics (11). Even if they are widely used, wine guides prices have been considered inappropriate for estimating hedonic price equations by many authors (5, 8, 15, 41). Because of these limitations in the use of prices from only specialized guides, and as previously showed, the present article uses both, specialized guide prices and retailer prices.

Data and methods

Sample and variables

From the famous Peñín Guide (2010) the characteristics and price of the wines presented were accounted. From the on-line distribution points, only price was accounted. At first, all the red, white and rosé wines of the guide were chosen, 331 in total, but these were reduced to 183 because not all the bottles were found at the on-line sales outlets. Below, the

study present the main characteristics of each variable.

The price of the product is the endogenous variable of this study; it captures the effect on the valuation of the different attributes of the wine. Price in the sample varies between 1.9 € and 125 € in reds, between € 1,5 and € 13,95 in whites, and between € 1.3 and € 8.8 in rosés. From the difference between the minimum and the maximum, one could understand that, especially in red wine, there are attributes that cause important differences in price.

The exogenous variables are the considered attributes $Q_{j,i}$: the "Denomination of Origin" (Protected Designation of Origin), the quality, the grape variety, the time of fermentation, and the year of harvest or vintage. They are quantified as binary variables, taking the value "1" when the mentioned characteristic occurs and "0" if it does not occur.

The "Denomination of Origin" (Protected Designation of Origin), $Q_{DO,i}$, is a reference to the provenance of the wine. The different denominations of origin present in the sample are Manchuela, La Mancha, Valdepeñas, Ribera del Júcar, Jumilla, Méntrida and Almansa.

To analyze the *quality* attribute, $Q_{QUAL,i}$, the ranking of the publication Peñín Guide (2010) was used. The guide qualifies wines in exceptional, excellent, very good, and acceptable. Only 2% of the Guide wines obtained the qualification of exceptional.

The different types of grape varieties, $Q_{VA,i}$, generate a high diversity of products, a wide variety of flavors and combinations. The grape varieties classified for this study, depending on the type of wine, are Cabernet Sauvignon, Bobal, Cencibel, Merlot, Petit Verdot, Syrah, Tempranillo, Monastrel, Garnacha, Garnacha Tinta, Sauvignon Blanc Verdejo Viura, Airen Macabeo, Moscatel, and Chardonnay. Although many wines are produced with different grape varieties, it was given a value of "1" to the predominant in its composition.

Depending on the duration of the *fermentation* of the wine, $Q_{FER,i}$, different types of wine will be obtained. Their "technical files" will present very personal characteristics that will classify them according to their grape of production, their aroma, their flavors, and their maturation, in wines that are Young, Crianza, Reserve, Grand Reserve and Fermented in Barrel.

The *vintage* of the wines, $Q_{VINT,i}$ is the year of the harvest of the grapes, and it goes in this study from 1998 to 2008.

Functional form of the model

To develop the study the theory of hedonic models was used, $P_i=f(Q_{ji}, \varepsilon_i)$. It considers that the wine price (P'_i) is implicitly present in each of its attributes ($Q_{j,i}$).Considering the Box-Cox technique for the identification of the functional form (*f*) and that the exogenous variables are binary numbers, it is obtained [1]:

where:

ε_i = the random disturbance that follows a normal distribution of zero mean and constant variance $\varepsilon_i \approx N\left(0, \sigma_\varepsilon^2 I_n\right)$

The variable P_i assumes the values of a) red wine, b) white wine, and c) rosé wine. Two sub-models of model (1) were estimated; both sub-models determine the valuation of price, one by experts and the other by distributors.

1

$$P_i^{\lambda} = \beta_0 + \beta_1 \sum_{DO=1}^{g} Q_{DO,i} + \beta_2 \sum_{QUAL=1}^{h} Q_{QUAL,i} + \beta_3 \sum_{VA=1}^{k} Q_{VA,i} + \beta_4 \sum_{FER=1}^{l} Q_{FER,i} + \beta_5 \sum_{VINT=1}^{m} Q_{VINT,i} + \varepsilon_i \quad (1)$$

The SPSS-15 econometric software has been used to obtain the statistical and econometric results.

