Geography vs. Brands in a Global Wine Market

Abstract:
Producer brands increasingly dominate the international wine market. Concurrently, generic advertising campaigns are launched in an attempt to promote wine origin and exports (e.g. Australia, Austria, Spain). We analyze U.S. price data and quality indicators for 24 wine growing regions within eleven countries using a hedonic modeling approach. We assess the value of producer brands vs. geographical indicators that signal above average quality. We define an indicator for high, average, and low quality producers (brands) within a region based on their relative peer performance, i.e. whether they consistently produce qualities that are one standard deviation above or below the regional average. Based on this indicator, estimated premiums (discounts) range up to +20% (-10%) for high and low quality producers (brands) within their regions. The estimated regional price differences range up to 50%. On average, prices for a top new world producer never exceed the prices obtained for an average Napa Valley producer brand which was chosen as the reference category in the estimation. In contrast, prices for the top producers from France and Italy will exceed the prices even for the top Napa Valley producers. Therefore, we must conclude that new world wine still has to catch up with the old world in terms of regional reputation. However, leading new world producers are able to pick-up most of the price differential. We can conclude that generic promotions with export quality controls accompanied by quality leaders emphasizing origin in their own marketing efforts can level the playing field for laggard regions.

1. Introduction

We frequently observe price differences for otherwise similar products seemingly based on regional origin. International trade economists stress the importance of production cost, product quality, and strategic behavior. They associate product origin with a reputation or quality measure. However, this may neglect the impact of subjective consumer preferences based on marketing, advertising, brands or product loyalty. Advertising campaigns for export promotion, such as those for Austrian wine or Colombian coffee, reflect the recognition that establishing a regional brand is an important vehicle to boost exports. In this paper, we apply a hedonic model to estimate the potential impact of regional origin on wine prices controlling for blind-tasted sensory quality, variety, *and* producer quality signals to assess their significance in the U.S. wine market.[1] Economic theories explaining the correlation between prices and regional origin include production costs approaches with monopolistic competition (e.g. Helpman and Krugman, 1985), spatial models (e.g. Fujita et al., 1999), quality differentiated product markets (e.g. Tirole, 1988), and reputation signaling (e.g. Shapiro, 1983). Empirical approaches with specific applications to wine include Schamel (2000) modeling product scarcity and Brooks (2001) modeling brand value and correcting for cost differences that transcend borders.

Quality signals are important price determinants for an experience good such as premium wine, which is a highly differentiated good with numerous quality aspects. Objective (impartial) quality measures are difficult to define. Many *sensory* indicators that

[1] Wine from the New World dominates the US market. About 77% of consumption is either from California or imported from Australia, New Zealand, Argentina, Chile, or South Africa. Only 15% are from Europe and 8% from sources outside of California (Sumner et al. 2001). Recently, the market share of Old World wine sold in the U.S. has decreased steadily (Anderson and Norman, 2003).

determine expert ratings are highly subjective. In addition, labels, bottle design, and the reputation of producers and growing regions may also advance or hinder wine sales. Frequently, we observe that wine prices vary significantly despite very similar sensory quality attributes. For instance, wine from California's Napa Valley typically sells at higher prices than wine of comparable sensory quality from another region.

We explain such observations by positing that reputation indicators, variety, and regional origin affect wine purchase decisions. Consumers will pay much higher prices for reputable wines from a well-known producer and/or region because they do not have sufficient information or they are uncertain about quality. Given limited attention levels that consumers can expend, not all quality signals receive equal notice. Consequently, we assume that the attention level that consumers pay to positive (negative) quality signals is higher for producers that perform significantly above (below) their average peers. Then, unusually high as well as unusually low quality demonstration form a lasting producer quality signal in the minds of consumers.

In this paper we estimate a hedonic pricing model to evaluate the impact of producer quality signals as well as expert evaluations, regional origin, wine variety, judging age on wine prices. From this, we are able to derive interesting marketing implications for wine producers and regionally associated producers. We also draw conclusions with respect to the correlation between prices and regional origin and the interpretation of brand values vs. regional quality premiums. Data source for this analysis are expert quality evaluations for premium wines published in the "Wine Spectator" between 10/01 and 10/02 which are available online at www.winespectator.com. We derive an indicator of positive and negative producer quality demonstrations based on the deviation from the average quality performance of producers within a region. Modeling a unique indicator for a producer quality signal is a distinct feature of this empirical application.

2. Literature Review

A number of studies have applied hedonic models to estimate implicit prices for wine quality and reputation attributes. They are based on the notion that any product represents a bundle of characteristics that define quality. Theoretical foundation is the seminal paper by Rosen (1974), which posits that goods are valued for their utility-generating attributes. Rosen suggests that competitive implicit markets define prices for embodied product attributes, and that consumers evaluate product attributes (e.g. features of a car) when making a purchase. The observed market price is the sum of implicit prices paid for each quality attribute. Rosen also recognizes an identification problem for supply and demand functions derived from hedonic models, because implicit prices are jointly determined equilibrium supply and demand conditions. Hence, implicit prices may not only reflect consumer preferences but also factors determined by production. To solve the identification problem it is necessary to separate supply and demand conditions. Arguea and Hsiao (1993) argue that identification is essentially a data issue, which can be avoided by pooling cross-section and time-series data specific to a particular side of the market.

