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in the Market for Tuscan Red Wines

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Abstract

This paper argues that imperfectly informed consumers use simple signals to identify the characteristics of wine. The geographical denomination and vintage of a wine as well as the characteristics of a particular wine will be considered here. However, the specific characteristics of a wine are difficult to ascertain *ex ante* given the enormous product variety. The reputation of a denomination will thus be an important guide for consumers when assessing individual wines. Denomination reputation is a function of average quality as revealed by the past performance of producers. The impact of past performance increases over time, since producers consider improved average quality to be an important factor in enhancing the price, but this necessitates monitoring of members in the denomination. The market and pricing of Tuscan red wines provide a natural experiment because there are a number of denominations of different age, each of which is typically undergoing a process of gradual increase in quality standards over time. Furthermore, Tuscan red wines are easily comparable because of great similarities in climate and choice of grape varieties, soil and exposure to sun etc. We show that new denominations have a lower average quality score and that price differentials between denominations are linked to differences in average quality, although consumers tend to exaggerate the quality gap between prestige denominations and new denominations. Thus, a producer in an old denomination benefits from a substantial mark-up relative to an equally good producer from a new denomination. Since ambitious producers in new denominations suffer from price ‘discrimination’ it can be expected that they will produce vineyard branded but denomination neutral wines, provided they can overcome the large fixed costs associated with that strategy. We show that denomination neutral wines do indeed have a stronger price-quality relationship than denomination specific wines.

JEL codes: L15, L66

Keywords: wine, Tuscany, price-quality relationship

1. Introduction¹

The wine economics literature indicates that what is *on the label of the bottle* often has an impact on price which is much larger than the impact of what is *within the bottle*. (Oczkowski 2001, Lecocq and Visser 2006 summarized their earlier articles, but see Cardebat and Figuet 2004 for a dissenting view) However, there are national differences in the sense that the rigid classification systems applied in France seem to be particularly biased against quality or sensory aspects being able to have an impact on price. Studies of wine prices in nations which do not use denominations give sensory characteristics and/or jury grades significant explanatory power. (Schamel and Anderson 2003, but this result is disputed by Haeger and Storchman 2006). Collective reputation is a quasi-public good, so in a rigid classification system, as practiced in Bordeaux, free-riding on the collective reputation must be higher than in Burgundy where the classification right is evaluated every year and de-classification is practiced (Combris, Lecocq and Visser 2000) Indeed, Combris et al show that sensory characteristics have a larger impact on price in Burgundy than in Bordeaux.

The fact that quality (as revealed by the evaluation of experts) and sensory characteristics often play a minor role in determining the price of a commodity is disturbing and is not immediately compatible with the postulate that consumers are well informed. There is of course the argument that experts' evaluations or other estimates of sensory characteristics do not correspond strongly to consumers' tastes and preferences. However, we take the view that consumers and experts share similar preferences, but that consumers differ from experts in that they have imperfect information on individual wines. This is understandable given the product variety of the wine market. One of the authors' local supermarkets has about ten varieties of toothpaste but the local bottle shop (Systembolaget at HansaCompagniet, Malmö, Sweden) has about 1200 varieties of white wine and 1700 varieties of red wine. A recent edition of an Italian wine guide regularly tests about 15,000 individual Italian wines from a little less than 3,000 producers, and the recent edition of *Gault Millau Vin à découvrir, Meilleurs vins de France* lists scores and prices of 5000 French wines.

Facing this product variety, consumers may learn about individual wineries, but they will use the ranking of denominations as an important indicator of the quality of a particular wine. Indeed, it might well be the case that although consumers have knowledge about the average quality of well established denominations, they infer that denominations that they do not know of must be of an

¹ We thank Heino Bohn Nielsen for useful comments on an earlier version of this paper and Mette Bjarnholt for research assistance. Comments at the Enometrics conference in Trier, May 2007, and from seminar participants at the Department of Economics, University of Oxford are gratefully acknowledged.

inferior rank. We propose that the average quality of the denomination of a wine will have an impact on the price of individual wines in that denomination which is independent of their individual quality. The average quality of a denomination is a function of time and monitoring regimes in the denomination. Since an increase in the average quality enhances the price members of a denomination can acquire for their product, members will try to purge other members which are below average in terms of quality. There is also a tendency within a denomination to gradually introduce stricter rules in the wine making process, as will be discussed in next section. Furthermore, it takes time for new denominations to get the media coverage that is necessary for building a reputation. A recent Google search for two denominations included in this study gave about 1 million hits for one of the established denominations, *Brunello di Montalcino*, but only 25,000 for a recently formed denomination, *Rosso di Sovana*.

