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Good Will or Good Wine? Napa versus Sonoma County Wines

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INTRODUCTION

Perceptions matter. In a market characterized by incomplete information, consumers will seek signals of a products quality. These signals include: Price, brand, region, ratings, and prior experience. How consumers interpret these signals determines whether and how much they are willingness to pay for the respective product. Consider for example price. While in blind tastings, consumers did not view more expensive wines to taste better[1], when told a wine is more expensive, consumers consistently rated wines perceived as more expensive as better than wines perceived as less expensive.[2] Moreover, even in the face of more complete information, for example actual tastings, consumers used external signals such as price and country of origin, to evaluate wines more than their own actual evaluations from tastings.[3] Clearly, perceptions play an integral role in both the decision to purchase and hence their willingness to pay for products. Along these lines, this paper seeks to answer a simple question, "Are consumers willing to pay a premium for wines produced in Napa County over similar quality wines from Sonoma County?" To answer this, we construct a unique data set used to estimate a hedonic price function controlling for varietal, quality, promotional activity, brand and region. We concentrate on wines from Napa and Sonoma Counties only and examine purchases of glass 750 ML bottles of Cabernet Sauvignon and Zinfandel, the flagship varietals of Napa and Sonoma respectively. To control for quality we use ratings taken from *Wine Spectator* magazine. The *Wine Spectator* ratings are then integrated with US retail scan data of the same wines and used to estimate the ratings premium on the sample of wines as well as the price premium associated with wines of the same rating and varietal from Napa over equivalent wines from Sonoma County.

REVIEW OF LITERATURE

There is a well establish body of literature surrounding the affect of ratings on wine prices. Despite the reliability of wine judges to rank wines consistently[4], there is a consistent body of research indicating that wine rankings positively affect wine prices. Most recently, Hadj Ali, Lecocq and Visser (2007) exploit a natural experiment to examine the affect of Robert Parker ratings on Bordeaux wine prices. The authors find a positive and statistically significant affect of ratings on wine prices.

In an earlier paper, Hadj Ali and Nauges (2004) examine the affect of ratings on Bordeaux prices using Parker and *Wine Spectator* ratings. In this instance, the authors find a small but statistically significant affect of ratings on price. In a reexamination of the Ali and Nauges (2004) data, Dubois and Nauges (2005) correct for potential endogeneity and find evidence of a positive and statistically significant affect of ratings on price.

Jones and Storchmann (2001) examine the affect of Parker ratings on Bordeaux wine prices and find a positive and statistically significant affect of the ratings on wine prices at auction.

Our data set differs significantly from prior research. Most of the data analyzed in the studies above examine wine prices at auctions. Our data examines actual purchases by a broad set of US consumers at major food, drug and liquor retail outlets. We believe this is more reflective of overall consumer demand than auction prices. Also, as far as we can tell, no one has integrated ratings data with scan data to examine the affect of ratings on price.[5,6]

With respect to branding and good will, the literature is equally well established. Carew and Florkowski (2008) examine the affect of branding on willingness to pay for Australian wines in British Columbia and find positive and statistically significant brand effects. In a market characterized by terroir, appellation, region, state and country distinctions it is no surprise that regional effects have been a significant part of the literature. Al-Sulaiti and Baker (1998) provide an exhaustive review of country of origin effect and geographic branding and the affect on consumer perceptions. With respect to wine, while Veale and Quester (2008) find a statistically significant effect of country of origin on consumers' perception of wine quality, the affect on price has varied. In their review of regional effects, San Martin, Troncoso and Brummer (2008) note that Nerlove (1995) and Steiner (2004) find little or no affect of country of origin on price, while Schamel(2000, 2004), Schamel and Anderson (2003) and Troncoso (2006) find significant affects of region on price. Additionally, in the wine ratings literature discussed above, many of the results showed differential affects of ratings on wines by different producers indicating a differential in good will associated with those producers.[7]

