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Portuguese wine ratings: An old product a new assessment

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Portuguese wine ratings: An old product a new assessment

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Abstract

Typically, wine is a good experience, its quality being unknown before consumption, with wine drinkers tending to be risk-averse. This being so, expert and consumer opinions may help to fill this information void. Following the classic example of the Bordeaux region increasing numbers of wine producers submit their wines to the *raters'* evaluation, aware of its importance in consumer purchases and in the definition of wine prices. Portugal, particularly in the last decade, has been following this tendency, with an increasing number of Portuguese wines appearing on the ratings list of Robert Parker (RP) and Wine Spectator (WS) gurus.

Using the ratings published in 2010, by RP, WS, João Paulo Martins (Portuguese) and cellartrack.com, this paper aims to assess the consistency between the ratings assigned by different experts and by consumers and, additionally, to determine if the score attained by a specific wine is influenced by colour attributes and/or wine region (geographic origin). A statistical analysis shows that, with minor differences, there is consistency between the different ratings. Furthermore, the results of the regression models indicate that red wines tend to have higher scores and, in geographical terms, Douro wines are in prime position.

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Keywords: Portuguese wines; Ratings; Consistency

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1. Introduction

During the last decade, the word *rating* has become increasingly familiar, whether in relation to sovereign debt, creditworthiness of firms and universities, or wines. In all these situations, it is assumed that *ratings* are a way of filling consumers' information failures, a question that belongs to the microeconomics topic of adverse selection market failures.

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Typically, wine is a good experience, where quality is not recognised before consumption, i.e., until one buys and opens a bottle its content and quality remain unknown. That is why wine consumers count on expert opinions expressed in wine ratings and critical reviews. Internationally, some of the best known experts are Robert Parker (RP) and his publication the Wine Advocate, first published in 1978, and Wine Spectator (WS),¹ whose first number came out in 1976. These *raters* have an enormous influence on both producers and consumers of wine. Both wine *raters* score the wines from 50 to 100 and a high score (for RP and WS, an outstanding score is from 90 upwards), in general, leads to a higher price and increased sales. On the other hand, a low score can lead to decreased sales and often to a lower price (Thompson and Mutkoski, 2011).

In Portugal there have also appeared several *raters* and opinion makers, over the last decade, albeit with less renown than the international ones. One of the most prominent experts is João Paulo Martins (JPM), with his annual publication *Guia dos Vinhos de Portugal*, which, in addition to the rating, gives a detailed description of the characteristics of each wine tasted. This *rater* grades the wines from 14 to 20.

As a complement, and in some ways, as a counter power to *raters'* influence in consumer decisions, social networks have emerged recently, including the web, in which consumers express their opinions and ascribe their scores, the information included in <http://www.cellartracks.com>² being particularly important.

Table 1 presents the scores and rating descriptions for each of the rating sources referred to above.

The aim of this paper is to assess the consistency between ratings assigned by different experts and by consumers and, additionally, to determine if the score attained by a specific wine is influenced by colour attributes and wine region. To achieve this objective the paper is organised as follows: Section 2 includes a literature review; Section 3 presents an overview of the Portuguese wine sector and Section 4 data and results; finally, in Section 5, concluding observations are given.

2. Literature review

In the wine economics field, three major research topics have deserved special attention: finance, climate changes and expert opinion. The research has been extended to subjects related to market regulation, quality signalling and consumer search (Storchmann, 2011).

Typically, wine is a good experience and wine drinkers tend to be risk-averse (Gocekus and Nottebaum, 2011). Hence, reputation is one of the most important factors in overcoming the informational asymmetry problem – adverse selection – associated with this type of products (San Martin et al., 2008).

Reputation can be influenced in three different ways: (a) producer and/or brand recognition associated with “objective” wine characteristics, such as colour, alcohol content, grape variety, and vintage year; (b) expert opinion, based on the wine's sensory characteristics; and (c) the umbrella brand/collective reputation, such as region of origin.

The influence of reputation on price has been analysed mainly using the so-called hedonic price functions – following Lancaster's theory on consumer behaviour – where prices are regressed on a set of characteristics in order to determine which of these have a significant effect on prices. The price equation includes the objective characteristics of wine, where reputation is conveyed through the producer and/or brand name to consumers, and sensory characteristics, as judged by expert rankings and opinions (San Martin et al., 2008).

