Is the Average of Expert Tasters' Grades a Good Price Predictor?[¤]

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Preliminary Version

Abstract

This paper takes yet another look at the price/quality relationship studied in Combris, Lecocq and Visser (1997, 2000). The data come from an experimental study that is very similar to the two previous studies. Like in the earlier studies, quality, measured as the average of expert tasters' grades, has a small impact on wine prices. Exploiting the fact that the new data are recorded on a relatively …ner level—expert-speci…c grades are observed instead of averages—the paper sheds new light on the price/quality paradox. We …nd a strong correlation between average grades and price when the dispersion of grades is small, i.e. when there is much consensus among experts about the quality of a wine. Wine prices are also strongly correlated with the highest grade assigned. Possible explanations for these …ndings are given.

Keywords: experimental data, hedonic price equation, quality, taste heterogeneity, Bordeaux wine.
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1. Introduction

In two previous papers (Combris, Lecocq and Visser, 1997, 2000), we estimated hedonic price equations and jury grade equations for Bordeaux and Burgundy wines, considering not only the objective characteristics appearing on the label of the bottle, but also the sensory characteristics of the wine. Our data came from two very similar experimental studies held by the Institut National de la Consommation (INC). The results of these studies were published in two issues of a French review called 50 Millions de Consommateurs. The December 1992 issue was devoted exclusively to Bordeaux wines and formed the basis of the …rst paper. The second paper was based on the November 1993 issue, which was devoted solely to Burgundy wines.

In these studies, the wines were evaluated and graded by experts juries, three four-person juries for the sample of 519 Bordeaux wines and three …ve-person juries for the sample of 613 Burgundy wines. All the jury members blind-tasted the wine. After tasting, the jury was requested to write down its technical comments. These comments were published in 50 Millions de Consommateurs. The jury had to record its olfactory …ndings, its gustatory …ndings and then make some general remarks about the wine. Each of the jury members assigned a grade between 0 and 20 to the wine he tasted. The review only published the average of the grades. The review also indicated the name, the colour, the rank, the appellation, the vintage, and the price of each wine. Our main …nding in these two studies was that the characteristics described on the label explain the major part of the price di¤erences and that wine prices are hardly a¤ected by the quality as measured by the average grades.

Using a new data set, the present paper takes yet another look at the price/quality paradox. The data are again the result of a study held by INC, and are published in the October-November 2000 issue of 60 Millions de Consommateurs. The 2000 study is based on (another sample of) Bordeaux wines, and is stuctured like the ones of 1992 and 1993. The similarity with the previous data sets allows us, in the …rst part of the paper, to make direct comparisons with our earlier work. In the second part of the paper we exploit the fact that, unlike the previous studies, the 2000 data record the grades assigned by each jury member. Also recorded is the name of each jury member and the date at which each wine was evaluated. The data are thus recorded on a relatively …ner level. They allow us to asses to what extent individual expert-e¤ects and time e¤ects matter in the evaluation of wines, and whether the correlation between price and quality is stronger when calculated on disaggregated data. That is, the new dataset allows us to cast another light on the price/quality paradox found in our earlier studies.

2. The data

As in the two preceding studies, the agents of the Institut National de la Consommation (INC) bought the wines anonymously. They thereby circumvented a possible bias in wine studies organised by (even famous) guides, where wine producers select specially prepared samples to the contest. Contrary to many newspapers and wine guides (which organise their tests on the places of production and solicit a local jury), the INC organised its tasting out of the vineyards, in Paris, in the buildings of the company of the wine brokers of Paris, and with expert tasters that have no special ties with the Bordeaux region.

INC bought 292 wines chosen among 26 Appellations d'Origine Contrôlée (out of 57 AOC that exist in the Gironde). Their selling price ranged between 20 and 200 francs. The selected years were 1996 and 1998 for the red wines, 1999 for the dry white, 1997 for the sweet white. 265 of the 292 wines which had been ordered were delivered within the deadlines, and 256 were preserved for tasting. The delivery of the bottles was done in a place other than the INC. The cheques did neither mention 60 Millions de Consommateurs, nor the INC. The wines rested one month in a fresh and obscure room of the company of the wine brokers of Paris.

The 256 wines were tasted between the 19th and 23rd of June. Grouped in jurys of 5 or 6 people, the 34 specialists (oenologists, cavists, wine waiters, brokers, members of the company of the wine brokers of Paris) evaluated the wines in individual workstations. Each expert knew the appellation, colour and vintage of the wine he tasted, but was ignorant of all other characteristics (name of the château, price, etc.).