DATA

The ratings scores used in this analysis are taken from the *Wine Spectator* magazine web site.[8] Since our main focus is on the price differential between Napa and Sonoma Counties, we gathered scores for wines from only those two regions. Additionally, we chose to examine only Cabernets Sauvignon and Zinfandel varietals. These were chosen because they represent the flagship varietals of Napa and Sonoma respectively and would best reflect the regional affiliation of the two regions. We matched wines ranked by *Wine Spectator*, with the product descriptions of the wines in the Nielsen Scantrack data set. The Nielsen Scantrack data consists of a cross section of sku (store keeping unit) level monthly purchases of wine scanned at U.S. retail outlets from December 2004 through February 2009. The data is for the entire US and we concentrate on prices of traditional glass, 750 ML bottles. In total, we were able to match 154 *Wine Spectator* ratings with their equivalent sku or product descriptions in the scan data over 55 4-week periods, to produces a panel of 8,470 observations. We were able to further disaggregate each observation by promotional activity (i.e., whether the product was promoted through a feature, in store display, a feature and display, or a temporary price reduction) thereby increasing the number of observations to over 30,000.

The benefit of scan data is that it represents actual purchases of wine by consumers and is reflective of consumer demand for wine. One drawback of scan data is that it only reflects purchases in major U.S. retail chains and does not represent wine sold on premise at wineries, purchases through wine clubs or purchases at restaurants. Another, draw back of scan data is that it does not contain a variable for vintage; only the date of purchase is noted in the data description. However, if the scores of wines have spillover effects, then high scores for one vintage can be expected to raise the demand for subsequent vintages. Likewise, low scores of one vintage are likely to decrease the price consumers are willing to pay for other vintages.[9] While this is less than optimal, it is the next best solution when merging rankings and scan data.[10] Table 1

[1] Goldstein, Almenberg, Dreber, Emerson, Herschkowitsch and Katz (2008).
[2] Plassmann, O'Doherty, Shiv, Rangel (2008).
[3] Veale and Quester (2008).
[4] Hodgson (2008).
[5] Carew and Florkowski (2008) use retail level data provided by a distributor to examine the affect of weather on price and ratings of wines.
[6] Steiner (2004) uses similar Nielsen scan data to estimate hedonic price functions but does not include rating data.
[7] See Hadj Ali, Lecocq and Visser (2007) for a more thorough discussion of these results.
[8] www.winespectator.com
[9] This may be especially true for Napa and Sonoma wines if there is very little year to year variation. See Ramirez (2008) for an elaboration on this point.
[10] Private correspondence with scan data providers reveal that they are unable to provide vintage in the product description because wine producers often re-use sku's for subsequent vintages.

provides the summary statistics for Cabernet Sauvignons from both Napa and Sonoma, while Figure 1 shows the distribution of prices of the Cabernet Sauvignons for the two regions. The summary statistics show that Napa Cabernet Sauvignons are on average more expensive and higher rated than Cabernet Sauvignons from Sonoma County.

The summary statistics for Zinfandels are shown in Table 2, with the distribution of prices shown in Figure 2. Again, Napa Zinfandels are on average more expensive and higher rated than Sonoma Zinfandels.

Figure 3 shows the distribution of ratings between Napa and Sonoma wines. The distribution reinforces the summary statistics shown in Tables 2 & 3. Specifically, the distribution of ratings for Napa wines is generally above that of wines from Sonoma.