Different papers show the importance of the producer or individual brand on wine prices, namely, Oczkowski (1994) for Australian premium table wines; Combris et al. (1997, 2000) for Bordeaux and Burgundy wines; Schamel and Anderson (2003) for Australian and New-Zealand wines; Luppe and Angelo (2005) for Brazilian, Argentinean and Chilean wines; Haeger and Storchmann (2006) for American pinot noir; Lecocq and Visser (2006) for Bordeaux and Burgundy wines; Hadj Ali and Nauges (2007) for Bordeaux wines; San Martin et al (2008) for Argentinean wines in the US market; and Viana and Rodrigues (2007) for Porto wine. In the case of Portugal, Viana and Rodrigues, drawing on a sample of 14,000 observations from the largest Port wine firms, found that the brand/ type of Port and producer's reputation are significant determinants of wine prices.

The influence of wine expert *raters*, such as WA and WS, is, generically, seen to be of great importance. Several papers have addressed this influence via the estimation of the so-called hedonic price functions, comparing the effect on prices of official classifications with the impact of *raters'* classification, and analysing the marginal effect of *rater* marks. Jones and Storchmann (2001), using data from wine auction prices for 21 prestigious Bordeaux *crus classés chateaux* wines, conclude that experts' influence is significant, for each additional Parker's point score the price increased, on average, 7%. Schamel and Anderson (2003) show that, for Australian and New-Zealand wines, price premium associated with both James Halliday's and Winestate magazine's sensory quality ratings, and with Halliday's winery ratings and classic wine designations, are highly significant. Dubois and Nauges (2007), using a panel data set of 108 châteaux selling wines on the Bordeaux *en primeur* market, confirm that experts' grades affect the *en primeur* price more than the unobserved wine quality. Hadj Ali et al. (2010) estimate that the marginal effect of Parker's scores on *en primeur* Bordeaux wines, is, on average, 2.80 euro per bottle of wine.

Gocekus and Nottebaum (2011) attempt to shed light on the question of whose rating a regular buyer should pay attention to, comparing the taste of regular consumers with that of experts. From a sample of 120 vintage 2005 Bordeaux wines listed in cellartracker.com, they conclude that both average and median community scores are lower than expert scores, the

¹As with financial agencies, in the wine industry the best known gurus are also from the USA.

²This website follows a rating criterion identical to that of RP and WS. See Table 1.

Table 1

Raters description of wine quality as related to wine score.

Source: Erobertparker.com (RP); winespectaror.com (WS) and JPM (2011).

Rater	Score	Description
RP	96–100	An extraordinary wine of profound and complex character displaying all the attributes expected of a classic wine of its variety. Wines of this calibre are worth special effort to find, purchase and consume.
	90–95	An outstanding wine of exceptional complexity and character. In short these are terrific wines.
	80–89	A barely above average to very good wine displaying various degrees of finesse and flavour as well as character with no noticeable flaws.
	70–79	An average wine with little distinction, except that it is a soundly made. In essence, a straightforward, innocuous wine.
	60–69	A below average wine containing noticeable deficiencies, such as excessive acidity and/or tannin, an absence of flavour, or possibility dirt aromas or flavours.
	50–59	A wine demand to be unacceptable.
WS	95–100	Classic: a great wine.
	90–94	Outstanding: a wine of superior character and style.
	85–89	Very good: a wine with special qualities.
	80–84	Good: a solid well-made wine.
	75–79	Mediocre: a drinkable wine that may have minor flaws.
50–74	Not recommended.	
JPM	19–20	Great wine, of world class.
	17.5–18.5	Excellent wine, of great refining.
	16–17	Good, of strong personality.
	14–15.5	Good, well done, very pleasant to drink.
	< 14	Acceptable, without tasting note.

correlation between the expert ratings is higher than that between the community and expert ratings, and, most interestingly, compared to expert ratings, the average price paid for a bottle of wine is more highly correlated with median community score.