Descriptive analysis

The general analysis of the origin of the price of wine allows us to draw some conclusions in order to put in context their economic situation.

In table 1 the descriptive statistics of the endogenous variables, *P,* are shown, while in table 2 (page 300-301), the exogenous variables frequencies are presented.

As can be seen in table 1, there is a range of variation of results between the prices on the specialized guide and the prices at the on-line stores that is confirmed with the non-parametric contrast of Mann-Whitney, with a p-value less than 0,05 (table 3, page 302).

A non-parametric contrast was chosen for the rejection of the Null Normality Hypothesis of the endogenous variable *P* in the Kolmogorov-Smirnov test, also with p-value less than 0.05 (table 3, page 302).

This result could be explained following Bello and Cervantes (2002), they indicate that the quality of a wine is inferred by its value and quality, in short, if the price of a wine is more expensive is because it is better. Then, it may also be argued that if the on-line stores prices are higher than the ones in the specialized guide that is a consequence of the suppliers valuing the qualities of the wine more than the experts.

However Ruíz *et al.* (2004) mentioned that "from the perspective of companies, their knowledge of the market can lead them to develop opportunistic behavior if it gives them higher levels of profitability". Companies or on-line stores may be interested in creating commercial communication mechanisms, under an apparent fairness environment, that will interest consumers in making their purchasing decisions based on non-impartial advice, issued as independent advice.

On the other hand, specialized guides summarize the information about the product, providing rankings in an independent way that helps the consumer to evaluate the information and make the decision most appropriate to their wants and needs.

Table 1. Endogenous variables descriptive statistics.

Tabla 1. Estadísticas descriptivas de las variables endógenas.

	N	Minimum	Maximum	Mean	Typical Deviation
Red Wine					
Specialized Guide P	115	1.9	113.0	10.893	15.9643
On-line P	115	1.20	125.00	11.8467	17.58990
White Wine					
Specialized Guide P	47	1.5	11.0	3.541	2.2343
On-line P	47	1.72	13.95	4.3211	2.75568
Rosé Wine					
Specialized Guide P	21	1.3	4.0	2.633	0.7370
On-line P	21	1.72	8.80	3.3386	1.46296

Table 2. Exogenous variables frequencies.
Tabla 2. Frecuencias de las variables exógenas.

			Frecuency (value 1)	Frecuency (value 0)	N
Red	DO	DO Manchuela	12	103	115
		DO La Mancha	30	85	115
		DO Valdepeñas	11	104	115
		DO Ribera Júcar	10	105	115
		DO Jumilla	38	77	115
		DO Méntrida	10	105	115
		DO Almansa	4	111	115
	Quality	Exceptional	4	111	115
		Excellent	28	87	115
		Very Good	78	37	115
		Acceptable	5	110	115
	Grape Variety	Cabernet-Sauvignon	12	103	115
		Bobal	8	107	115
		Merlot	5	110	115
		Petit Verdot	5	110	115
		Syrah	20	95	115
		Tempranillo	37	78	115
		Monastrell	26	89	115
		Garnacha	2	113	115
		Garnacha tinta	7	108	115
	Fermentation	Young	81	34	115
		Crianza	18	97	115
		Reserve	11	104	115
		G.Reserve	4	111	115
		Fermented in Barrel	1	114	115
	Vintage	1998	1	114	115
		1999	1	114	115
		2000	1	114	115
		2001	2	113	115
		2002	4	111	115
		2003	7	108	115
		2004	6	109	115
		2005	17	98	115
		2006	24	91	115
		2007	32	83	115
		2008	20	95	115

Note: N are the total observations. A variable has a value of "1" if the wine has that attribute and "0" otherwise.