Figure 1

Distribution of Prices for Cabernet Sauvignon from Sonoma and Napa Counties

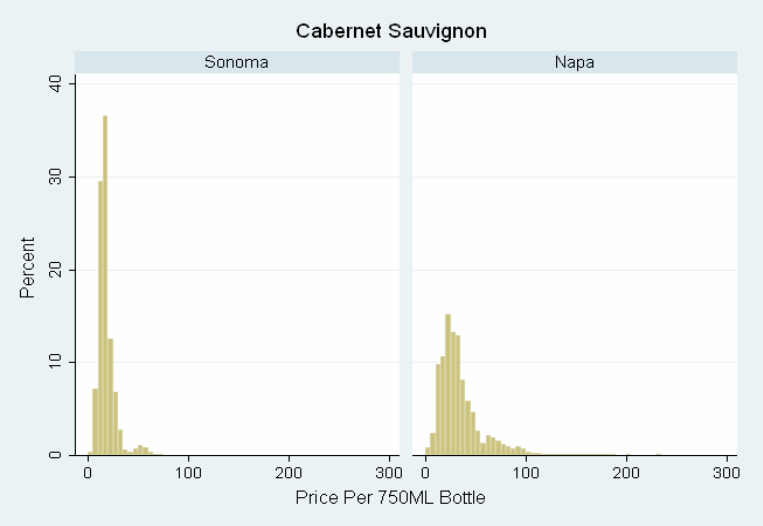


Table 1

Summary Statistics for Cabernet Sauvignon

	Cabernet Sauvignon			
	Napa		Sonoma	
	Price	Rating	Price	Rating
Mean	35.24	85.80	18.67	83.58
75th Percentile	41.57	88	20.42	86
50th Percentile	29.59	87	16.98	83
25th Percentile	20.40	83	13.51	82
Maximum	232.00	94	72.67	90
Minimum	2.00	78	1.00	78
Standard Deviation	23.64	4.21	8.92	3.07
observations	11760	11760	8078	8078

Figure 2

Distribution of Prices for Zinfandel from Sonoma and Napa Counties

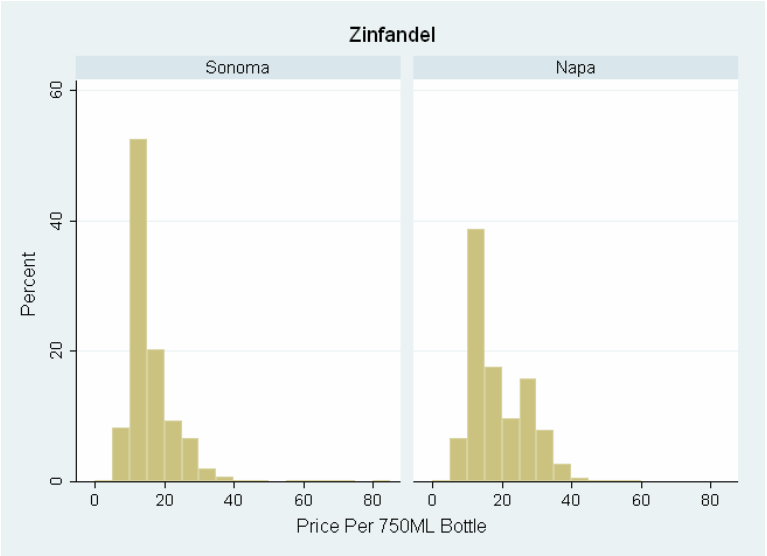


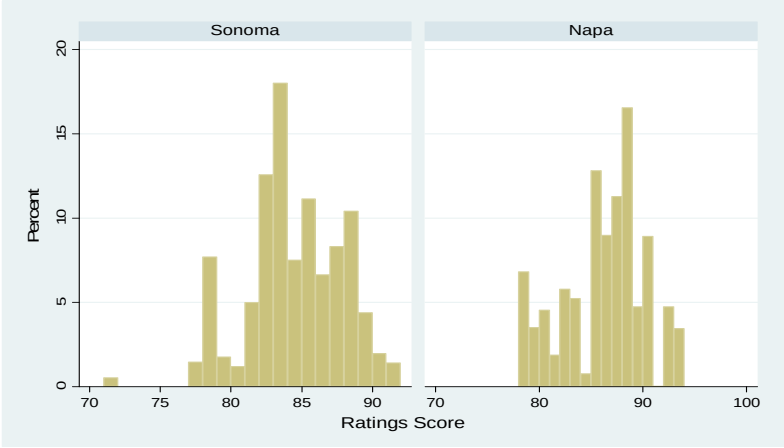
Table 2

Summary Statistics for Zinfandel

	Zinfandel			
	Napa		Sonoma	
	Price	Rating	Price	Rating
Mean	19.21	85.79	15.74	84.31
75th Percentile	26.00	87	18.23	87
50th Percentile	15.79	86	13.77	84
25th Percentile	13.03	85	11.79	83
Maximum	58.50	89	80.13	92
Minimum	4.93	78	1.81	71
Standard Deviation	8.43	1047	6.03	13.00
observations	1865	1865	9641	9641