After tasting, each jury member was requested to write down (independently from the other experts in the jury) its technical comments. He was to record its olfactory …ndings (aromatic intensity, …nesse and complexity of aroma), its gustatory …ndings (…rmness of attack, suppleness, ‡atness, fat, harmony of components, …nish, etc.) and then make some general remarks about alcohol level, need for keeping, etc... Combining the comments from the di¤erent jury members, a journalist has written a synthetic comment on the wine. These comments were published in 60 Millions de Consommateurs (there is thus 1 technical comment for each of the 256 wines tasted). In the rest of this paper we will refer to these variables as the sensory characteristics.

Each of the jury members assigned a grade between 0 and 20 to the wine he tasted. The jury members actually assigned two grades, one for the overall impression of the wine at the time of the test, and one for the wine's predicted future quality. The future grade exceeds the present grade if the wine was considered worth storing for further maturation; the present grade exceeds the future grade if, on the contrary, the impression was that the wine should have been consumed already; the two grades are equal if the wine was considered at its optimum. For each wine the review 60 Millions Consommateurs published the average of the

present grades and the average of the future grades. The averages were computed and rounded to the closest quarter of a point, e.g. a 12.68 average was rounded to 12.75. When the grades assigned by a jury were such that the di¤erence between the lowest and highest exceeded 8 points, the wine was retested by one of the other juries. Here again jury members each graded the wine. These grades were added to the grades assigned by the initial jury. The extremes, i.e. the two highest and two lowest grades, were eliminated and the average was computed on the remaining grades.

For each wine, the review also gives information about the name of the château, the ranking of the wine (grand cru classé or cru classé, cru bourgeois, or cru non classé), the colour (red or white since there were no pinks in the sample), the vintage (1996, 1997, 1998, or 1999), and the appellation (26 out of the 57 Bordeaux appellations are represented in our sample; for practical reasons, these 26 appellations are regrouped into 6 larger appellations according to criteria proposed by the Conseil Interprofessionnel du Vin de Bordeaux). These variables will be called the objective characteristics. Finally, the review reported the price at which each bottle was purchased

Out of the original sample of 256 observations, we retain 255 wine bottles (one sample was defective). Table 1 gives the list of variables available in the data set together with their abbreviations and some descriptive statistics.

[Table 1 about here]

The variables appearing in the table are the same as the ones in the …rst Bordeaux paper. Only the tasting day and the future jury grade FGRAD are new (in the Bordeaux data set only the present jury grade PGRAD was available). For the same reason as in the …rst Bordeaux data set some of the sensory characteristics are sometimes missing from the technical comments made by the juries. To (partly) overcome this problem of the missing observations, we adopt the same working hypotheses as in the previous papers. Thus for most of the sensory variables, we can infer any missing observation from other characteristics or other indications in the jury's comment. Only if INTE or FINI are missing, they cannot be inferred from other indications. The INTE and/or FINI variables are missing for 152 wines. Hence, there are 103 wines for which all characteristics are known.

As we mentioned earlier, the main interest of the 2000 data, compared to those used in the preceding studies, is that they provide the grades assigned by each jury member. These individual grades, as well as the day that each wine was tasted, were not published by 60 Millions de Consommateurs. They were directly obtained by us from INC. Table 2 displays the number of wines tasted by each of the 34 experts, together with the mean and the standard deviation of the grades they assigned.

[Table 2 about here]

We can see that the expert number 4 was the most assiduous at the time of tastings, since he tasted 137 of the 255 wines considered. He is closely followed by the experts 23, 9 and 3, who tasted 100, 100 and 99 wines, respectively. Comparing with table 1, we also see that the dispersion is stronger for individual grades than for average jury grades. The standard deviation of expert 4 present grade, for exemple, is 2 while that of the jury present grade is only 1.37.

3. Empirical results

In this section, we start by replicating the estimations performed in the previous papers to make direct comparaisons with our earlier work. Then, we exploit the disaggregated feature of our data to provide additional results.