Nota: N son las observaciones totales. Una variable tiene un valor de "1" si el vino tiene ese atributo y de "0" en caso contrario.

Table 2 (cont). Exogenous variables frequencies.
Tabla 2 (cont). Frecuencias de las variables exógenas.

			Frecuency (value 1)	Frecuency (value 0)	N
White	DO	DO Manchuela	7	40	47
		DO La Mancha	24	23	47
		DO Valdepeñas	6	41	47
		DO Ribera Júcar	2	45	47
		DO Jumilla	6	41	47
		DO Almansa	2	45	47
	Quality	Very Good	40	7	47
		Acceptable	7	40	47
	Grape Variety	Sauvignon -blanc	7	40	47
		Verdejo	10	37	47
		Viura	1	46	47
		Airen	12	35	47
		Macabeo	16	31	47
		Moscatel	3	44	47
		Chardonay	2	45	47
	Fermentation	Young	44	3	47
		Fermented in Barrel	3	44	47
	Vintage	2004	1	46	47
		2007	7	40	47
		2008	39	8	47
Rosé	DO	DO Manchuela	4	17	21
		DO La Mancha	10	11	21
		DO Valdepeñas	2	19	21
		DO Jumilla	5	16	21
	Quality	Very Good	20	1	21
		Acceptable	1	20	21
	Grape Variety	Cabernet-Sauvignon	20	1	21
		Bobal	4	17	21
		Tempranillo	9	12	21
		Monastrell	5	16	21
		Garnacha tinta	2	19	21
	Fermentation	Young	21	0	21
	Vintage	2008	21	0	21

Note: N are the total observations. A variable has a value of "1" if the wine has that attribute and "0" otherwise.
Nota: N son las observaciones totales. Una variable tiene un valor de "1" si el vino tiene ese atributo y de "0" en caso contrario.

Table 3. Contrasts of Kolmogorov-Smirnov and Mann-Whitney.
Tabla 3. Contrastes de Kolmogorov-Smirnov y Mann-Whitney.

	Kolmogorov-Smirnov		Mann-Whitney	
	Statistic	Sig.	Statistic	Sig.
Red Wine	0.282	0.000	6112.500	0.032
White Wine	0.266	0.000	801.500	0.002
Rosé Wine	0.151	0.017	148.500	0.063

Results

To identify the lambda value of P_i, the contrasts of Ramsey, White, and Durbin Watson (table 4, page 303) were applied.

As a result, the logarithmic function is the chosen one for the red wine, the reciprocal for the white wine, and the double logarithmic function for the rosé wine. Their analytical expressions are [2]:

Because they are complex models, as they incorporate many effects that can influence prices, the Backward estimation method was applied. Following this method, the less influential variable is eliminated at each stage, until no more terms are possible to delete. The estimation of the corresponding models is shown in table 5 (page 304).

The contrasts of joint significance F-Snedecor, with a p-value less than 0.05, and the relatively high goodness of fit, measured by the coefficient of determination R^2, and a sum of residual squares SCR close to zero indicate a valid estimate (table 6, page 304).

Once the estimate is accepted, the results needs interpretation. To facilitate the interpretation of the fictitious variables, it is convenient to calculate the relative percentage effect of the dummy variable on the price. To do this, the estimate of the percentage impact developed by Kennedy (1981) is used:

$$IP_i = 100 * \left[\exp(\hat{\beta}_i - 0.5 Var(\hat{\beta}_i)) - 1 \right]$$

where:
β = the estimated coefficient

2

$$\ln P_i\ (\text{red}) = \beta_0 + \beta_1 \sum_{DO=1}^{7} Q_{DO,i} + \beta_2 \sum_{QUAL=1}^{4} Q_{QUAL,i} + \beta_3 \sum_{VA=1}^{9} Q_{VA,i} + \beta_4 \sum_{FER=1}^{4} Q_{FER,i} + \beta_5 \sum_{VINT=1}^{11} Q_{VINT,i} + \varepsilon_i \quad (2)$$