Figure 3

Distribution of Ratings Scores of Wines from Sonoma and Napa Counties



RATINGS AND PRICE

To examine the relationship between ratings and price we ran a simple linear regression of price on ratings. Table 3 shows the regression results of a simple linear regression between price and *Wine Spectator* ratings while Figure 4 shows these results graphically. Table 3 indicates that ratings alone, explains 21% of the variation in log price. Furthermore, the simple linear regression results are relatively large and statistically significantly. Specifically, the regression results shows that a one point increase in the *Wine Spectator* rating results in nearly a 7% increase in price.

Figure 4

The Affect of Ratings Score in the Price of Wine

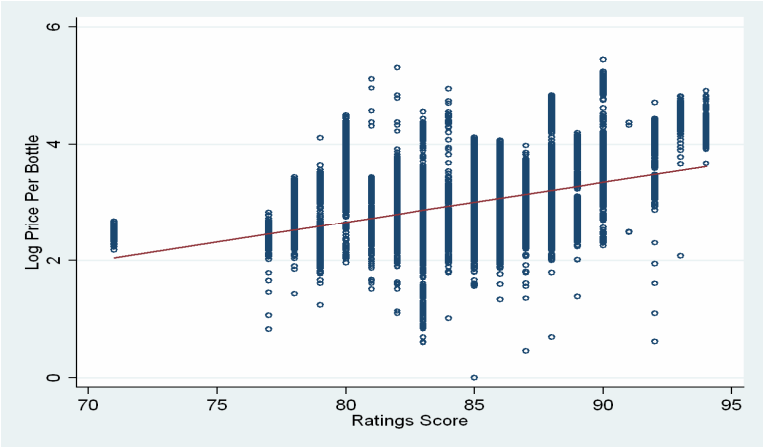


Table 3

Simple Linear Regression Between Price and Ratings

	lnprice
score	0.069
	(104.84)**
Constant	-2.847
	(51.07)**
Observations	40320
R-squared	0.21

Absolute value of t-statistics in parentheses

* significant at 5% level; ** significant at 1% level

THE MODEL

To determine whether or not there is a premium paid for Napa wines over Sonoma wines of the same quality we estimate the following fixed effects model:

$$\text{Price}_{ijt} = \beta_0 + \beta_1 Score_{ijt} + \beta_2 Napa_i + \beta_3 Cabernet_i + \sum \lambda X + \sum_k \gamma \ \text{Promotion} + \sum_t \delta Time_t + u_{ijt} \quad (1)$$

Where: Price_{ijt} represents the log price per 750ML bottle of wine i produced in region j and sold in period t.

Score_{ijt} represents the *Wine Spectator* ratings score of wine i, produced in region j and sold in period t.

Napa is a dummy that equal 1 if the wine is produced in Napa and 0 if the wine is produced in Sonoma.

Cabernet is a dummy that equals 1 if the wine is a Cabernet Sauvignon and 0 if the wine is a Zinfandel.

X is a vector of interaction terms among the independent variables score, Napa and varietal.

Promotion is a vector of dummies indicating the type of promotional activity occurring in period t. That is whether the wine was sold with a feature, display, feature and display or temporary price reduction.

T_t is a vector of dummies for the years 2005-2009.

To isolate the affect of region on price, we examine only Cabernet Sauvignon and Zinfandel varietals. We chose these varietals because Cabernet Sauvignon and Zinfandel represent the flagship varietals for Napa and Sonoma Counties respectively and are most reflective of their respective regions.

We also control for promotional activity, if any, that occurs in the purchase data. This is done for three reasons. First, Cuellar and Karnowsky (2008) show that promotion is often associated with a price change. That is, one of the things that promotion conveys is a price reduction. Second, in contradistinction to the previous goal of promotion, the general goal of promotion is to shift the demand for the product thereby increasing willingness to pay and price. Third, ratings and promotion may interact confounding the effect of both. That is, sellers may increase promotion following a high rating.