In addition to sensory quality and variety, producer and regional reputation indicators will also affect wine prices since the quality of a bottle is not known until uncorked. Shapiro (1983) models the effects of individual producer reputation on prices in competitive markets but with imperfect information. Improving their knowledge about product quality is costly to consumers. He demonstrates that reputation allows high-quality producers to sell their items at a premium, which may be interpreted as return on investments in reputation building. In

such an imperfect information environment, credible indicators of product quality and reputation can be effective in reducing decision-making costs to consumers. Expert quality assessments are an important vehicle enabling consumers to learn about the reputation for quality of producers and regions. Tirole (1996) presents a model of collective reputation as an aggregate of individual reputations where current producer incentives are affected by their own actions and collective actions of the past. He derives the existence of stereotype producers from history dependence, shows that new producers may suffer from past mistakes of older producers for a long time after the latter disappear, and derives conditions under which the collective reputation can be regained.

Nerlove (1995) studies the Swedish wine market with government-controlled prices, no domestic production, and a small share of global consumption. He estimates a reduced form hedonic model with exogenous prices (as opposed to supply assuming that Swedes reveal their valuation of a particular wine quality attribute by varying the derived hedonic demand for it), regressing sold quantities on various quality attributes and prices. Combris, Lecocq and Visser (1997) estimate a hedonic price equation and what is referred to as a jury grade equation to explain variations in price and quality for Bordeaux wine. Landon and Smith (1997, 1998) also analyze Bordeaux wine, focusing on a lagged reputation indicator in addition to sensory quality. In both papers, they use a hedonic model to study the impact of current quality and reputation based on past quality demonstrations. Their main findings are: reputation indicators have large price impacts; an established reputation is much more important than short-term quality improvements; and ignoring reputation indicators will overstate the impact of current quality on consumer behavior.

Roberts and Reagans (2001) examine price-quality relationships and market experience for New World wines in the U.S. market. They argue that producer or regional quality signals improve with the duration of market exposure and evaluation by consumers. Oczkowski (1994) estimates hedonic price function for premium Australian wines, examining six attribute groups and various interaction terms. In another paper, he argues that single indicators of wine quality and reputation are imperfect measures because tasters' evaluations differ and thus contain measurement errors. Employing factor analysis and 2SLS, he finds significant reputation effects but insignificant quality effects (Oczkowski, 2001).

Brooks (2001) argues that traditional views of international competitiveness emphasize product quality and production cost and neglect the potential impact of marketing and brand development on export demand. Applying hedonic regression analysis, she controls for vintage, blind-tasted quality, variety and also cost differences. Cross-country comparisons that suggest that neither cost nor quality differences, but country “brands” affect a wine bottle’s price in excess of fifty percent. Crucial for this conclusion is to interpret the premiums on regional dummies as a marketing premium as opposed to a quality premium.

Schamel (2000) estimates a model with blind-tasted sensory quality, variety, scarcity, and special designations examining seven regions and two varieties (Cabernet Sauvignon and Chardonnay). He finds that consumers are willing to pay a higher quality premium for Chardonnay compared to Cabernet Sauvignon. In contrast, red wine consumers put a higher value on regional origin and product scarcity. This suggests that the public-good value is higher for red wine appellations and their producers would benefit more from collective marketing efforts. Schamel and Anderson (2003) evaluate wine quality and regional indicators for wines from Australia and New Zealand.

In this paper, the focus is on regional and producer quality signals. Consumers have an idea about a producer's ability to deliver premium wine based on relative regional peer performance. Their willingness to pay depends on expert opinions, maturing potential, age and relative scarcity of the wine. In addition, they have quality perceptions about grape varieties and growing regions when forming their buying decisions. To assess the significance of such subjective perceptions on wine trade, we estimate the impact of regional origin *and* producer quality signals on wine prices controlling for blind-tasted sensory quality, variety. At least part of the estimated price premiums or discount due to regional origin may be interpreted as a marketing premium as opposed to a quality premium or discount when the variation in regional effects does not correspond to the regions producing a higher average qualities.

3. Data and Analysis

Building on Rosen (1974), we propose a hedonic model where the price of a particular wine (P_w) is a function of product attributes z_j: $P_w = P_w(z_1, ..., z_j, ..., z_n)$.[2] We apply a detailed data set obtained from *The Wine Spectator*. It publishes U.S. release prices as well as sensory wine quality ratings based on a 100-point scale (*Sq*), maturing potentials (*Pot*) and special expert selections (*SS, BB*).[3] Dependent variable is the logarithm of wine prices (*P*) in US$.[4] Using the sensory wine quality ratings, we derive an indicator for high-end (*He*) and low-end (*Le*) quality producers by calculating the deviation of a producer's average quality rating from their respective regional average. We then define dummy variables identifying high-end and low-end quality producers, which deviate by more than one standard-deviation (about two points) from their respective peer average.[5] Further control variables in the model are available quantities (*A*), age (*Age*) and a categorical dummy for wine variety (*Va*). The raw data set had more than 6,400 observations. The sample size usable in the estimation was reduced due to missing information about prices, varieties, availability and vintage, but still amounts to a total of 5,420 observations. We analyze separate models for red and white varieties in order to see differential impacts due to the basic wine color.