However, authors such Haeger and Storchmann (2006) and Lecocq and Visser (2006) found that expert opinion on prices is less important than the objective characteristics of wine. Haeger and Storchmann (2006), when analysing Pinot Noir price determinants, found that, after temperature and precipitation, producer/winemaker reputation is the most important determinant of wine prices, while expert opinions have little explanatory value. Furthermore, Lecocq and Visser (2006) conclude that the impact on price of expert opinions is very small compared with the objective characteristics appearing on the label, such as vintage and appellation. And Unwin (1999) stressed that the application of hedonic prices related to individual brands and expert ratings seems to be misguided and inappropriate, since most of the variables used are closely interdependent and there is insufficient knowledge on consumers' definitions of wine quality to enable valid conclusions to be drawn from regressions.

The umbrella brand/collective reputation literature provides additional and important insights and conclusions on the impact of reputation on wine prices and consumer's choice. Landon and Smith (1998): 629 state that *in a market with a large number of firms, it may be very costly for consumers to acquire information on the past quality of goods produced by all firms [therefore] it is typically less costly for consumers to acquire information on a group/collective quality that can be used as an indicator of the quality of the goods produced by individual*

firms in the group. Moreover, for Castriota and Delmastro (2009): *2 the use of a well-known group brand may enable (small) producers to reap the benefits of a reputation rent, without incurring all the costs that a company has to face when it has to establish the reputation of a commercial brand name.*

The literature on collective reputation seems to be in its infancy, the topic having received more theoretical attention than empirical (Castriota and Delmastro, 2009; Gergaud and Livat, 2010). The issue of collective reputation is principally modelled using Tirole's concept of group reputation as an aggregate of individual reputations – considering that a group's reputation is only as good as that of its members or, at least, of its most famous members (Gergaud and Livat, 2004). Empirical analysis has been applied to the impact of collective reputation on individual reputation and/or prices, and the spillover effects of collective reputation as a quality signal.

Landon and Smith (1997, 1998), using data from the market for Bordeaux wines, showed that both individual and collective reputations explain a substantial part of price variation and that long-term reputation is considerably more important than short-term quality improvement.

Castriota and Delmastro (2008), using data from wineries located in four regions of North-West Italy with an established national reputation, test the determinants of the process of collective reputation, taking into account the interactions between individual and collective reputation, and the determinants of the “jump” from national to international reputation. They confirm the prediction of the theoretical literature, finding positive effects of collective reputation on the reputation of individual firms. Additional research by the same authors (2009) provides empirical evidence in favour of the positive

effects of minimum quality standards on group reputation. Furthermore, they show that the relationship between group size and collective reputation is non-linear: free entry may be not optimal, since, above a certain number of producers, group reputation can decline due to free-riding behaviour.

Frick (2010), using information published by the wine guide Gault Millau, also found statistically significant non-linear returns to individual reputation as well as statistically significant returns to collective reputation in the case of Mosel Valley wines. Gergaud and Livat (2010), from an application to Bordeaux wines, using detailed survey data collected in seven European countries, obtained positive and significant spillover effects from umbrella reputation (Bordeaux), which are found to increase with the reputation of individual wines. These spillover effects, when significantly positive, vary from a minimum of 5% to a maximum of 15% of additional favourable quality opinions. Schamel (2009), in a study based on wine prices from 27 regions around the world, concludes that wines from producers with a high quality reputation rely more on their own strengths and depend less on their region's reputation.

To sum up, this literature overview suggests that: (a) wine reputation is a means to overcome the informational asymmetry problem of wine consumers; (b) there is no unanimity among researchers on the most important group of variables that influence reputation: objective characteristics, expert opinion and region of origin; (c) reputation seems to be highly positively correlated with wines prices; (d) the judgement of experts, as a source of reputation, influences prices and buyer's decisions (e) the buyer is uncertain on the question of whose rating he/she should pay attention to.

3. The Portuguese wine sector: an overview

Like other southern European countries, Portugal is a traditional wine producer. Vineyards cover (IVV, 2011: 38) 237,786 ha, with almost 41.3% (98,210 ha) considered capable of producing higher quality wines, i.e., with production of denomination of origin (PDO) and/or production of geographic indication (PGI). The total vineyard area is occupied by 341 different varieties, most of them native, allowing Portugal to produce non-standard wines for market niches, which could be a strong point, according the unpublished document prepared by the Monitor Group of Michael Porter.