$$1/P_i\ (\text{white}) = \beta_0 + \beta_1 \sum_{DO=1}^{7} Q_{DO,i} + \beta_2 \sum_{QUAL=1}^{4} Q_{QUAL,i} + \beta_3 \sum_{VA=1}^{9} Q_{VA,i} + \beta_4 \sum_{FER=1}^{4} Q_{FER,i} + \beta_5 \sum_{VINT=1}^{11} Q_{VINT,i} + \varepsilon_i \quad (3)$$

$$\ln P_i\ (\text{rosé}) = \beta_0 + \beta_1 \sum_{DO=1}^{7} Q_{DO,i} + \beta_2 \sum_{QUAL=1}^{4} Q_{QUAL,i} + \beta_3 \sum_{VA=1}^{9} Q_{VA,i} + \beta_4 \sum_{FER=1}^{4} Q_{FER,i} + \beta_5 \sum_{VINT=1}^{11} Q_{VINT,i} + \varepsilon_i \quad (4)$$

Table 4. Evaluation test for the functional form of the model.
Tabla 4. Prueba de evaluación de la forma funcional del modelo.

Evaluation Test functional form						
Type of price	Functional form	White		Ramsey Test		Durbin Watson
			p-value	Reset	p-value	
	Linear	60.17	0.0012	84.94	0	2.17 *
Red Wine	**Non linear**					
Specialized	Logarithmic **	31.77	0.427*	0.028	0.867*	2.18 *
Guide Price	Double logarithmic	28.42	0.599*	4.82	0.028	2.17 *
	Reciprocal	34.59	0.3*	10.79	0	2.12 *
	Square root	45.85	0.04	15.82	0	2.15 *
	Linear	60.41	0	78.51	0	2 *
Red Wine	**Non linear**					
On-line Price	Logarithmic **	27.57	0.64*	0.57	0.45*	1.96 *
	Double logarithmic	14.56	0.99*	2.75	0.097*	1.87 *
	Reciprocal	17.14	0.97*	6.94	0.0008	1.81 *
	Square root	45.61	0.04	21.55	0	1.96 *
	Linear	25.47	0.043	27.62	0	1.46
White Wine	**Non linear**					
Specialized	Logarithmic	22.08	0.10*	11.55	0	1.54
Guide Price	Double logarithmic	18.59	0.23*	2.14	0.14*	1.60 *
	Reciprocal **	18.40	0.24*	1.68	0.19*	1.60 *
	Square Root	23.74	0.07*	18.71	0	1.50 *
	Linear	30.87	0.009	26.04	0	1.11
White Wine	**Non linear**					
On-line Price	Logarithmic	19.28	0.2*	3.16	0.075*	1.27
	Double logarithmic	6.014	0.97*	0.168	0.68*	1.10
	Reciprocal **	6.24	0.975*	0.64	0.42*	1.1
	Square Root	29.4	0.014	11.8	0	1.22
	Linear	7.32	0.29*	8.65	0.0032	1.86 *
Rosé Wine	**Non linear**					
Specialized	Logarithmic	5.21	0.51*	8.74	0.003	1.95 *
Guide Price	Double logarithmic**	6.012	0.42*	0.081	0.775*	1.81 *
	Reciprocal	5.22	0.51*	4.7	0.03	1.92 *
	Square Root	6.29	0.39*	23.25	0	1.92 *
	Linear	5.5	0.48*	3.928	0.047	2.18 *
Rosé Wine	**Non linear**					
On-line Price	Logarithmic	5.45	0.49*	8.69	0.003	2.063*
	Double logarithmic**	4.82	0.56*	0.79	0.37*	2.03 *
	Reciprocal	4.74	0.57*	4.25	0.039	2.045*
	Square Root	5.54	0.47*	14.32	0	2.11 *

* Significant at 5% significance. ** Selected forms according to the aforementioned tests.
* Significativo al 5% de importancia. ** Fórmulas seleccionadas de acuerdo con las pruebas mencionadas.