Tables 1 and 2 (incl. notes) provide key information and sample statistics for the data. For the estimation, we differentiate 24 regions in eleven countries and ten varieties as well as red and white wines in general. Napa was chosen as the base region and Cabernet Sauvignon as the base variety (Chardonnay for the white sample). Overall, the average score is 86.7 points, ranging from 61 to 100. The average nominal price is $30.37 ranging from $4 to $520. The average age of a wine when judged is 2.46 years and the expert opinion on the maturing potential of wines is about 2.9 years on average. Just about 2/3 of all the wines in the sample are red varieties and 1/3 are white varieties.

We also explored alternatives to our producer reputation indicator (a dummy variable based on relative peer performance). We ran models using producer averages or their

[2] The theory of hedonic pricing models is well documented in the literature (e.g. Nerlove 1995).

[3] New World wines (California, Oregon, Chile, Australia, etc.) are labeled primarily by variety, while Old World wines (France, Italy, Spain, etc.) are labeled primarily by their region of origin. Thus, the data set does not classify a "Cabernet Sauvignon" from "Bordeaux." Therefore, "Bordeaux style" wines are grouped as Cabernet blends.

[4] The reported price is a suggested retail price on *release* and prior to tasting. This price may differ from actual consumer transaction prices due to retail mark-ups and government taxes differ.

[5] Note that the estimated regional effects (measured on the regional dummy variables) will be mitigated through the producer quality signal derived from the regional averages.

deviations from the regional averages, which are highly correlated and thus yield similar results. Moreover, assuming uncertain consumers, it seems more reasonable to use a less precise measure when modeling producer quality signals. We include a set of indicator variables for grape variety as well as the age and maturing potential at the time of judging as we expect that aged wines (especially reds and/or those with a high potential to mature) will achieve higher prices.

Although we use a mixed log-linear functional form, the results are robust to model specification.[6] The core model estimated in this paper is:

$$\log(P) = \alpha + \beta_1 \log(Sq) + \beta_2 \log(A) + \gamma_1 He + \gamma_2 Le + \gamma_3 BB + \gamma_4 SS + \delta_1 Age + \delta_2 Pot + \eta_j Va + \theta_k Reg + \varepsilon$$

where log(P) is the logarithm of the suggested release price in US$. Given the functional form this equation, β_1 measures the price elasticity of the quality rating, β_2 the price elasticity of available quantities (scarcity). The γ coefficients measure the premiums/discounts for high/low-end quality producers and for the two special expert designations. The δ coefficients for *Age* and *Pot* indicate the percentage premium paid for older and maturing wines while η and θ measure price premiums/discounts for regional origin and variety, respectively. *Reg* and *Va* denote dummy variable matrices for regional origin and variety. Estimating equation (1) results in a vector of coefficients relative to the contribution of the base control.

4. Estimation Results

Table 3 lists the results for all three models. Most estimates are highly significant (except for one variety), and F-tests show that adding these variables will significantly improve the fit of the model. With respect to sensory expert evaluations for all wines, prices are highly elastic (about 3.4% or 1.03$ at the average price). Producer quality signals (high-end, low-end) also affect prices significantly. It is interesting that high-end producers receive higher premiums (+21%) compared to the low-end discount (–9.6%). Moreover, the estimated premium for high-end producers is 3.9% higher for red wines (22.1% vs. 18.2%) while the discount for low-end producers is 1.6% higher for red wines (–9.7% vs. –8.1%). Therefore, red (white) wine producers are to gain more (less) from consistently producing higher qualities, but will also loose more form consistent under-performance.

As expected, wine prices increase with age (+14.4%) and maturing potential (+3.6%), and that the premium for both of these variables is much larger for reds. Special selections (*SS*) receive a 14.3% premium while best buy designations (*BB*) carry a 26% discount. "Availability" coefficients are negative and highly significant in all samples. This suggests that a small scarcity effect may be present which is somewhat larger for red wines, where a 1% increase in the number of cases made results in a 0.12% (or 3.5¢) decrease in price. A more detailed look at variety effects suggests that prices for Cabernet blends are not significantly different from the base variety, a pure Cabernet Sauvignon. Only the low yielding Pinot Noirs sell at a premium (+11.6%). The other estimated variety discounts vary up to –23.3% for Zinfandel.

The most interesting results come from the relative contribution of regional origin to prices. The price discounts for regional origin are quite large, varying between 16% and 60% (relative to the Napa base region). Apart from “Other California” and the North Coast region, the California regions receive higher prices relative to imports form the New World. New

[6] A RESET F-test does not reject this functional formulation but the others including linear and log-linear.