The wine industry is spread throughout the 11 Portuguese demarcated regions. Table 2 shows the average of wine production of the last five years for each of these regions and for the whole country. Relative to wine production, the Douro region occupies the first place, followed by Lisboa, Alentejo, Beiras³ and Minho. However, by area, the first place is occupied by Beiras, followed by Douro and Minho, Lisboa having highest per ha productivity.

Table 3 shows that, on average,⁴ about 57% is PDO and PGI, 14.4% fortified PDO and 28.8% table wine, figures that

Table 2

Portuguese wine production (hl), by region and vineyards area (ha).
Source: Instituto da Vinha e do Vinho – IVV (2011).

Wine region	Average 2006–2011	%	Area	%	hl/ha
Minho	841,984	13.02	31,010	13.04	27.15
Trás-os-Montes	132,779	2.05	21,730	9.14	6.11
Douro	1,509,768	23.35	47,035	19.78	32.10
Beiras	890,243	13.77	56,663	23.83	15.71
Tejo	599,874	9.28	24,799	10.43	24.19
Lisboa	1,070,845	16.56	18,743	7.88	57.13
Peninsula de Setubal	399,051	6.17	9210	3.87	43.33
Alentejo	940,873	14.55	23,490	9.88	40.05
Algarve	25,151	0.39	1983	0.83	12.68
Madeira	45,415	0.70	1700	0.71	26.71
Açores	10,122	0.16	1423	0.60	7.11
Total	6,466,105	100.00	237,786	100.00	27.19

are in line with the fact that most of the Portuguese wine production is carried out in demarcated regions. Mono-varietal wines have an insignificant share in Portuguese wine production. Furthermore, among the fortified wines, Port wine deserves special attention, representing (832374 hl), on average, i.e., around 90% of this category of wine.

In 2010, Portuguese (Instituto do Vinho e da Vinha, IVV, 2011) domestic consumption was 4695 thousand hectolitres (for a 2009 production campaign of 5894 thousand hectolitres), imports were roughly 1464 thousand hectolitres (67.7% in bulk) at an average price of 0.57 euro/l, and exports, by wine typology, were as follows: non-fortified wines, 1838 thousand hectolitres (64% in bottle), at an average price of 1.76 euro/l; Port wine, 862 thousand hectolitres (100% in bottle), at an average price of 4.30 euro/l; Madeira wine (fortified), 28 thousand hectolitres, with price identical to that of Port wine.

If both Port and Madeira wines have a long history of more than 200 years of export, with approximately 86% of their production being sold on the international markets, the situation is different for table wines. Until the late 1980s, both imports and exports of table wines were irrelevant, production being intended for domestic consumption and for the brandy⁵ used to fortify Port wine.

With Portugal's entry into the European Union (1986), a high number of grape-growers developed a strategy of forward vertical integration (Muhl and Rebelo, 2011), producing and bottling their quality table wines under their own labels, rather than selling the grapes to companies and co-operatives. While these new brands found heavy demand in Portugal, their entry into international markets was more difficult, as the Portuguese wine regions were not widely known, and therefore did not represent a category to be included in wine lists and on the shelves. Thus the market strategy followed by these new wine producers is based on differentiation for niche markets, where product promotion is made through marketing events, press releases and interactions with wine experts (such as media, trade and gastronomy) in the target markets. One of the consequences of this entrepreneurial behaviour is the

³The region called Beiras includes the sub-regions of Dão, Bairrada, Beira Interior and others.

⁴By wine colour, on average, 32% is white and 68% is red.

⁵5501 (a barrel) of Port wine incorporate, on average, 435 l of must and 115 l of brandy.

Table 3
Wine production by type (1000 hl).