Table 5. Backward estimations of the hedonic models.
Tabla 5. Estimaciones hacia atrás de los modelos hedónicos.

			Guide Coefficient	Typical Error	Online Sotore Coefficient	Typical Error
Red	DO	DO Manchuela	0.190	0.040	0.149	0.039
		DO La Mancha	0.127	0.025	0.152	0.026
		DO Valdepeñas	0.115	0.032	0.108	0.034
		DO Ribera Júcar	0.117	0.034	0.115	0.035
	Quality	Exceptional	-0.262	0.0460	-0.215	0.048
		Excellent	-0.132	0.023	-0.115	0.024
		Acceptable	0.095	0.042	0.094	0.044
	Grape Variety	Cabernet-Sauvignon	-0.072	0.027	-0.070	0.028
		Bobal	-0.196	0.048	-0.138	0.047
		Merlot	-0.096	0.040	-0.085	0.042
		Petit Verdot	-0.163	0.039	-0.145	0.040
		Syrah	-0.043	0.024	-	-
	Fermentation	Young	-0.211	0.031	-0.211	0.031
		Crianza	-0.213	0.032	-0.205	0.040
		Reserve	-0.300	0.044	-0.301	0.040
		G.Reserve	-0.394	0.047	-0.382	0.045
	Vintage	2004	-0.090	0.037	-0.073	0.036
		2005	-0.057	0.025	-0.037	0.024
		2008	0.052	0.024	0.068	0.026
White	DO	DO Manchuela	-	-	-0.151	0.032
		DO Almansa	-0.253	0.080	-0.067	0.055
		DO Jumilla	-0.107	0.048	-0.058	0.033
		DO Valdepeñas	-0.085	0.048	0.099	0.034
	Grape Variety	Chardonay	0.051	0.077	-0.094	0.054
		Moscatel	0.018	0.064	0.014	0.044
		Sauvignon Blanc	-0.338	0.046	-0.040	0.032
		Verdejo	-0.025	0.041	0.115	0.028
Rosé	DO	DO Manchuela	-0.349	0.118	-0.363	0.164
		DO Jumilla	0.286	0.108	0.302	0.151

Table 6. F-Snedecor, R^2 and SCR. / F-Snedecor, R^2 y SCR.

	F-Snedecor	R^2	Scr
Red	14.554 (0.000) 13.012 (0.000)	0.855 0.825	0.652 0.744
White	10.685(0.000) 9.872 (0.000)	0.742 0.832	0.195 0.186
Rosé	10.799 (0.001) 6.109 (0.009)	0.739 0.711	0.747 1.445

In parentheses the p-value associated with the Snedecor F.
Entre paréntesis, el p-valor asociado con el Snedecor F.

Var ($\hat{\beta}$) is its variance (table 4, page 303, values and *Var* ($\hat{\beta}$)=(typical error)^2). The impatcs are presented in table 7 (page 306).

In general, the assessment, both positive and negative, is stronger in the guides of the experts than in the online stores assessments. From the results of the red wine, it should be noted that both the experts on the guides and the on-line vendors consider the Denomination of Origin (Protected Designation of Origin) the only attribute that, on average, would increase the price of red wine of Castile-La Mancha (about 14%).

The DO most valued by all is the DO La Manchuela. Both the experts on the guides and the on-line vendors agree that the impact on the price of other attributes is negative. The results shown regarding grape variety may happen because these are grape varieties considered to be traditional and as noted in Oczkowski (1994), Angulo *et al.* (2000), Schamel and Anderson (2003), Steiner (2004b), Bicknell *et al.* (2005), and Schamel (2006), the grape varieties that are fashionable at the time of the study tend to attract higher prices than those that are outdated or are out of trend. As for the vintage, the impact is also negative since they are very recent at the date of price assessment (year 2010), and as noted in Lee and Zhao (2013), older wines tend to attract higher prices.