Zealand and Australia are the most successful New World importers, while Oregon and Washington are about on par with Chile, South Africa, and Argentina We have argued that the regional coefficients reflect both, a regional brand value and a reputation value, because producer quality signals are significant. With the exception of Washington State and Oregon the ranking of the estimated premiums for the domestic regions corresponds to the ranking of average regional qualities listed in Table 2. However, for Washington scoring the highest on average, we estimate a regional discount of 48.8% or twice as much as for wine from California's Central Coast. The correspondent rankings of estimated premiums and average regional qualities brakes down further when the foreign new world regions are included. For example, the average New Zealand wine rates 87 points, but the estimated discount of 39% is 2.5 times as high as for the Sonoma region, rating only 86.5 points on average. Part of this may be explained by a consumer home bias, which warrants some further investigation below. Including the foreign old world regions, the ranking equivalence between estimated premiums and average regional quality breaks down further. For example, the average Rhône wine rates higher than the Napa base, but we estimate a significant discount of 10%. In the white wine sample, the German discount is 41.7% although the average quality is the highest and greater than 90 points, a sure sign that given their high ratings, German wines are clearly undervalued relative to other wine regions in the U.S market.[7]

Let us turn to the mitigating effects of producer quality signals on the estimated regional effects. Producers within a region may benefit from each other's quality performance due to spillover effects. As consumers pay closer attention to differences among producers, the price-quality relation within a region becomes less complementary and more competitive. A high level of regional quality facilitates quality-based competition among producers and may diminish the importance of collective regional promotion efforts. Figures 1 and 2 show the estimated regional effects superimposing the adjustments due to high and low quality producer signals. Although these adjustments largely preserve the regional rankings, they reveal some interesting results. For example, no non-U.S. New World wine, even from high-end producers, exceeds the Napa average except that whites from high-end New Zealand producers reach almost parity. High-end Australian producers receive higher price for their reds than the average Sonoma producer, but still sell below Napa's low-end. The results for the old world are somewhat better relative to the Napa Valley base. In particular for whites from Burgundy and the Rhône valley and for reds from Burgundy, the estimated premiums for high-end producers are significantly above the Napa Valley base. However, the laggard in the Old World (i.e. Germany, Spain, and Portugal) have been surpassed by the leaders in the New World (i.e. Australia and New Zealand).

Discussion and Conclusion

In general, we argue that one cannot interpret regional premiums as a regional "brand" value (as opposed to a quality premium) without adjusting for producer quality. Therefore, we argue that the estimated brand values of up to 50% in Brooks (2001) may be biased. Moreover, similar to individual producers, entire regions have a track record of quality evaluations, which in the eyes of consumer marks them as a high or low quality-producing region. However, in order to fully disentangle regional "brand" values and regional quality premiums, an additional indicator that corrects for regional *quality* must be incorporated in the analysis.

[7] Note, that the estimation includes no red wines from Germany and no white wine from Bordeaux and Piedmont.

Three general lessons can be drawn from our results. First, expert opinions and producer quality signals have a significant and positive impact on the prices, even after we correct for grape varieties and regional origin. This finding has been confirmed in other studies and suggests consumer's value this information in their quest for greater knowledge about available wines. Moreover, it may validate the claim that consumers who get more confident in their own ability to discern quality, are less reliant on imperfect signals, including generic regional quality indicators (Tirole, 1996). The significance of producer quality indicators is large and may even negate an estimated regional discount as in the case of white wine from high-end Central Coast producers. Moreover, positive producer quality signals carry a larger percentage premium than negative signals.

Second, we observe a clear trend towards regional differentiation, reinforced by the protection of geographical indications. They provide for stronger property rights and value in regional names, thereby raising the rates of return on investments in regional promotion. Because regional reputation is a public good, it may be useful to engage in activities to enhance the reputation of particular wine growing areas or regional varieties. For regions primarily trading red wine (e.g. Australia), our results suggest that marketing a regional "brand" can be rewarding. Australia's sensory quality rating for red wine is almost equal to Napa's average but it carries an estimated regional discount of 39%. Thus, promoting regional origin is sensible for new world producers, but also for laggards in the old world, in particular for white wine from Germany. However, for top producers in regions primarily growing white wine it seems that a marketing strategy emphasizing regional origin is less rewarding as they could benefit more from individual marketing efforts (e.g. New Zealand's top producers almost reach parity with Napa). Nevertheless, we may conclude that generic promotions with export quality controls accompanied by quality leaders emphasizing origin in their own marketing efforts can level the playing field for laggard regions in both the Old and the New World .

It remains to be seen whether regional indicators become more or less important over time. On the one hand, regions are investing more in generic promotion. On the other hand, globalization is causing individual wineries to agglomerate and put more emphasis on building a corporate brand reputation. Our analysis raises the question whether estimated regional premiums are to be interpreted as a quality premium, a regional brand value or both. Our conclusion is that they are both and that they need to be adjusted for producer as well as regional quality signals to get a clearer idea of regional brand values. This paper is a first step and includes an adjustment for producer quality signals. The next step in this research would require a larger panel data set to be able to define consistent regional quality signals.