We will expect that there is a positive relationship between quality (as revealed by scores given by experts) and price but that there are strong denomination effects, explained by the fact that average quality differs between old and new denominations. That is, an individual wine from an old denomination will receive a price premium, linked to the average quality of its denomination, which is independent of the quality of the individual wine. Conversely, the price of a wine from a new denomination will be affected by its quality (sensory characteristics summed up by the score given by an expert) but will suffer from price discrimination linked to the perceived average quality of its denomination. As a consequence, wines of equal quality from different denominations will command significantly different prices. We call the price premium obtained by denomination only a reputational rent or mark-up and we will try to estimate the magnitude of it. We conjecture that the perceived quality difference is larger than the actual or objective difference because consumers have distorted access to information. New denominations have less media coverage than old ones, partly because old denominations have higher average quality. We also investigate the nature of price formation in the market for Tuscan red wines which do not rely on strong denomination attachments – the so called IGT (*Indicazione Geografica Tipica*) and *Vino da Tavola* discussed below. Although IGT carries a vague geographical connotation, the major signal of IGT and *Vino da Tavola* is that these wines have a much larger variance in quality than traditional denominations. The implication is that consumers must learn about the specific characteristics of the individual wines. These wines thus rely on linking quality to brand name reputation, rather than strict geographical denomination. We expect these wines to show a stronger link between price and quality.

2. A brief note on Italian and Tuscan classification principles

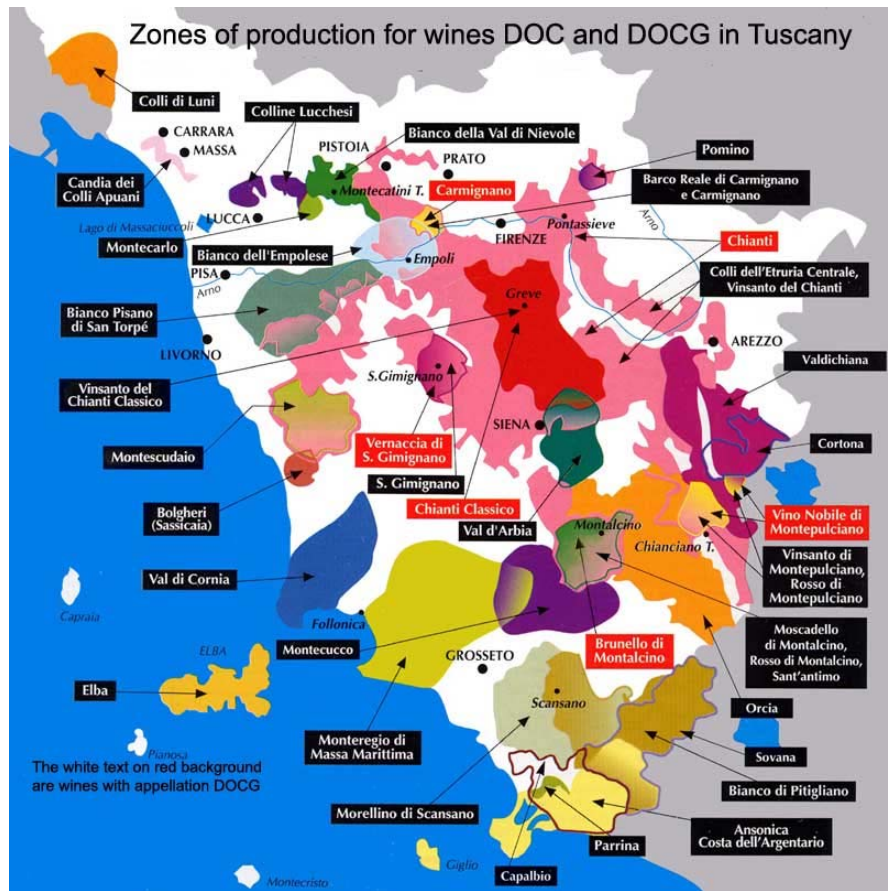
Italy has four types of denominations, and the system is authorized by the Ministry of Agriculture (*Ministero delle politiche agricole e alimentari e forestali*), although the body that monitors members, the *consorzio*, is elected by members. The most rigorous is DOCG (*Denominazione di Origine Controllata e Garantita*) followed by DOC (*Denominazione di Origine Controllata*). A denomination covers a restricted geographical territory and prescribes through its *disciplinare di produzione* the grapes which are permitted and in what proportions they are to be used, as well as a number of conditions for the wine growing and making procedures. These rules include the permitted yield and the properties of the grapes at harvest, amongst others.