3.1. Comparative analysis

In our hedonic price equation, the dependent variable is the logarithm of the price of a bottle of Bordeaux wine. The explanatory variables are all the characteristics of the bottle as represented by the objective and sensory variables de…ned in section 2. Furthermore, we consider two jury grade equations. The dependent variable is either the logarithm of the present grade or the logarithm of the future grade, and in both equations the wine characteristics constitute the explanatory variables. Since we want to estimate the hedonic price function and the jury grade functions on the complete sample (255 cases instead of 103), we add two dummy variables to the list of explanatory variables that indicate if the INTE and FINI variables are missing. The …rst dummy is equal to 1 if INTE is missing, and 0 otherwise. The second dummy is equal to 1 if FINI is missing, and 0 otherwise. If INTE or FINI is missing we set the variable equal to 0.

In table 3, we present the Ordinary Least Square (OLS) estimates for the hedonic price equation. In table 4, column (1), we give the results of the OLS estimates of the jury PGRAD equation, and in table 4, column (2), the OLS estimates of the FGRAD equation. Because of the large number of explanatory variables, we have used a stepwise procedure to select the regressors that are signi…cant at the 5% level. Results show that the parameters associated with the two dummy variables are not signi…cantly di¤erent from zero in the hedonic price equation. In the jury grade equations, only the parameter corresponding to the second dummy variable is signi…cantly di¤erent from zero. In sum, we estimate the following hedonic price and two jury grade equations

$$\ln PRICE_i = X_i\beta + u_i; \qquad i = 1;:::;n; \tag{3.1}$$

$$\ln PGRADE_i = Y_i\gamma + D_i\delta + v_i; \qquad i = 1;:::;n; \tag{3.2}$$

$$\ln FGRADE_i = Z_i\alpha + D_i\mu + w_i; \qquad i = 1;:::;n; \tag{3.3}$$

where D_i is the dummy variable that is equal to 1 if $FINI_i$ is missing and 0 otherwise, X_i, Y_i and Z_i are the vectors of characteristics for wine i in, respectively,

the hedonic price equation, the jury PGRAD equation and the jury FGRAD equation, ®, ¯, °, ± and µ are unknown parameters (®, ¯ and ± are vectors, and ° and µ are scalars), u_i, v_i and w_i are error terms, and n represents the total number of wines. For the same reasons as in the Bordeaux paper, the error terms in (3.2) and (3.3) might be correlated with the dummy D: Using the Hausman (1978) exogeneity test we conclude, however, that E(Dv) = 0 and E(Dw) = 0; and hence OLS estimation of (3.2) and (3.3) leads to consistent estimates of the parameters of interest.

Table 3, column (1) displays estimates for the hedonic price equation with jury grades excluded from the set of independent variables. The …t is relatively good since the $\overline{R}^2$ is equal to 0.635. Whether we use the forward or the backward stepwise procedure does not make any di¤erence here; in both cases the set of explanatory variables selected is the same.

[Table 3 about here]

The price rises if the wine is fat, if the wine has a long …nish, if the jury feels it will improve with age, and if the wine is highly ranked. The price goes down for a 1998 or 1999 vintage, and for a wine that originates from the Bordeaux or the Côtes appellation group. Surprisingly, the price also decreases if the attack of the wine is considered …rm. Note that four of the nine selected variables are sensory variables and …ve are objective variables. This result is closer to the Burgundy results, where four of the seven selected variables were sensory variables and three were objective variables, than to the …rst Bordeaux results, where almost all the selected variables were objective variables.

In table 3, column (2), we present the results of the estimation of the hedonic price equation including the mean jury grades, PGRAD and the di¤erence between the FGRAD and the PGRAD, in the vector of independent variables. The …rst term represents the present quality of the wine, the second represents its potential for ageing. The $\overline{R}^2$ is 0.657, a slightly better …t than that obtained without jury grades. The forward and backward stepwise procedures lead to identical results. The parameters associated with two of the sensory variables (FAT and FINI) reported in column (1) are no longer signi…cant, while an additional objective variable (SEPF) is selected with a negative sign. Furthermore, the parameter corresponding to the second quality indicator is signi…cant and takes the expected sign: price increases follow the same trend as improvements in ageing potential. On the other hand, the price of a wine is not a¤ected by the present quality as evaluated by the juries. This last result is di¤erent from what we found in our two previous studies, where the present grade had a small but signi…cant impact on prices (0.018 for Bordeaux wines and 0.024 for Burgundy wines).

Table 4, column (1) presents the estimates of the jury PGRAD equation, in which we control for the presence or absence of FINI. The estimated value of ° is 0.066 with a standard deviation of 0.019. The $\overline{R}^2$ is equal to 0.575, which indicates a relatively good overall …t. Here the choice of the stepwise

procedure (forward or backward) make a slight di¤erence. AN97, AN99, BORD and MEGR are signi…cant when the backward procedure is used but not when the forward procedure is used. Conversely, COTE is signi…cant with the forward procedure but not with the backward procedure. We only retain variables that are selected in both procedures.