A third lesson relates to Tirole (1996). He suggests that consumers forming their buying decisions may rely on approximated quality signals when access to more precise signals is costly or difficult. Not all consumers may have access to individual wine quality evaluations, but may have an idea about high and low quality producers within a region or may be exposed to regional marketing or brand promotion. In the current context, this would help to explain part of the home bias as proximity may imply a more complete consumer knowledge about high and low quality producers and/or a greater exposure to regional marketing and brand promotion. U.S. consumers might miss the more accurate quality signals from foreign sources and more of the foreign price variation is then captured by their regional dummy variable. The fact that price differentials and significance levels on the foreign regions are much larger points in this direction. Finally, we mention a few peculiarities of the wine industry studied in this paper. It is probably save to say that wine quality evaluations

receive a relatively high level of consumer attention in the U.S., with several publications providing quality ratings on a regular basis, not to mention the regional or variety 'fashion' trends in wine consumption that these publications may determine. In addition, the quality of each vintage is affected by many factors beyond producer control.

Table 1: Description of the Data †

Variable		Short description	∅	Min.	Max.
Price [1]	*P*	Suggested retail price on *release*	30.37	4	520
Sensory quality [2]	*Sq*	Point score from blind tasting (max. 100 pts.)	86.8	61	100
Availability [3]	*A*	Approx. # of cases made with particular label	9,856	5	1.1M
Potential [4]	*Pot*	Potential to improve with age (years)	2.88	0	22
Age	*Age*	Judging year minus Vintage (in years)	2.46	0	9
High-end [5]	*He*	High-end quality producer (dummy variable)			
Low-end [5]	*Le*	Low-end quality producer (dummy variable)			
Best Buy [6]	*BB*	Outstanding value at modest price (dummy)			
Special Selection [7]	*SS*	Selected, highly recommended wines (dummy)			
Variety	*Va*	Wine variety (categorical dummy)			
Region [8]	*Reg*	Regional origin (categorical dummy)			

Source: Wine Spectator Online at www.winespectator.com

†Notes:

[1] Release prices as published in the Wine Spectator magazine as well as online.

[2] Scale: 95-100 (classic; a great wine)
90-94 (outstanding; superior character and style)
80-89 (good to very good; with special qualities)
70-79 (average; drinkable, may have minor flaws)
60-69 (below average; drinkable, not recommended)
50-59 (poor; undrinkable, not recommended).

[3] Availability estimates stated in the tasting notes.

[4] Maximum storage potential in years based on the expert opinion at the time of tasting (e.g. drink now = 0).

[5] The average quality of high-end (low-end) producers deviates by more than 2 points from the regional average.

[6] Value for money designation awarded after blind tasting procedure (incl. best buy, smart buy, and best value).

[7] Includes highly recommended (selected highest-scoring wines in an issue), cellar selections (will improve most with aging), and spectator selections (not necessarily highest scoring, but make a most out-standing purchase).

[8] California regions are defined as follows:

Napa	incl. Napa Vly. and Carneros (chosen as base region)
Sonoma	incl. Sonoma Vly./Co.
Central Coast	incl. Bay Area, Central Coast, and Monterey Co.
North Coast	incl. Mendocino, Lake, and Solano Co.
South Coast	incl. Santa Barbara Co., Paso Robles, Santa Maria, Santa Ynez, and Edna Vlys.
Other California	incl. all other California wine and non-specified blends from above.

Table 2: Regional Statistics

	All Wines			Red Wine			White Wine		
Regions	**Count**	**∅ Price**	**∅ Score**	**Count**	**∅ Price**	**∅ Score**	**Count**	**∅ Price**	**∅ Score**
Napa	741	44.69	87.5	551	50.62	87.6	190	27.52	87.1
Sonoma	567	31.12	86.5	386	32.60	86.3	181	27.96	87.1
South Coast	208	29.05	85.9	145	30.72	85.7	63	25.21	86.5
Central Coast	144	28.29	85.6	90	32.92	85.7	54	20.57	85.3
North Coast	121	23.17	85.1	81	25.62	85.4	40	18.23	84.6
Other California	236	16.30	84.0	167	17.69	84.3	69	12.94	83.4
All California	2,017	33.48	86.4	1,420	37.27	86.4	597	24.47	86.3
Oregon	104	26.62	87.4	51	35.00	88.7	53	18.55	86.0
Washington	244	26.00	88.2	180	29.64	88.6	64	15.76	87.0
New York	99	16.07	83.5	26	22.73	82.8	73	13.70	83.8
NEW ZEALAND	123	19.13	87.0	31	25.68	86.3	92	16.92	87.3
AUSTRALIA	535	23.84	86.5	380	26.82	87.0	155	16.54	85.3
SOUTH AFRICA	124	17.77	84.9	81	19.95	85.1	43	13.65	84.5
CHILE	157	16.65	84.4	112	18.92	84.9	45	11.00	83.0
ARGENTINA	99	17.45	83.8	79	18.94	83.6	20	11.60	84.5
Bordeaux	218	46.65	89.5	218	46.65	89.5	---	---	---
Burgundy	220	52.02	88.2	72	62.19	87.2	148	47.07	88.6
Rhône	179	40.17	87.7	137	38.53	87.7	42	45.52	87.8
Other FRANCE	318	16.00	85.5	172	14.35	85.4	146	17.94	85.6
GERMANY	250	26.89	90.2	---	---	---	250	26.89	90.2
Piedmont	161	37.60	86.6	160	37.76	86.6	---	---	---
Tuscany	303	38.49	88.1	285	39.65	88.3	18	20.11	85.6
Other ITALY	94	24.55	87.3	61	26.92	87.5	34	19.97	86.8
PORTUGAL	54	16.85	85.2	45	18.11	85.4	9	10.55	84.2
SPAIN	121	26.11	86.3	102	28.27	86.7	19	14.47	84.6
All Regions	**5,420**	**30.37**	**86.8**	**3,612**	**33.76**	**86.8**	**1691**	**23.60**	**86.71**