A denomination typically starts by obtaining a DOC status and then strives after DOCG status, which is essentially a process of increasing the average quality. Members need to obey the rules established by the *consorzio* and can be subject to disciplinary action.

There are two additional classifications which cover wider territorial units and which are much less rigorous. IGT (*Indicazione Geografica Tipica*) and *Vino da Tavola*. IGT wines are subject to a much larger variance in quality and wine making procedures. In fact some of the best wines in Tuscany are in the IGT or *Vino da Tavola* category – as well as some of the worst. As a consequence these denominations do not confer a direct signal as to the quality of the wine but rely on brand-name impact. Typically, established large producers use this type of denomination to experiment with grape varieties not permitted in DOC and DOCG and to enhance the price-quality link through brand-name promotion.

In most cases, producers are both members of a DOC or DOCG and devote part of the land to IGT or *Vino da Tavola*.² We argue that producing IGT wines is a way for high quality producers in new denominations to get a better deal, since denomination neutral wines can be expected to give a better price-quality relationship. It is also worth noting that denominations that enjoy high reputational mark-ups, such as Barolo in Lombardy or Montalcino in Tuscany, are less inclined to

Map 1:



produce IGT wines. Producing IGT wines is open only for medium to large producers because of the fixed costs involved in establishing brand name reputation.

The Tuscan denominations in the sample analyzed in this paper are within a fairly homogenous geographical area, shown in Map 1. Of the Tuscan denominations, we include *Chianti Classico* which stretches from south of Florence to north of Siena; *Brunello di Montalcino* south of Siena; and a number of new denominations in the Grosseto province, to the west of Montalcino.

The denominations are ranked below in terms of age, and the proportion of Sangiovese in DOC and DOCG wines is given in square brackets. When it comes to IGT wines, the grape composition varies, but as a rule ‘international’ grapes, such as Merlot, Syrah and Cabernet Sauvignon, are fairly important in addition to Sangiovese. However, there is no obligation to include Sangiovese.

² The wine producing branch of the de Rothschild family (of Chateau Lafite) recently established a *fattoria* (*Rocca di Frassinello*) in the Grosseto province, in the *Monteregio di Massa Marittima* denomination. However, the local DOC is not produced - only IGT wines - and only the two top wines are allowed to carry the brand name, *Rocca di Frassinello*.

Brunello di Montalcino: formed 1966 as DOC and received DOCG status in 1980. [100 per cent Sangiovese]

Chianti Classico: previously part of various Chianti DOCs but broke away and got DOCG status in 1996. [80 per cent Sangiovese]

Grosseto province DOCs: Morellino di Scansano: DOC 1992 and DOCG beginning with the 2007 harvest. [85 per cent Sangiovese]

There are several DOCs in the Grosseto province of recent origin, such as *Monteregio di Massa Marittima* (DOC 1994) and *Montecucco* (DOC 1998). The new Grosseto DOCs are also predominantly Sangiovese wines. In addition to these three, other new denominations are also represented in the sample: *Rosso di Sovana*, *Capalbio* and *Parrina DOC*.

In addition to these DOC and DOCG we have also included IGT red wines produced in these denominations.

3. Data and modelling

The data for this study come from the well recognized Italian wine guide *I vini de Veronelli* which is published yearly. It uses a quality scale expected to reveal the taste, perfume and other sensory qualities of the wines. The scale is inspired by the one popularized by Robert Parker, although only wines in the 80-100 range are reported. The guide provides quality judgments on individual wines, as well as retail prices in intervals, maturing techniques, vintage etc. There are a number of well known problems in using this type of data. However, it can be argued that wine guides operate in a market for serious wine-drinkers and *connoisseurs* and any systematic bias – as opposed to stochastic errors of judgement – would be penalised by market forces.