Type of wine	2006–07	2007–08	2008–09	2009–10	2010–11	Average	%
Wines from PDO	2360	1874	2013	2132	2454	2167	33.51
Fortified wines from PDO	961	966	964	886	867	929	14.36
Wines from PGI	1737	1516	1297	1261	1691	1500	23.20
Mon-varietal wines	0	0	0	4	26	6	0.09
Table wine	2484	1717	1415	1611	2094	1864	28.83
Total	7542	6073	5689	5894	7132	6466	100.00

emergence, in the last decade, of Portuguese wines in the ratings assigned by experts. One of the paradigmatic cases of this situation is that of Douro region quality table wines, which, from being unknown, have achieved, within a decade, high national and international recognition (Muhr and Rebelo, 2011).

4. Data and analysis

4.1. Data collection, samples and descriptive statistics

Data was collected on ratings from RP, WS, and Cellar via the websites of each *rater* and from JPM on his annual publication *Guia dos Vinhos de Portugal*, for the year of 2010.

The publication of JPM presents the scores of about 2000 wines tasted, the Wine Advocate of RP (December 2010) includes the scores of 180 Portuguese wines and the Wine Spectator (April 2010) rates 211 Portuguese wines. In Cellar 5167 wines (18,993 notes) are evaluated.

Comparing the wines classified by both RP and WS publications we observe that a large number of them do not coincide. There are wines classified by one *rater* but not by the other and vice-versa. In view of this fact, to establish a comparison, two samples were constructed, taking into account only the wines turning up simultaneously in all data sources: (a) the first sample includes 126 wines common to RP (international rating), JPM (national rating) and Cellar (consumers' rating); (b) the second sample includes 111 observations of wines common to WS (international rating), JPM (national rating) and Cellar (consumers' rating). In addition, since WS evaluations go beyond wine scores, also including sales prices, this sample also includes this variable.

Table 4 presents the descriptive statistical measures for the first sample, which includes wines from all 11 wine production regions of Portugal: Douro – 62; Alentejo – 33; other regions⁶ – 31 (Ribatejo – 11, Estremadura – 7; Dão – 6, Bairrada – 4, Trás-os-Montes – 3). Of the total, 33 (26.2% of the total) are white wines, 15 being from Douro (45.5%), 4 from Alentejo (12.1%) and 14 from other regions (42.4%); the remainder are red wines, 47 from Douro (50.5%), 29 from Alentejo (31.2%) and 17 from other regions (18.3%).

RP ranks 26 wines above 90 points, of which 23 are red (21 from Douro), and 3 are white (2 from Douro). JPM ranks 14 wines above 17 points, 12 being red and 2 white, all from

⁶Given the small number of observations in each of these regions they were aggregated as one.

Table 4
Descriptive statistics of RP, JPM and Cellar scores per colour and wine region.

	RP	JPM	Cellar
White wines – no. of observations	33	33	33
Average	88.2	16.1	88.1
Standard deviation	1.9	0.8	2.2
Min.	85	14	84
Max.	93	17.5	93
Coefficient of variation (%)	2.1	4.9	2.5
Red wines – no. of observations	93	93	93
Average	88.7	16.4	87.9
Standard deviation	2.6	0.8	3.1
Min.	84	14.5	72
Max.	95	18	98
Coefficient of variation (%)	2.9	4.8	3.5
Total no. of observations	126	126	126
Average	88.5	16.3	87.9
Standard deviation	2.4	0.8	2.9
Min.	84	18	72
Max.	95	14	98
Coefficient of variation (%)	2.7	4.9	3.3
Douro – no. of observations	62	62	62
Average	89.5	16.5	88.8
Standard deviation	2.4	0.7	2.6
Min.	84	18	85
Max.	95	15	98
Coefficient of variation (%)	2.7	4.5	3.0
Alentejo – no. of observations	33	33	33
Average	87.2	16.1	86.5
Standard deviation	1.8	0.7	2.6
Min.	84	14.5	83
Max.	92	17.5	93
Coefficient of variation (%)	2	4.5	3.0
Other regions – no. of observations	31	31	31
Average	87.7	16.1	87
Standard Deviation	2.3	0.8	3.3
Min.	84	14	72
Max.	93	17	91
Coefficient of variation (%)	2.6	5	3.8

the Douro region. In Cellar 18 wines are classified above 90 points, 14 being red and 4 white, all from the Douro region, too. The values of the coefficients of variation show that scores tend to approach the average, being slightly higher for red and the Douro wines. JPM's scores present a higher coefficient of variation than that of RP and Cellar, but still relatively low (between 4.5% and 5%).