Source: Wine Spectator Online at www.winespectator.com

Table 3: Regression Results [dep. variable = log(Price)]

	All Wines		Red Wine		White Wine	
Parameter	Estimate	(t-statistic)	Estimate	(t-statistic)	Estimate	(t-statistic)
CONSTANT	-11.10*	(-11.37)	-11.00*	(-8.60)	-10.37*	(-7.17)
Log(Score)	3.378*	(15.42)	3.349*	(11.66)	3.190*	(9.88)
Log(Cases)	-0.116*	(-30.87)	-0.119*	(-24.27)	-0.112*	(-20.10)
Potential	0.036*	(13.35)	0.042*	(11.05)	0.028*	(7.53)
Age	0.144*	(20.12)	0.152*	(17.84)	0.101*	(7.66)
High-end	0.211*	(13.70)	0.221*	(11.25)	0.182*	(7.73)
Low-end	-0.096*	(-5.90)	-0.097*	(-4.76)	-0.081*	(-3.18)
Best Buy	-0.259*	(-7.62)	-0.298*	(-6.76)	-0.166*	(-3.35)
Special Selection	0.143*	(4.02)	0.184*	(4.08)	0.056	(1.05)
Sonoma	-0.161*	(-7.49)	-0.197*	(-7.21)	-0.048	(-1.45)
South Coast	-0.214*	(-7.03)	-0.251*	(-6.46)	-0.095**	(-2.06)
Central Coast	-0.238*	(-6.87)	-0.278*	(-6.07)	-0.144*	(-2.95)
North Coast	-0.356*	(-9.60)	-0.401*	(-8.44)	-0.232*	(-4.21)
Other California	-0.477*	(-15.91)	-0.491*	(-12.95)	-0.407*	(-8.75)
Oregon	-0.510*	(-12.70)	-0.460*	(-7.71)	-0.504*	(-10.06)
Washington	-0.484*	(-17.11)	-0.471*	(-13.40)	-0.494*	(-10.63)
New York	-0.568*	(-13.31)	-0.381*	(-4.69)	-0.556*	(-11.76)
NEW ZEALAND	-0.390*	(-16.77)	-0.391*	(-12.96)	-0.363*	(-10.31)
AUSTRALIA	-0.323*	(-8.52)	-0.389*	(-5.27)	-0.254*	(-6.16)
CHILE	-0.537*	(-12.69)	-0.506*	(-9.78)	-0.643*	(-8.57)
SOUTH AFRICA	-0.500*	(-14.27)	-0.495*	(-11.06)	-0.485*	(-8.82)
ARGENTINA	-0.520*	(-13.78)	-0.534*	(-10.68)	-0.443*	(-8.19)
Bordeaux	-0.091*	(-2.62)	-0.134*	(-3.33)		
Burgundy	0.012	(0.37)	0.146*	(2.75)	0.085**	(2.11)
Rhône	-0.103*	(-2.92)	-0.208*	(-4.78)	0.225*	(3.79)
Other France	-0.565*	(-18.62)	-0.683*	(-15.92)	-0.333*	(-8.20)
Germany	-0.602*	(-17.02)			-0.417*	(-9.97)
Piedmont	-0.050	(-1.34)	-0.070	(-1.60)		
Tuscany	0.007	(0.22)	-0.017	(-0.44)	-0.013	(-0.17)
Other Italy	-0.341*	(-7.66)	-0.445*	(-7.53)	-0.105	(-1.66)
Portugal	-0.508*	(-9.15)	-0.535*	(-8.10)	-0.418*	(-3.79)
Spain	-0.380*	(-9.44)	-0.428*	(-8.93)	-0.290*	(-3.68)
Cabernet Blends	0.011	(0.33)	0.021	(0.58)		
Merlot	-0.124*	(-4.71)	-0.107*	(-3.86)		
Pinot Noir	0.116*	(4.32)	0.145*	(4.82)		
Shiraz	-0.142*	(-5.28)	-0.126*	(-4.33)		
Zinfandel	-0.233*	(-7.95)	-0.200*	(-6.31)		
Other Reds	-0.176*	(-7.25)	-0.127*	(-4.55)		
Chardonnay	-0.127*	(-5.54)				
Sauvignon Blanc	-0.221*	(-6.58)			-0.154*	(-5.69)
Other Whites	-0.181*	(-6.49)			-0.141*	(-5.87)
N	5420		3612		1808	
Adj. R^2 [%]	67.86		65.89		70.16	
RESET F-statistic	1.667		1.018		2.250	

* and ** indicates significance at the 1% and 5% level, respectively.
Source: Own calculations.