RESULTS

A summary of the regression results for the main variables of interest in Equation 1 are shown in Table 5 and shown graphically in Figure 5. From Table 5 and Figure 5, a few observations can be made. First and foremost, the hedonic price-ratings function for Napa wines are above those for Sonoma wines for both Zinfandel and Cabernet Sauvignon. That is, there appears to be a Napa premium for both Zinfandel and Cabernet Sauvignon over equivalently rated wines from Sonoma. Table 4 converts the regression coefficients to regional and marginal effects. As Table 4 shows, when evaluated at the mean score of 85 for wines from both regions, a Napa Cabernet Sauvignon receives a premium of 34% over a similarly rated Cabernet Sauvignon from Sonoma. This premium is statistically significant at the 1% level. Put differently, for an expenditure of $20, you could either buy a Napa Cabernet Sauvignon rated at 80 by *Wine Spectator*, or a Sonoma County Cabernet Sauvignon rated at 86.

For Zinfandel, the Napa premium evaluated at the mean score of 85 is only 6.7%. Or, for an expenditure of $20, you could purchase a Napa Zinfandel rated at 91 by *Wine Spectator* or a Sonoma County Zinfandel rated at 93. This premium, however, is statistically insignificant from zero.

The second observation illustrated by Figure 5 is that the slopes of the price-ratings functions are steeper for Cabernet Sauvignon for both Napa and Sonoma relative to the slopes of the price-ratings functions for Zinfandel. That is, ratings appear to have a greater marginal effect on the price consumers are willing to pay for Cabernet Sauvignon than for Zinfandel. Specifically, for Napa Cabernet Sauvignon, a one point ratings increase, increases price by approximately 5.6%. For a Sonoma Cabernet Sauvignon, a one point ratings increase, increases price by approximately 6.3%. While the slope of the price ratings function is steeper for Sonoma Cabernet Sauvignon than the slope of the price ratings function for Napa Cabernet Sauvignon, the difference is not statistically significant. These results are similar to those obtained by Jones and Storchmann (2001) who find an average affect of 7%, but lower than those obtained by Hadj Ali, Lecocq and Visser (2007) who find a relatively large affect of nearly 15% and less than Hadj Ali and Nauges (2004) and Dubois and Nauges (2005) who find marginal affects of 1% and 1.38% respectively.

Figure 5

The Affect of Region and Score on Price

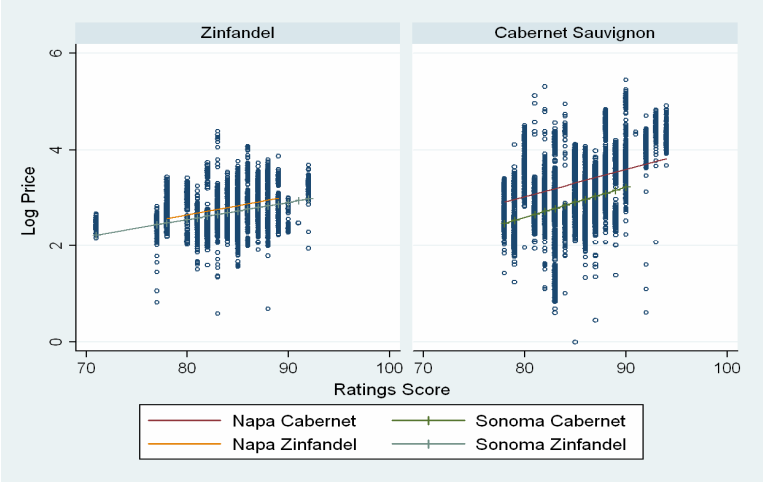


Table 4

Summary of Regression Results

	Napa Premium[A]		
	Model 1	Model 2	Model 3
Cabernet Sauvignon	33.9%	114.6%	107.9%
Zinfandel	6.7%	.2%	-0.08%
	Ratings Effect[B]		
	Model 1	Model 2	Model 3
Napa Cabernet Sauvignon	5.6%	-2.8%	-3%
Sonoma Cabernet Sauvignon	6.3%	.7%	9%
Napa Zinfandel	3.3%	10.4%	14%
Sonoma Zinfandel	3.1%	1.5%	7.4%

A-Evaluated at the mean score of 85.