Table 5
Descriptive statistics of WS, JPM and Cellar scores and prices per colour and region.

	WS	JPM	Cellar	Price (\$USA)
White wines – no. of observations	25	25	25	25
Average	86.2	15.9	86.7	18.9
Standard deviation	2.12	0.82	2.7	10.4
Min.	83	14.5	80	9
Max.	90	17.5	95	57
Coefficient of variation (%)	2.5	5.1	3.1	55.2
Red wines – no. of observations	86	86	86	86
Average	88.8	15.9	88.1	31.9
Standard deviation	3.7	0.82	3.6	29.8
Min.	83	14.5	14	7
Max.	96	17.5	18.5	159
Coefficient of variation (%)	4.1	5.1	6.9	93.4
Total – no. of observations	111	111	111	111
Average	88.2	16.1	87.8	29.0
Standard deviation	3.3	1	3	27.2
Min.	83	14	80	7
Max.	96	18.5	95	159
Coefficient of variation (%)	3.7	6.2	3.4	93.8
Douro – no. of observations	67	67	67	67
Average	89.8	16.4	88.7	38.2
Standard deviation	3.2	0.9	3	31
Min.	83	14	80	8
Max.	96	18.5	94	159
Coefficient of variation (%)	3.6	5.7	3.4	81.1
Alentejo – no. of observations	25	25	25	25
Average	86	15.8	86.2	15.9
Standard deviation	1.7	0.9	2.9	11.2
Min.	83	14.5	80	7
Max.	90	18	95	45
Coefficient of variation (%)	2	5.4	3.3	70.5
Other regions – no. of observations	19	19	19	19
Average	85.7	15.4	86.5	13.6
Standard deviation	1.7	0.6	1.6	4.5
Min.	83	14.5	83	7
Max.	88	16.5	89	24
Coefficient of variation (%)	2	3.7	1.7	33.9

The procedures used to analyse sample 2 are similar to those used for sample 1. Table 5 presents the descriptive statistical measures for the scores assigned by the *raters* and for prices in the following wine production regions: Douro – 67; Alentejo – 25; other regions – 19 (Ribatejo – 3, Estremadura – 6, Dão – 6, Bairrada – 1, Setubal – 3). Of these, 25 (22.5% of the total) are white – 12 from Douro (48%), 9 from Alentejo (36%) and 4 from other regions (16%) – and 86 are red, 52 from Douro (60.5%), 14 from Alentejo (16.3%) and 20 from other regions (23.3%).

In terms of reputation, WS awards scores above 90 points to 27 wines, all red and from Douro; JPM ranks 11 above 17 points, all red, 1 from Alentejo and the others from Douro; for Cellar there are 23 wines above 90 points, all red, 1 from Alentejo and the remainder from Douro.

Relative to price, there are 24 wines (23 red) priced above \$40, one from Alentejo and 23 from Douro. These data

reinforce the findings of sample 1 that red wines and wines from Douro are in a prime position compared with the others.

The scores of this sample also present low levels of dispersion relative to their average (the coefficients of variation are low), though slightly higher in the scores assigned by JPM. The reverse is true in the case of prices, which present a relatively high dispersion, 93.8% (the average is \$29, the minimum \$7 and the maximum \$159). Red wines have a higher average price (\$31.90) than that of white wines (\$18.90), and among regions, Douro is the one that displays a higher price: \$38.70, versus \$16.9' in Alentejo and \$13.60 in other regions.

4.2. Analysis

To check if there are differences in scores in terms of wine colour (red vs. white) and between regions (Alentejo vs. others e Douro vs. others), for each *rater* and sample, the statistical analysis is made computing the differences in averages. To analyse the consistency between *raters*, correlation coefficients are calculated for each sample.