[Table 4 about here]

The estimated parameters take the expected signs. The jury PGRAD increases if the wine has strong aromatic intensity, has a …ne and complex nose, is considered fat, has balanced harmony among its components, has …ne tannins and a long …nish, improves with time and belongs to the SEPF appellation group. The jury PGRAD goes down if the wine is ‡at.

In table 4, column (2), we report the results of the estimation of the jury FGRAD equation in which we also control for the presence or absence of FINI. The estimated value for μ is 0.089 with a standard deviation of 0.023. The $\overline{R}^2$ is 0.613, indicating a higher overall …t than for the jury PGRAD equation. Unlike the previous equation, the results are not a¤ected by the choice of procedure. The ten signi…cant parameters in the jury PGRAD equation are also signi…cant in the jury FGRAD equation and take the same expected signs. There are two new variables that appear: the jury FGRAD rises if the wine is highly ranked and drops if the wine presents some traces of staleness. In contrast to the hedonic price equation, the jury grades are essentially determined by the sensory variables. A similar result was obtained in the two previous papers.

3.2. Further results

We saw above than the mean jury present grade had no signi…cant impact on the price of a wine. This result may seem paradoxical since the grades given by the jury's expert tasters should provide a good measuring rod of quality. One of the two arguments that can be used to explain why tasting grades are not irrefutable quality indicators purports that tastes are heterogeneous. In this scenario, the mean grade will always express a compromise between the tasters' evaluations. The market, on the other hand, is a re‡ection of the contrary; a compromise is not needed since an explanation for the price level can re‡ect the preferences of sub-sets of consumers. A high market price can then be compatible with a modest appreciation of the wine (by the public as a whole) if a small group of individuals intensely likes the product. This suggests that a better predictor of price would be the jury's highest grade rather than the mean grade.

In table 3, column (3), we report the estimates of the hedonic price equation where the mean jury grades are replaced by the jury's highest grades in the set of explanatory variables. The $\overline{R}^2$ is 0.651, a value very close to that found in column (2). Again, it does not matter whether we use a forward or a backward stepwise procedure. Comparing with column (2), we see that the selected variables and

their signs are unchanged. The only difference is that the jury's highest present grade is significant and takes a positive sign: the price increases with quality when quality is evaluated by the expert who has the strongest taste for the wine. Yet the impact of the two jury's highest grades is considerably smaller than the impact of the other variables. For example, when a wine is 'promoted' to a higher RANK category, the price increase is so great that the jury's highest present grade would have to be increased by 4.4 points or the difference between the jury's highest future and present grades would have to be increased by 3.5 points to generate the same effect.

The jury's highest grade being a measure of the preference of a single taster and not of a group of tasters, it can be considered as an indicator of horizontal differentiation: some experts may for instance prefer tannic wines whereas some others may prefer non-tannic wines. On the other hand, the fact that the mean jury present grades are not closely connected to prices may imply that ranking is a sufficiently satisfactory indicator of vertical differentiation. However, if the weak correlation observed between the mean tasting grade and the price can be explained by taste heterogeneity, one could expect this correlation to increase with the degree of convergence of individual grades. In other words, the mean grade of a wine should have a stronger influence on the price if there is more consensus among the tasters. It should then constitute a measure of the vertical differentiation of wines much finer than the ranking.

In Figure 1, we present the distribution of the standard deviation of the jury members' present grades. It shows a rather great dispersion of individual appreciations, since the standard deviation is distributed as a normal distribution centered around 2, with a minimum of 0.4 and a maximum of 4.

[Figure 1 about here]

Table 5 displays the OLS estimates of the hedonic price equation on two subsamples of 60 wines each, the first made up of the wines for which the dispersion of the grades inside the jury is the weakest (standard deviation lower than 1.43) and the second of the wines for which this dispersion is the strongest (standard deviation higher than 2.58). In both cases, the mean jury grades are included in the set of independent variables.