Figure 1: New World Regions & Adjustments for High and Low-end Producers

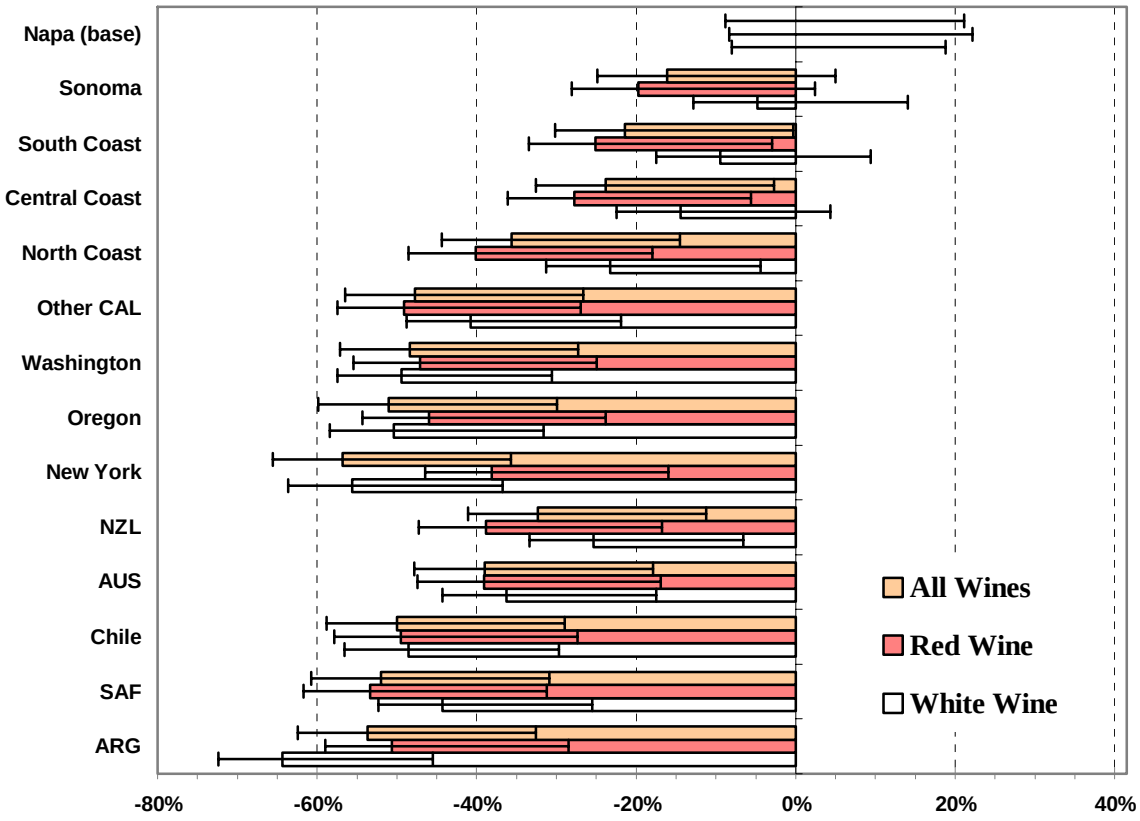
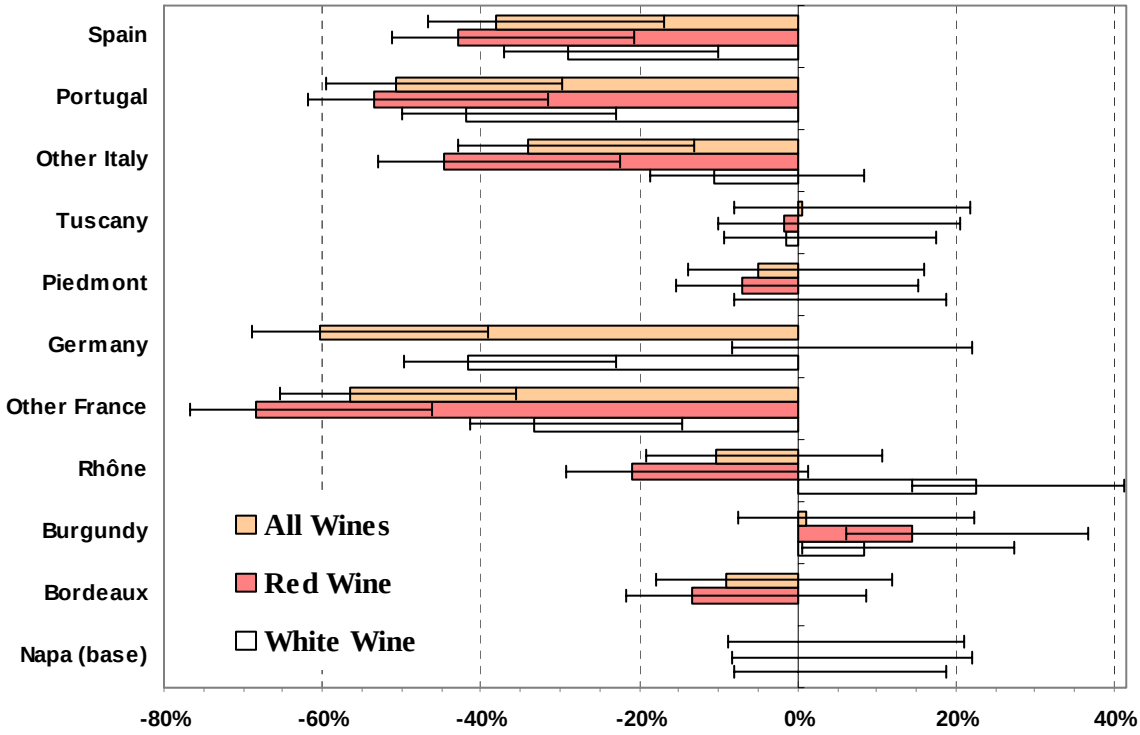