Guides do not, however, present an unbiased selection of producers, but concentrate on the best in each denomination. We suspect that this selection bias *understates* the difference in average quality between old and new denominations, in that the sample for Brunello di Montalcino and Chianti Classico are reasonably representative, while new denominations are represented only by their best producers. Nonetheless our data indicate a large difference between Brunello's average score, 91, and that of Grosseto province DOCs, which obtain an average of 87. But as we will point out below the average of a representative sample of Grosseto denominations is probably lower. Chianti Classico is in-between at 88. We have compared the Veronelli assessment with other guides and found a high consensus.

The dataset consists of 684 observations of wines. These are classified according to quality (from the results in *I Vini di Veronelli*, 2007 edition), denomination (Grosseto³, Morrelino di Scansano, Chianti Classico and Brunello di Montalcino), vintage (1999-2005) and whether they enjoy IGT or DOC(G) status.

The intuition of the model can be summarized as follows. We argue that the price of a wine is determined by individual sensory characteristics as revealed by expert opinion. Furthermore there is an independent positive denomination effect which is linked to the perceived average quality of a denomination. New vintages tend to have a negative impact on price because buyers are imposed the cost of cellaring the wines. Furthermore, since information about a vintage takes time to get diffused there is more uncertainty as to the quality of new vintages, and consumers are compensated for that uncertainty by a lower price. Finally we expect that IGT wines will have a stronger price-quality relationship because consumers cannot rely on denomination as a proxy for quality and have to learn about the qualities of particular brands or vineyards. The formal model is as follows:

$$price_i = \beta_0 + \beta_1 quality_i + dummies + \varepsilon_i$$

price is expressed in euros⁴. Dummies are introduced for the denominations *Chianti* (which stands for Chianti Classico) and *Brunello* (which stands for Brunello di Montalcino)⁵, for *IGT* status and for the “*new*” vintages (2003-05). In addition, interaction terms were introduced for the interaction between quality, IGT and vintage and the two denominations Chianti and Brunello (*q*c*, *q*b*, *i*c*, *i*b*, *n*c*, *n*b*); for the interaction between IGT status and quality (*q*i*); and for the interaction between IGT status and vintage (*n*i*). The reference category is thus a Grosseto of “old” vintage without IGT status. ε_i is the error term. The model was estimated using OLS, resulting in

Table 1: Estimation results

Dependent variable is price (€)

	(1)	(2)
Constant	-34.39	-74.58***
	-1.44	-3.29
Quality	0.58**	1.07***
	2.14	4.12
IGT	-145.25***	-123.58***
	-4.92	-4.44
New	-3.82	-6.19***
	-1.26	-3.08
Chianti	-139.37***	-113.67***
	-5.31	-4.23
Brunello	-63.82	14.79***
	-1.32	5.82
q*c	1.68***	1.33***
	5.68	4.33
q*b	0.91*	
	1.70	
i*c	-1.29	
	-1.00	
i*b	-11.6*	-11.5***
	-1.85	-3.40
n*c	-4.50	
	-1.18	
n*b	-2.09	
	-0.36	
q*i	1.67***	1.43***
	5.02	4.48
n*i	1.63	
	0.32	
R²	0.58	0.58
N	684	684

All t-values are based on heteroskedasticity consistent standard errors

P-value:

* <10% ** <5% *** <1%

³ Which is in fact several independent denominations of very recent origin.

⁴ Unfortunately, the price data is not ideal, since the original data is reported in intervals and a simple average has thus been used.