[Table 5 about here]

The results obtained on the subsample of the wines which show a low present grade dispersion are presented in column (1). The $\overline{R}^2$ is equal to 0.684, which is a value very close to that reported in table 3, column (2), for the complete sample. The set of selected variables is slightly different according to the choice of the stepwise procedure. BLDO is significant with the forward procedure only, and AN97 is significant with the backward procedure only. We retain variables that are selected in both procedures. The price increases if the wine is highly

ranked and if the wine is a 1998 vintage, but it decreases if the wine has a complex nose and if the wine is balanced. The two sensory variables do not take the expected signs. But most importantly, we …nd that the mean present grade is signi…cant with a positive sign. This suggests that the average judgement of a group of tasters is a good predictor of price for wines that are caracterised by homogenous appreciations.

We report the results obtained on the subsample of the wines which show a high present grade dispersion in column (2). The $\overline{R}^2$ is 0.740, a strongly better …t than the preceeding ones. Here the forward and the backward procedures lead to identical results. The price goes down if the wine has strong aromatic intensity, if the wine is a 1998 or 1999 vintage, and if the wine originates from the Côtes or Saint-Emilion-Pomerol-Fronsac appellation group. The price rises with the ageing potential of the wine, but now it is independent of the present quality of the wine. Again, the selected sensory variable takes the wrong sign.

The mean present grade is thus signi…cantly correlated with the price only when tasters agree about the present quality of the wine. It is only in this case therefore that the average of expert tasters' present grades can be considered as a good measure of the vertical di¤erentiation, and a good price predictor.

Since the tasters' appreciations are heterogeneous, one might wonder whether the set of characteristics related to the tasting grades of a given expert would not be di¤erent from that related to the tasting grades of another. We thus estimated expert grade equations by regressing on the explanatory variables the grades of the four most assiduous experts separately. Under the assumption that the sensory variables are independent of the experts' tastes, which comes down to saying that they objectify the sensory attributes of the wines, we can then determine the set of characteristics, speci…c to each expert, from which the judgement is made. The results are presented in tables 6 to 9, column (1) for the present grade equation, column (2) for the future grade equation. Compared to previous results, the overall …t is relatively poor, with $\overline{R}^2$ ranging from 0.052 to 0.336. This deterioration of the …t is rather logical insofar as the sensory variables, which are constructed on the basis of synthetic comments, are probably more correlated with grades that are synthetic too. The choice of the stepwise procedure does not matter in all cases but three: in table 8, column (1), FINI is only signi…cant when the forward procedure is used, and FAT is only signi…cant when the backward procedure is used; in table 9, column (1), MEGR is only selected with the forward procedure, and RANK is only selected with the backward procedure; …nally, in table 9, column (2), FAT and RANK are selected with the forward procedure only, and COMP and FINI are selected with the backward procedure only. We retain variables that are signi…cant in both procedures.

[Tables 6 to 9]

For expert 4, table 6 shows that four variables are selected in both columns and take the expected signs: two are objective variables (RANK and SEPF) and

two are sensory variables related to olfactive characteristics (INTE and COMP). For expert 23, table 7 indicates that four variables are selected with the righteous signs. They appear in the present grade equation as well as in the future grade equation and are all sensory variables: two are related to general remarks (HARM and KEEP) and two are related to gustatory characteristics (FLAT and FAT). Tables 8 and 9 show that the results are less distinct for experts 9 and 3. The variables take the expected signs, but for each taster, only one variable is common to columns (1) and (2). In both cases, this variable is a defect: ALCO for expert 9 and FLAT for expert 3.

From these results, one can think that there is a typology of the tasters, some reacting more to the olfactive aspects of the wine, others to gustatory aspects, or others still to defects.

4. Conclusion

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Table 1
Descriptive statistics