Figure 2: Old World Regions & Adjustments for High and Low-end Producers



References

Anderson K, and D. Norman. 2003. “Global Wine Production, Consumption, and Trade, 1961 to 2001: A Statistical Compendium. CIES. Adelaide University, Australia.

Arguea, N. and C. Hsiao. 1993. “Econometric Issues of Estimating Hedonic Price Functions.” *Journal of Econometrics* 56: 243-67.

Brooks, E. 2001. “Countries as Brands: International Trade in Wine.” Harvard University Working Paper presented at the VDQS 2001 in Napa Valley, CA.

Combris, P., S. Lecocq, and M. Visser. 1997. “Estimation of a Hedonic Price Equation for Bordeaux Wine: Does Quality Matter?” *The Economic Journal* 107: 390-402.

Fujita, M., P. Krugman, and A. Venables. 1999. *The Spatial Economy: Cities, Regions, and International Trade*. Cambridge, MA: MIT Press.

Helpman, E. and P. Krugman. 1985. *Market Structure and Foreign Trade*. Cambridge, MA: MIT Press.

Landon, S. and C. E. Smith. 1997. “The Use of Quality and Reputation Indicators by Consumers: The Case of Bordeaux Wine.” *Journal of Consumer Policy* 20: 289 - 323.

Landon, S. and C. E. Smith. 1998. “Quality Expectations, Reputation and Price.” *Southern Economic Journal* 64(3): 628 - 47.

Nerlove, M. 1995. “Hedonic Price Functions and the Measurement of Preferences: The Case of Swedish Wine Consumers.” *European Economic Review* 39: 1697 - 716.

Oczkowski, E. 1994. “A Hedonic Price Function for Australian Premium Table Wine.” *Australian Journal of Agricultural Economics* 38: 93-110.

Oczkowski, E. 2001. “Hedonic Wine Price Functions and Measurement Error.” *The Economic Record*: Vol. 77 No. 239, 374-82.

Roberts P. and R. Reagans. 2001. “Market Experience, Consumer Attention and Price-Quality Relationships for New World Wines in the US Market”. GSIA Working Paper. Graduate School of Industrial Administration, Carnegie Mellon University, Pittsburgh.

Rosen, S. 1974. “Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition.” *Journal of Political Economy* 82: 34 - 55.

Schamel, G. 2000. “Individual and Collective Reputation Indicators of Wine Quality.” CIES Discussion Paper 0009. Centre for International Economic Studies, Adelaide University.

Schamel, G. and K. Anderson. 2003. "Wine Quality and Varietal, Regional and Winery Reputations: Hedonic Prices for Australia and New Zealand" *The Economic Record*: Vol. 79 No. 246 pp. 357-69.

Shapiro, C. 1983 "Premiums for high quality products as Returns to reputations." *Quarterly Journal of Economics*, 98: 659-679.

Sumner D. et al. 2001. The wine and winegrape industry in North America. Workshop Paper No. 2 presented at the CIES Wine Economics Workshop in Adelaide, October 2001.

Tirole, J. 1996. "A theory of collective reputations (with applications to the persistence of corruption and to firm quality)." *Review of Economic Studies*, 63: 1-22.

Tirole, J. 1988. *The Theory of Industrial Organization*. Cambrigde, MA: MIT Press.

Wine Spectator. 2002. "Wine Spectator Magazine" Issues Oct. 15, 2001 through Dec. 31, 2002. Wine Spectator Press, New York. (http://www.wine-spectator.com)