⁵ Morrelino was grouped with Grosseto at an early stage of the analysis, since the difference between them was found to be insignificant.

the output shown in column 1 of Table 1. It is clear that several interactions are insignificant⁶: removing them results in the estimates given in column 2. Here all the coefficients are strongly significant. The preferred model is therefore:

$$price_i = \beta_0 + \beta_1 \cdot quality_i + \beta_2 \cdot IGT_i + \beta_3 \cdot new_i + \beta_4 \cdot Chianti_i + \beta_5 \cdot Brunello_i + \beta_6 \cdot quality_i \cdot Chianti_i + \beta_7 \cdot IGT_i \cdot Brunello_i + \beta_8 \cdot quality_i \cdot IGT_i + \varepsilon_i$$

According to the estimates, the price change associated with a one point increase in quality is thus

$$\frac{\partial \hat{price}_i}{\partial quality_i} = \hat{\beta}_1 + \hat{\beta}_6 \cdot Chianti_i + \hat{\beta}_8 \cdot IGT_i = 1.07 + 1.33 \cdot Chianti_i + 1.43 \cdot IGT_i > 0$$

The increase is thus €1.07 for a Grosseto, €1.07 + €1.33 = €2.40 for a Chianti and €1.43 greater for any wine, if it enjoys IGT status. The price change associated with IGT status is

$$\frac{\partial \hat{price}_i}{\partial IGT_i} = \hat{\beta}_2 + \hat{\beta}_7 \cdot Brunello_i + \hat{\beta}_8 \cdot quality_i = -123.58 - 11.5 \cdot Brunello_i + 1.43 \cdot quality_i \leq 0$$

This price decreases with IGT status for wines of low quality, but increases for wines of high quality. Brunello decreases in price by €1.50 if it has IGT status, in addition to the above.

The price change associated with a “new” vintage is

$$\frac{\partial \hat{price}_i}{\partial new_i} = \hat{\beta}_3 = -6.19$$

A wine of new vintage is cheaper than one of old vintage by €6.19. This effect is quality independent. The price change associated with a Chianti is

$$\frac{\partial \hat{price}_i}{\partial Chianti_i} = \hat{\beta}_4 + \hat{\beta}_6 \cdot quality_i = -113.67 + 1.33 \cdot quality_i \leq 0$$

A quality of less than $\frac{113.67}{1.33} = 85.47$ associates a price decrease with Chianti denominations compared to Grosseto. In practice this quality is very rare in our sample, so Chianti enjoys a mark-up compared to Grosseto. This is increasing with quality.

The price change associated with a Brunello is

$$\frac{\partial \hat{price}_i}{\partial Brunello_i} = \hat{\beta}_5 + \hat{\beta}_7 \cdot IGT_i = 14.79 - 11.5 \cdot IGT_i > 0$$

⁶ The price effect of vintage is independent of denomination and IGT status. The price of Chianti is more dependent on quality than Grosseto and Brunello, whereas IGT status results in a large reduction in the price of a Brunello.

A Brunello thus enjoys a mark-up of €14.79 compared to a Grosseto. However, if the Brunello has IGT status, this is reduced to just €3.29. Some implications of our econometric analysis are summarized in Table 2, which shows the predicted price, \hat{price} , for various parameter values, and the implied mark-up on the price of a Chianti or a Brunello over that of an identical (in terms of quality, IGT status and vintage) Grosseto. 89 represents the average quality for the sample.

Table 2: Some implications of the estimation results

Predicted Prices and Mark-up over Grosseto

		DOC					
Vintage		Old			New		
Quality		87	89	91	87	89	91
Grosseto	Predicted Price	€ 18.51	€ 20.65	€ 22.79	€ 12.32	€ 14.46	€ 16.60
Chianti	Predicted Price	€ 20.55	€ 25.35	€ 30.15	€ 14.36	€ 19.16	€ 23.96
	Mark-up	€ 2.04	€ 4.70	€ 7.36	€ 2.04	€ 4.70	€ 7.36
Brunello	Predicted Price	€ 33.30	€ 35.44	€ 37.58	€ 27.11	€ 29.25	€ 31.39
	Mark-up	€ 14.79	€ 14.79	€ 14.79	€ 14.79	€ 14.79	€ 14.79

		IGT					
Vintage		Old			New		
Quality		87	89	91	87	89	91
Grosseto	Predicted Price	€ 19.34	€ 24.34	€ 29.34	€ 13.15	€ 18.15	€ 23.15
Chianti	Predicted Price	€ 21.38	€ 29.04	€ 36.70	€ 15.19	€ 22.85	€ 30.51
	Mark-up	€ 2.04	€ 4.70	€ 7.36	€ 2.04	€ 4.70	€ 7.36
Brunello	Predicted Price	€ 22.63	€ 27.63	€ 32.63	€ 16.44	€ 21.44	€ 26.44
	Mark-up	€ 3.29	€ 3.29	€ 3.29	€ 3.29	€ 3.29	€ 3.29