As for white wines it should be mentioned that, on average, of all the significant attributes, none have a positive impact on price. However, if we analyze the results at the individual level, the Moscatel grape variety is the only one with a positive impact.

Finally, and regarding rosé wines, on average, the impact the Denomination of Origin (Protected Designation of Origin) has is negative, except for the DO La Manchuela that, at the individual level, has a positive impact. Here, contrary to what happened with red and white wines, the positive and negative evaluations have greater weight at the points of sale (on-line stores).

The only attribute positively valued by both parties, specialized guides and on-line stores, is the Denomination of Origin (Protected Designation of Origin) and if a ranking of recommendations of attributes was to be done, it would only agree on this characteristic. This reflects that this market values more wines originated in a specific geographic area. It may imply that positioning a specific wine geographic area may justify a difference in the price of the wine with respect to those wines originated in global zones where no geographical area is shown.

The article confirmed that a wine attribute such as region of origin can attract price premiums; consumers attach considerable importance to the perceived origin of a labeled region. The relationships between variety and price, and age and price were less clear. Nevertheless, the results suggest that a relationship does exist.

The present article also focuses on defining if the determinants of the price of Castile-La Mancha wine are equally appreciated by the specialized guides and the on-line sales outlets. In principle, specialized guides experts are professionals who show their knowledge and criteria with no external influence. On-line sales outlets deal directly towards a very specialized end consumer, generally interested and very well informed.

Table 7. Impact measurement.

Tabla 7. Medida de impacto

			Impact guide	Impact online store	Difference	Average impacts guide	Average impacts online store
Red	DO	DO Manchuela	20.80	15.95	**4.85**	+15%	+14%
		DO La Mancha	13.52	16.29	**-2.76**		
		DO Valdepeñas	12.10	11.30	**0.80**		
		DO Ribera Júcar	12.36	12.09	**0.26**		
	Quality	Exceptional	-23.15	-19.42	**-3.72**	-9%	-7%
		Excellent	-12.41	-10.86	**-1.55**		
		Acceptable	9.91	9.74	**0.17**		
	Grape Variety	Cabernet-Sauvignon	-7.00	-6.76	**-0.24**	-11%	-10,4%
		Bobal	-17.92	-13.01	**-4.91**		
		Merlot	-9.20	-8.28	**-0.92**		
		Petit Verdot	-15.13	-13.62	**-1.51**		
		Syrah	-4.23				
	Fermentation	Young	-19.39	-19.37	**-0.02**	-24,5%	-24%
		Crianza	-19.54	-18.90	**-0.64**		
		Reserve	-26.26	-26.34	**0.09**		
		G.Reserve	-32.92	-32.10	**-0.82**		
	Vintage	2004	-8.65	-7.09	**-1.56**	-3%	-1,26%
		2005	-5.54	-3.66	**-1.88**		
		2008	5.32	6.96	**-1.64**		
White	DO	DO Manchuela		-14.15			
		DO Almansa	-23.22	-6.62	**-9.07**	-14%	-4%
		DO Jumilla	-10.27	-5.72	**-3.66**		
		DO Valdepeñas	-8.29	9.67	**-2.57**		
	Grape Variety	Chardonay	5.04	-9.26	**14.30**	0%	-6%
		Moscatel	1.65	1.29	**0.37**		
		Sauvignon Blanc	-29.04	-4.05	**-24.99**		
		Verdejo	-2.69	12.08	**-14.77**		
Rosé	DO	DO Manchuela	-29.96	-31.35	**1.39**	-1,2%	-1,2%
		DO Jumilla	32.32	33.68	**-1.35**		

Note: the third column is the difference between the first column and the second column. The average is the arithmetic mean of the column of the differences of each group of attributes.

Nota: la tercera columna es la diferencia entre la primera columna y la segunda columna. El promedio es la media aritmética de la columna de las diferencias de cada grupo de atributos.