Variables	Abbreviations	Modalities	Descriptive statistics
Price	*PRICE*	Continuous	69.10 (43.75)
Jury grade (present)	*PGRADE*	Continuous	12.93 (1.37)
Jury grade (future)	*FGRADE*	Continuous	13.91 (1.82)
Tasting day			
June 19 2000	*DAY1*	Yes = 2; No = 1	25.10; 74.90
June 20 2000	*DAY2*	Yes = 2; No = 1	18.82; 81.18
June 21 2000	*DAY3*	Yes = 2; No = 1	25.49; 74.51
June 22 2000	*DAY4*	Yes = 2; No = 1	17.26; 82.74
June 23 2000	*DAY5*	Yes = 2; No = 1	13.33; 86.67
Sensory characteristics			
Olfactory examination			
Aromatic intensity	*INTE*	Strong = 3; Classic = 2; Discrete = 1	43.69; 33.98; 22.33
Finesse of aromas	*FINE*	Yes = 2; No = 1	13.73; 86.27
Complexity of aromas	*COMP*	Yes = 2; No = 1	16.08; 83.92
Gustatory examination			
Firmness of attack	*FIRM*	Yes = 2; No = 1	5.49; 94.51
Excessive acidity	*ACID*	Yes = 2; No = 1	2.35; 97.65
Suppleness	*SUPP*	Yes = 2; No = 1	18.04; 81.96
Flatness	*FLAT*	Yes = 2; No = 1	1.96; 98.04
Fat	*FAT*	Plump = 3; Medium = 2; Lean = 1	10.59; 84.70; 4.71
Well concentrated	*WCON*	Yes = 2; No = 1	6.67; 93.33
Harmony of components	*HARM*	Balanced = 2; Unbalanced = 1	49.41; 50.59
Presence of fine tannins	*TANI*	Yes = 2; No = 1	6.67; 93.33
Finish	*FINI*	Long = 3; Medium = 2; Short = 1	51.46; 13.59; 34.95
General remarks			
Alcohol excess	*ALCO*	Yes = 2; No = 1	13.33; 86.67
Traces of staleness	*STAL*	Yes = 2; No = 1	9.41; 90.59
Touch of reduction	*REDU*	Yes = 2; No = 1	0.00; 100.00
Needs keeping in cellar	*KEEP*	Yes = 2; No = 1	23.14; 76.86
Objective characteristics			
Ranking	*RANK*	Cru or grand cru classé = 3; Cru bourgeois = 2; Cru non classé = 1;	5.10; 12.55; 82.35
Red wine	*RED*	Yes = 2; No = 1	81.57; 18.43
White wine	*WHIT*	Yes = 2; No = 1	18.43; 81.57
1996 vintage	*AN96*	Yes = 2; No = 1	59.61; 40.39
1997 vintage	*AN97*	Yes = 2; No = 1	8.63; 91.37
1998 vintage	*AN98*	Yes = 2; No = 1	25.88; 74.12
1999 vintage	*AN99*	Yes = 2; No = 1	5.88; 94.12
Bordeaux group	*BORD*	Yes = 2; No = 1	16.47; 83.53
Côtes group	*COTE*	Yes = 2; No = 1	9.02; 90.98
Médoc and Graves group	*MEGR*	Yes = 2; No = 1	29.02; 70.98
Saint-Emilion Pomerol			
Fronsac group	*SEPF*	Yes = 2; No = 1	27.06; 72.94
Blancs Secs group	*BLSE*	Yes = 2; No = 1	11.37; 88.63
Blancs Doux group	*BLDO*	Yes = 2; No = 1	7.06; 92.94

Notes: the descriptive statistics are based on the complete sample of 255 wines; we indicate the mean and the standard deviation (in parentheses) for the continuous variables, and the percentage of observations that is equal to the relevant modality for the discrete variables; for *INTE* and *FINI* the descriptive statistics are based on the subsample of 103 wines.

Table 2
Descriptive statistics

Experts	Number of observations	Present grades	Future grades
1	80	13.56 (2.73)	14.70 (3.25)
2	60	12.23 (1.78)	13.54 (2.45)
3	99	14.40 (2.20)	15.77 (2.47)
4	137	11.68 (2.00)	12.33 (2.49)
5	18	13.83 (2.12)	14.06 (2.65)
6	15	14.23 (2.09)	15.50 (2.96)
7	19	13.16 (2.40)	13.13 (3.14)
8	23	11.26 (1.98)	11.78 (2.88)
9	100	12.56 (2.00)	13.27 (2.29)
10	59	13.65 (2.12)	15.32 (2.76)
11	31	12.29 (2.24)	12.35 (2.52)
12	14	14.36 (1.91)	15.07 (2.92)
13	15	15.73 (2.25)	17.20 (3.63)
14	23	12.70 (1.99)	13.65 (2.62)
15	42	13.43 (1.61)	13.57 (1.93)
16	29	12.79 (2.08)	12.93 (2.25)
17	16	12.06 (2.95)	12.06 (2.95)
18	29	13.07 (3.29)	13.76 (3.82)
19	6	9.50 (2.07)	9.50 (2.07)
20	30	11.97 (2.01)	13.63 (3.00)
21	7	13.00 (3.32)	13.43 (3.78)
22	22	13.41 (2.48)	13.77 (3.16)
23	100	12.20 (1.63)	12.94 (2.37)
24	19	12.58 (1.51)	13.26 (2.07)
25	31	12.42 (2.73)	13.10 (3.37)
26	29	11.69 (2.17)	12.76 (3.14)
27	38	11.87 (1.50)	13.05 (2.30)
28	53	12.79 (1.77)	14.11 (2.30)
29	6	11.67 (2.88)	11.67 (2.88)
30	19	12.79 (2.90)	12.79 (2.90)
31	85	13.98 (2.28)	15.47 (3.38)
32	10	11.90 (1.91)	12.40 (2.84)
33	11	14.59 (2.01)	15.68 (2.39)
34	42	13.95 (1.99)	15.62 (2.78)