Additionally to test the mathematical relationships between the ratings and determinant factors, regression models were developed with rating scores (RP, JPM, WS, Cellars) and price, as the dependent variables, and the objective wine characteristics – colour (red/white) and collective reputation – wine region, as independent variables. The independent variables are defined using binary variables: for the wine typology assigning $T=1$, if red wine and $T=0$ if white wine; and for the wine regions considering two binary variables, $Alen=1$ if the wine is from Alentejo region and $Alen=0$ otherwise and $Dou=1$ if the wine is from Douro and $Dou=0$ otherwise.

Sample 1

Table 6 shows statistically the differences between the averages of RP, JPM and Cellar scores, in terms of colour attributes and geographic origins, as well as the respective linear correlation (Pearson) and order (Spearman) coefficients. On average, there is no statistically significant difference between the scores of red and white wines. By region, Douro wines are in a higher score position compared with the average of all other wines. On the other hand, those from Alentejo are at a disadvantage (negative values), although for Cellar this difference is not statistically significant.

The sign and significance of the linear correlation (Pearson) and order (Spearman) coefficients suggest that the scores of the experts and those of consumers follow the same pattern and that there is a strong association between them, both in linear and ordering terms.

The information presented above highlights the reputation of Douro wines. To check the consistency of this result, three regression models are estimated. Table 7 includes the OLS robust (corrected for heteroskedasticity) estimators.

The results of the estimations show that, although the three regression models are globally significant at a 5% level, only the constant and the parameter associated with the variable Dou

Table 6
Statistics of the differences between averages scores and correlation coefficients.

Variables	RP	JPM	Cellar
Red–White	0.44 (0.91)	0.25 (–1.59)	–0.24 (–0.41)
Alentejo – Other regions	–1.34* (2.84)	–0.36** (2.26)	–0.91 (–1.56)
Douro – Others	1.79* (4.49)	0.54* (3.99)	1.61* (3.23)
Pearson correlation	RP-JPM = 0.699* RP-CELL = 0.559*	JPM-CELL = 0.497*	
Spearman correlation	RP-JPM = 0.696* RP-CELL = 0.549*	JPM-CELL = 0.435*	

The values in parenthesis are *t* student.

*Significant difference at 1% level.

**Significant difference at 5% level.

Table 7
OLS robust estimators.

	RP	JPM	Cellar
Constant	87.532* (206.53)	15.904* (89.79)	87.255* (153.08)
$T=1$ if red wine and $T=0$ if white wine	0.395 (0.97)	0.235 (1.57)	–0.364 (–0.71)
Alen=1 if is Alentejo wine and AL=0 otherwise	–0.309 (–0.57)	–0.051 (–0.27)	0.315 (0.41)
Dou=1 if is Douro wine and Dou=0 otherwise	1.620* (3.03)	0.498* (2.89)	1.779* (2.55)
R-squared	0.073	0.130	0.0817
Statistic F (level of significance)	6.24 (0.003)	5.72 (0.001)	3.50 (0.018)

*Parameter statistically significant at 1% level. In parenthesis are statist t de Student.

Table 8
Statistics of the differences between averages scores and coefficients of correlation.

Variables	WS	JPM	Cellar	Price (USA)
Red – white	2.56 (3.57)*	0.26 (1.19)	1.36 (2.03)**	13.01 (2.14)**
Alentejo – Others	–2.81 (–3.83)*	–0.48 (–2.20)**	–2.13 (–3.15)*	–18.81 (–3.10)*
Douro – Others	3.76 (7.07)*	0.80 (4.78)*	2.40 (4.50)*	23.87 (5.04)*
Pearson correlation	WS-JPM = 0.651* WS-Cellar = 0.641* WS-Price = 0.691*	JPM-Cellar = 0.525* JPM-Price = 0.75*	Cellar-Price = 0.610*	
Spearman correlation	WS-JPM = 0.624* WS-Cellar = 0.633* WS-Price = 0.766*	JPM-Cellar = 0.522* JPM-Price = 0.777*	Cellar-Price = 0.697*	

The values in parenthesis are *t* student.

*Significant difference at 1% level.