B-Percentage change in price resulting from a 1 unit change in ratings score evaluated at the mean score of 85.

Table 5

Regression Results

	Model 1	**Model 2**	**Model 3**
	Log Price	Log Price	Log Price
Score	0.031	0.015	-1.092
	(27.26)**	(11.29)**	(30.94)**
Napa	-0.103	-7.563	103.893
	(0.26)	(10.13)**	(9.41)**
Cabernet Sauvignon	-2.515	0.811	61.437
	(15.13)**	(3.12)**	(13.18)**
Napa*Cabernet Sauvignon	1.037	11.684	-100.637
	(2.47)*	(13.12)**	(6.68)**
Score*Napa	0.002	0.089	-2.513
	(0.52)	(10.29)**	(9.68)**
Score*Cabernet Sauvignon	0.032	-0.008	-1.457
	(16.16)**	(2.66)**	(13.01)**
Score*Napa*Cabernet Sauvignon	-0.009	-0.124	2.582
	(1.84)	(12.09)**	(7.24)**
Constant	0.103	0.351	44.878
	(1.05)	(2.89)	(32.63)**
Time Effects	Yes	Yes	Yes
Brand Effects	No	Yes	Yes
Non Linear Effects	No	No	Yes
Observations	31344	31344	31344
R-squared	0.44	.86	0.88

Absolute value of robust t-statistics in parentheses

* significant at 5% level; ** significant at 1% level

For Napa Zinfandel, a one point increase in the *Wine Spectator* ratings, increases price by approximately 3.3% while a similar one point ratings increase for Sonoma Zinfandel increases price by approximately 3.1%. Once again, while the marginal effects of the ratings are statistically significant, the difference in the marginal effects of ratings between Napa and Sonoma is not statistically significant.

BRAND VERSUS REGION

The model, represented by Equation 1, assumes that the signal consumers perceive is region. However, what consumers may be using as a signal of quality is brand recognition. The 154 separate products represent 107 different brands. To distinguish between the affect of brand recognition and regional association, we add a vector of brand dummies to Equation 1. ω in Equation 2 represents the affect of each brand (m) on price.

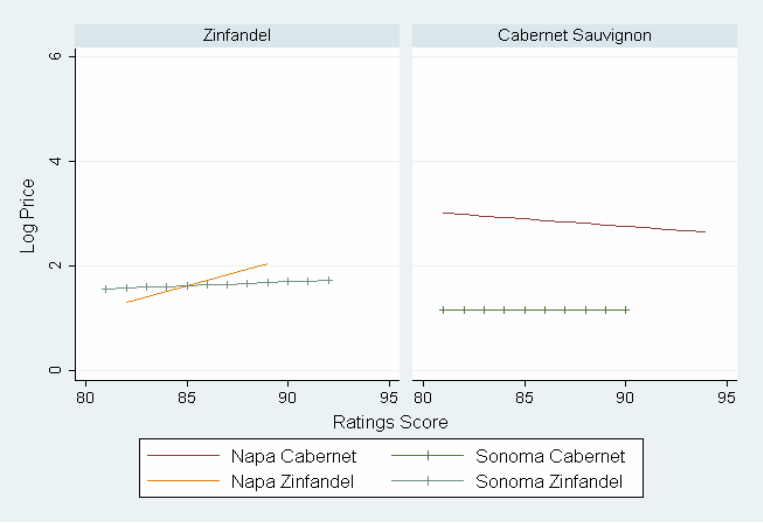
$$\text{Price}_{ijt} = \beta_0 + \beta_1 Score_{ijt} + \beta_2 Napa_i + \beta_3 Cabernet_i \quad (2)$$
$$\sum \lambda X + \sum_k \gamma \text{Promotion} + \sum_m \omega Brand + \sum_t \delta T_t + u_{ijt}$$