Notes: the descriptive statistics are based on the subsample of wines tasted by each expert; we indicate the mean and the standard deviation (in parentheses).

Table 3
Hedonic price equation for the complete sample

	(1)		(2)		(3)	
Jury grades						
PGRAD					0.046	(0.014)
FGRAD ¡ PGRAD			0.185	(0.039)	0.058	(0.023)
Sensory variables						
FIRM	¡ 0.268	(0.098)	¡ 0.246	(0.095)	¡ 0.229	(0.096)
FAT	0.129	(0.057)				
FINI	0.036	(0.017)				
KEEP	0.233	(0.053)	0.122	(0.058)	0.179	(0.054)
Objective variables						
RANK	0.248	(0.044)	0.169	(0.046)	0.205	(0.045)
AN98	¡ 0.279	(0.077)	¡ 0.328	(0.076)	¡ 0.290	(0.077)
AN99	¡ 0.798	(0.097)	¡ 0.721	(0.103)	¡ 0.777	(0.103)
BORD	¡ 0.550	(0.091)	¡ 0.523	(0.091)	¡ 0.613	(0.091)
COTE	¡ 0.597	(0.079)	¡ 0.685	(0.080)	¡ 0.618	(0.082)
SEPF			¡ 0.155	(0.056)	¡ 0.146	(0.057)
Constant	5.937	(0.259)	6.513	(0.279)	5.789	(0.346)
Number of observations	255		255		255	
$\overline{R}^2$	0.635		0.657		0.651	

Notes: standard errors in parentheses; (1) results obtained using Ordinary Least Squares (OLS) without jury grades; (2) results obtained using OLS with mean jury grades; (3) results obtained using OLS with jury's highest grades.

Table 4
Jury grade equations for the complete sample

	(1)		(2)	
Sensory variables				
INTE	0.010	(0.004)	0.011	(0.005)
FINE	0.033	(0.013)	0.037	(0.016)
COMP	0.058	(0.013)	0.051	(0.015)
FLAT	¡ 0.127	(0.033)	¡ 0.173	(0.040)
FAT	0.043	(0.012)	0.060	(0.015)
HARM	0.073	(0.010)	0.075	(0.011)
TANI	0.049	(0.018)	0.050	(0.022)
FINI	0.035	(0.008)	0.045	(0.009)
STAL			¡ 0.041	(0.019)
KEEP	0.057	(0.011)	0.092	(0.013)
Objective variables				
RANK			0.030	(0.011)
SEPF	0.048	(0.010)	0.074	(0.012)
Constant	2.109	(0.055)	2.095	(0.074)
Number of observations	255		255	
$\overline{R}^2$	0.575		0.613	

Notes: standard errors in parentheses; (1) results obtained using OLS for the jury PGRAD equation; (2) results obtained using OLS for the jury FGRAD equation.