**Significant difference at 5% level.

(Douro)⁷ are statistically significant. These findings demonstrate that, taking into account the value of the constant, on average, the minimum value of the RP, JPM and Cellar scores are 87.5, 15.9, and 87.3, respectively. Moreover the scores assigned to wines from the Douro region, when compared with those from other regions are higher in 1.6, 0.5 and 1.8, respectively for RP,

⁷Additional regressions models were estimated assuming as explanatory variables only one of the variables T, AL, Dou or, at the same time, T and one of the others. Taking into account the sign and significance level of their respective parameters, the results show that: the variable T has no influence on the scores; on average, the wines produced in Alentejo have lower scores than those from other regions of Portugal; the opposite occurs for Douro wines.

JPM and Cellar. The variation of the scores is neither influenced by colour attributes (red/white) nor by Alentejo.

Sample 2

Table 8 presents statistically the differences between the averages of WS, JPM and Cellar scores and prices, in terms of colour attributes and geographic origin as well as the respective linear correlation (Pearson) and order (Spearman) coefficients. The results indicate that red wines have higher scores and that, when compared with those from other regions, Douro wines have both higher scores and prices. Moreover, the Alentejo wines, when compared with those from the set “Douro and other regions” have both lower scores and prices.

Table 9
OLS robust estimators.

	WS	JPM	Cellar	Price (\$ USA)
Constant	84.28* (131.22)	15.39* (74.65)	85.82* (139.80)	7.75** (2.18)
$T=1$ if red wine and $T=0$ if white wine	2.13* (4.08)	0.18(0.98)	1.00 (1.57)	9.93* (2.78)
Alen=1 if is Alentejo wine and AL=0 otherwise	0.42 (0.73)	0.22 (0.91)	-0.347(-0,50)	0.29(0.10)
Dou=1 if is Douro wine and Dou=0 otherwise	3.76* (6.47)	0.89* (4.75)	2.13* (4.25)	23.04* (5.24)
R-squared	0.384	0.183	0.1794	0.212
Statistic F (level of significance)	24.75(0.00)	8.89 (0.00)	8.02 (0.00)	11.53(0.00)

*Parameter statistically significant at 1% level.

**Parameter statistically significant at 5% level.

The values and significance of the linear correlation coefficients show that there is both a strong linear and order association between the different scores and between these scores and price. Prices are positively related with scores.

The results of the robust OLS estimators, presented in Table 9, show that: (a) the four regression models are globally significant at 1% level; (b) the constant is statistically significant in all models, meaning that on average the minimum scores for white wine produced out of Alentejo and out of Douro are 84.3 for WS, 15.4 for JPM and 85.8 for Cellar and the price 7.75 \$US; (c) the variable Dou is statistically significant in all the models, indicating that, on average, the scores assigned to wines from the Douro region are higher (3.76 for WS, 0.89 for JPM, 2.13 Cellar and 23.04 for price) than those from other regions; (d) in the model in which the dependent variable is WS scores, there is a significant difference (2.13) between the scores of red vs. white wines; (e) the price of red wines is 9.9 \$US higher than that for the white ones; (f) the non-significance of the variable Alen indicates that the wines produced in this region do not differ in prices and scores from those of other wine regions of Portugal.

5. Conclusions

In wine economics the subject of reputation, as a way to correct consumers' information failures, is a relevant area of research, since there are still doubts about which are the variables that influence reputation: objective characteristics, expert opinions or region of origin.

In the case of Portuguese wines, this paper analysed the differences and/or consistency between the ratings assigned by several experts and consumers and, additionally, assessed if the score attained by a specific wine is influenced by colour attributes and wine region.

From our results we concluded that: (a) the scores of experts and consumers follow the same pattern, with a strong association between them; (b) there is a positive correlation between the different scores and prices; (c) the region of origin positively influences both the score assigned and prices; (d) with the exception of WS, colour has no influence on the scores; and (e) prices for red wines are much higher than those for white ones.

The results achieved indicate that the marketing of regional origin, as a reputation attribute, may have a higher payoff for the regions primarily growing red wine. We are aware that this research is merely a first approach to the problem, the analysis of which is conditioned by data availability. Future research should verify the above findings with new data sets from other years and information sources. Moreover, the results would certainly be more robust if it were possible to incorporate in the estimated models objective characteristics appearing on the label as well as sensory characteristics for the wine tasted.

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