4. Interpretation of the results

Prices respond positively to quality difference as revealed by experts' evaluations - as we expected. Furthermore, the price response to quality changes is much stronger for IGT wines, about €2.5 per quality point for IGT as opposed to €1.1 for the Grosseto DOC and Montalcino DOCG. This fact indicates that the denomination affiliation for a wine can disturb a consumer's assessment of quality. However, Chianti Classico DOCG wines are more price responsive to quality: in fact, they are almost as responsive as IGT wines. One possible interpretation is that Chianti Classico producers rely more on consumers identifying quality through producers' characteristics as opposed to denomination. Anecdotal evidence suggests that Chianti Classico labels downplay the denomination and rather stress producer identification. Wines of new vintages command lower prices which can be explained by the fact that knowledge about new vintages is not as widely dispersed as for old ones. Information transmission about vintage reputation takes time, since the true character of a vintage is not revealed until years after harvest. So buyers of new vintages get a

discount for the risk they are taking. Finally, consumers may be willing to pay for buying a wine which does not need cellaring.

There is a significant mark-up on Grosseto DOC for both Chianti Classico and Brunello di Montalcino and it is larger for the oldest denomination. The magnitude of the Brunello mark-up is almost €15 which is about half of what a good wine guide costs - consumers pay a high price for their ignorance.

The mark-up for Brunello over Chianti Classico is falling as you climb the quality ladder. This has to do with the fact that the price is more responsive to quality changes for Chianti Classico, as noted above. The price response of a Chianti Classico to a quality change of one unit is €2.4, which multiplied by the difference in the average quality between Brunello and Chianti Classico of three is €7.2. This corresponds well with the estimated mark-up of about €7.5 at score 91. However, if the price offered for a one point increase in quality is *ceteris paribus* just €1.07, as suggested by the regression, then consumers must overestimate the difference between average quality in Brunello and Chianti Classico: a mark-up of €7.5 suggests an implied expected quality difference of 7 points, which is more than twice the true level. We cannot apply the same assessment in explaining the Brunello mark-up on Grosseto, almost €15, since we do not know the true average of the Grosseto. However, this would imply an expected quality difference of almost 15 points, which would suggest that consumers' perceptions of the average quality is under 80. This is most likely an underestimate of the true average, but new denominations might suffer from consumers seriously downgrading products they do not know (much) about. Since the media are biased in favour of top producers and top average quality denominations it is understandable that consumers' perceptions of quality might systematically downgrade wines with low information exposure.

The analysis of the mark-up on IGT wines is rewarding and the interpretation is straightforward. IGT wines rely more on quality than on denomination reputation since they have only a remote association with their producers' denomination. In other words the positive and strong denomination effect that Montalcino enjoys with its Brunello wines disappears. Thus the mark-up of IGT wines produced in Montalcino is down to a few euros relative to Grosseto and Chianti Classico IGT wines. In fact, at the higher end of the quality scale, Chianti Classico IGT fetches a higher price. The fact that Chianti Classico has a positive price differential over Grosseto is mainly due to a stronger response of price to quality than for Grosseto and Montalcino. But the effect is that the price difference for a given quality is much smaller for IGT wines.

5. Conclusion

Most of the expectations spelled out in sections 1 and 3 have been confirmed by the empirical analysis. There is a significant correlation between price and quality as measured by the scores given by experts. The reputational mark-up for Montalcino DOCG wines is substantial and dependent on the age of the denomination and the high average quality in the denomination. However, the actual quality gap between old and new denominations is probably smaller than the perceived gap. Finally, we showed that wines that do not have a denomination affiliation enjoy a stronger impact of quality on price. It has been argued that large mark-ups can be compatible with the assumption of rational consumer behaviour given that there are high search costs. We observe, however, that the magnitude of the mark-up amounts to about half the price of a reputable wine guide. Serious and rational wine-drinkers should pay a visit to the book-shop before they enter the bottle-shop.

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