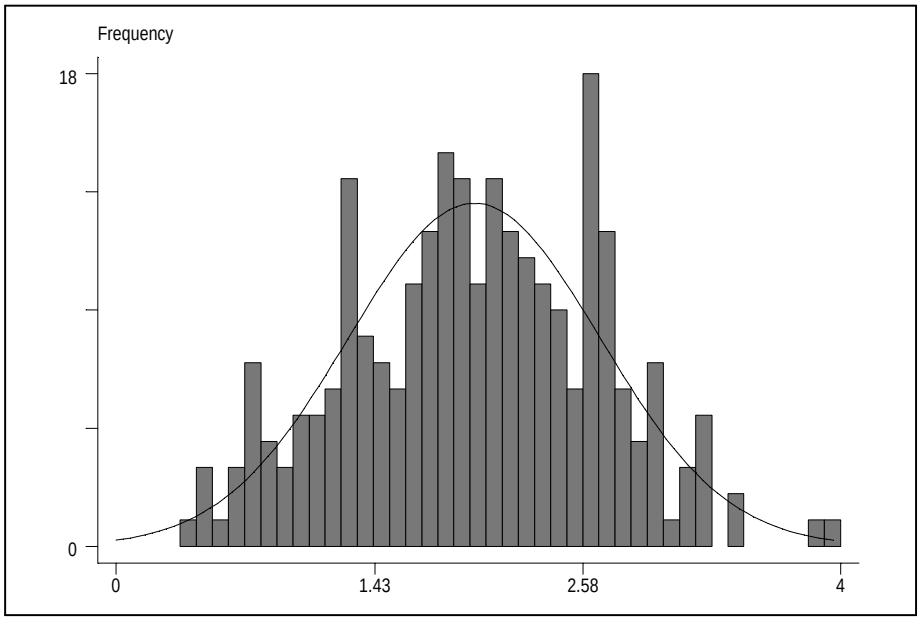

Figure 1
Distribution of the standard deviation of jury members' present grades

Table 5
Hedonic price equation for the wines which show a low or a high present grade dispersion

	(1)		(2)	
Jury grades				
PGRAD	0.177	(0.040)		
FGRAD ¡ PGRAD			0.169	(0.070)
Sensory variables				
INTE			¡ 0.098	(0.038)
COMP	¡ 0.568	(0.141)		
HARM	¡ 0.186	(0.110)		
Objective variables				
RANK	0.322	(0.084)		
AN96	0.547	(0.095)		
AN98			¡ 0.538	(0.169)
AN99			¡ 1.006	(0.174)
BORD			¡ 0.471	(0.176)
COTE			¡ 0.841	(0.155)
SEPF			¡ 0.309	(0.104)
Constant	1.439	(0.411)	7.792	(0.472)
Number of observations	60		60	
$\overline{R}^2$	0.684		0.740	

Notes: standard errors in parentheses; (1) results obtained using OLS for the wines which show a low present grade dispersion; (2) results obtained using OLS for the wines which show a high present grade dispersion.

Table 6
Expert 4 grade equations

	(1)		(2)	
Sensory variables				
INTE	0.041	(0.013)	0.044	(0.016)
COMP	0.114	(0.049)	0.122	(0.058)
HARM	0.065	(0.027)		
KEEP			0.083	(0.037)
Objective variables				
RANK	0.050	(0.023)	0.057	(0.028)
SEPF	0.072	(0.030)	0.105	(0.036)
Constant	1.991	(0.081)	1.961	(0.100)
Number of observations	137		137	
$\overline{R}^2$	0.197		0.181	

Notes: standard errors in parentheses; (1) results obtained using OLS for the expert 4 PGRAD equation; (2) results obtained using OLS for the expert 4 FGRAD equation.

Table 7
Expert 23 grade equations

	(1)		(2)	
Sensory variables				
FLAT	¡0.372	(0.082)	¡0.408	(0.113)
FAT	0.087	(0.030)	0.114	(0.041)
HARM	0.062	(0.023)	0.074	(0.032)
KEEP	0.086	(0.030)	0.137	(0.042)
Constant	2.500	(0.118)	2.457	(0.162)
Number of observations	100		100	
$\overline{R}^2$	0.336		0.290	

Notes: standard errors in parentheses; (1) results obtained using OLS for the expert 23 PGRAD equation; (2) results obtained using OLS for the expert 23 FGRAD equation.

Table 8
Expert 9 grade equations

	(1)		(2)	
Sensory variables				
FAT			0.117	(0.051)
FINI			0.025	(0.012)
ALCO	¡0.127	(0.050)	¡0.109	(0.052)
KEEP			0.073	(0.036)
Constant	2.659	(0.058)	2.3207	(0.130)
Number of observations	100		100	
$\overline{R}^2$	0.052		0.176	

Notes: standard errors in parentheses; (1) results obtained using OLS for the expert 9 PGRAD equation; (2) results obtained using OLS for the expert 9 FGRAD equation.

Table 9
Expert 3 grade equations

	(1)		(2)	
Sensory variables				
FLAT	¡0.308	(0.098)	¡0.505	(0.106)
FAT	0.098	(0.034)		
HARM	0.081	(0.028)		
Constant	2.642	(0.133)	3.261	(0.110)
Number of observations	99		99	
$\overline{R}^2$	0.233		0.180	

Notes: standard errors in parentheses; (1) results obtained using OLS for the expert 3 PGRAD equation; (2) results obtained using OLS for the expert 3 FGRAD equation.