The price valuations are not similar between the specialized guides and the on-line sales outlets, being prices generally higher on-line than those referenced in the specialized guides. However, the correlation between the two series has the same sign indicating that they follow the same standard. In addition, the impacts of each attribute on price also coincide in the sign, but those of the experts in the guides are more intense, both positive and negative; experts in the guides tend to exalt and devalue wines more than what on-line sellers do.

In view of the results shown, it is possible to acknowledge of a quasi-convergence between on-line sales prices and those in specialized guides. If an objective evaluation of wine quality would be carried out, there should be convergence, not unanimity, in the price valuations. The discrepancies detected in these wine prices raise questions about the causes of these differences.

The fundamental explanation of these differences may be found at the economic level because, on the one hand, and as pointed out by Ruiz *et al.* (2004), the guides are not always impartial since there are certain doses of opportunistic behavior by wineries to partially convert these guides into a commercial communication mechanism for them, and, on the other hand, the tendency of the wineries' strategies to use differentiation in a world flooded of brands or regions. Therefore, there is not a total objective mechanism for assessing the quality level of wines, commercial opportunity would be the main cause of that non-convergence between the still close referenced prices in some channels.

Conclusions

A hedonic price model was calculated for wines from Castile-La Mancha sold in Spain at on-line stores, using the prices presented in these several Spanish on-line stores and the prices presented at a reputed Spanish specialized guide as proxies.

The price of Castilian wine is the endogenous variable of this study; it captures the effect on the valuation of the different attributes of the wine.

The exogenous variables are the considered attributes: the "Denomination of Origin" (Protected Designation of Origin), the quality (following standards from the reputed Peñín Guide, 2010), the grape variety, the time of fermentation, and the year of harvest or vintage.

In an economy of highly differentiated products and complex purchasing decisions, the Hedonic price model offers a valid way to identify quality attributes influencing consumers' marginal willingness to pay and to estimate the implicit price of these attributes. These estimations provide useful information aiming to improve the producers' and intermediates' marketing strategies, which can be fine-tuned according to the different products' characteristics and target consumers (11). As Angulo *et al.* (2000) point out, the basic hedonic hypothesis is that wines are valued for their characteristics and not as the wine itself. The price of a wine can then be analyzed as the sum of the prices of the attributes that define this wine, and not the wine as a whole. Ferro and Benito-Amaro (2017) allocate monetary values to the underlying characteristics included in a good; these characteristics can reveal a lot about the attributes that consumers value in wine.

In this article, two main conclusions are identified. The first is that the assessment of the experts, regardless of the origin and the attributes valued in the wine, coincide, and must be taken into account. This corroborates what was indicated in Angulo *et al.* (2000). The second is that the variable "Denomination of Origin" (Protected Designation of Origin) is the only one that has a significant and positive impact on the price of the wine of Castile.

Some other studies using hedonic techniques have reached similar conclusions for Spanish wines. Angulo *et al.* (2000) proposed a function of Hedonic prices for red wines, the results showed that the variables "Denomination of Origin" (Protected Designation of Origin) and harvest year or vintage were the main determinants of the market price. In this case, the harvest year or vintage is not decisive since the year of reference was almost simultaneous with respect to the valuation of the guide and of the prices at the on-line stores. Morilla and Martínez (2002), in the same line, concluded that the quality assessment has a high impact on the price.

Therefore, and particularly in Spain and Castile, wine marketing strategies should deepen in systematizing the territorial differentiation of origin or its protected geography. In such a segmented market as it is wine selling, it is necessary to simplify the parameters for the consumer and provide wine differentiation and diversification basically by origin, terroir and/or spatial determinants.

As proved, the take-off of online sales is highly conditioned by the opinion of guides and experts. It is so recommendable that the strategy in the expansion of this commercial path is carried out in a way that the comments expressed by these experts and opinion formers is given the particular relevance they have.

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