The regression results are shown in Table 5 under Model 2 and shown graphically in Figure 6. Inclusion of brand effects changes the results significantly. To begin with, the proportion of the variation in price explained by the model jumps from 44% for Model 1 to 86% for Model 2 once brands are included. Next, the marginal effect of ratings on price changes significantly for both regions and varietals. For example, the marginal effect of score on price for Napa Cabernet Sauvignon goes down from a positive 5.6% to a relatively small negative 2.8%. For Sonoma Cabernet Sauvignon, the marginal effect of score goes down from 6.3% to .7%. However, for Napa Zinfandel, the marginal effect of score goes up from 3.3% to 10.4%, while for Sonoma Zinfandel, the marginal effect goes down from 3.1% to 1.5%.

In addition to the change in the marginal effect of ratings on price, the affect of region on price also changes drastically. For Cabernet Sauvignon, the Napa premium increases from 33.9% at a mean rating of 85, to a large and statistically significant 114.6% at the same rating.

Figure 6

The Affect of Region and Score on Price with Brand Effects



While these appear large, they are consistent with the brand effects obtained by Carew and Florkoski (2008), who found brand effects that ranged from -88% to 215%.

For Zinfandels, the results are mixed. At scores of 85 and below, Sonoma Zinfandels enjoy a small premium; while at scores above 85 Napa Zinfandels enjoy a small premium. At a mean score of 85, the Napa premium virtually falls to zero.[11]

The regression results indicate that consumers of Cabernet Sauvignon and Zinfandel do not use brand, region and score in the same manner as signals of quality. For example, the regression results indicate that consumers use brand and region as signals of quality for Cabernet Sauvignon. While for Zinfandel, consumers appear to use brand and score as signals of quality for Napa Zinfandels, and brand as the main determinant affecting their willingness to pay for Sonoma Zinfandels.

NON LINEAR AFFECTS OF RATINGS ON PRICE

To account for any non-linear affects of ratings on price, we add score squared to our hedonic price function.

This shown in Equation 3: $\text{Price}_{ijt} = \beta_0 + \beta_1 Score_{ijt} + \beta_2 Napa_i + \beta_3 Cabernet_i + \beta_4 Score_{ijt}^2$ (3)

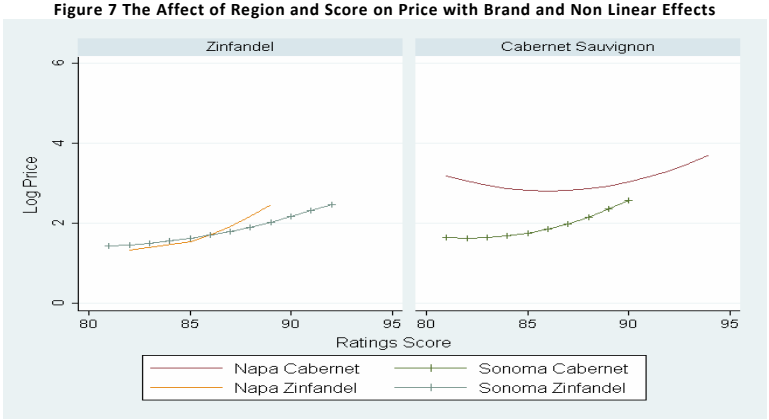
$$\sum \lambda X + \sum_k \gamma \text{Promotion} + \sum_m \omega Brand + \sum_t \delta T_t + u_{ijt}$$

The non linear term is also included in the vector X of interaction terms to allow for differences in the affect of ratings by region and varietal.

The regression results are given in Table 5 as Model 3 and shown graphically in Figure 7. While the proportion of the variation in price explained by the model increases slightly (from 86% to 88%), all the non-linear terms are statistically significant. Moreover, including non-linear effects provides a more nuanced view of consumer behavior.

For example, as Figure 7 illustrates, while Napa Cabernet Sauvignons still enjoy a significant advantage over Sonoma produced Cabernet Sauvignons, this advantage diminishes as ratings increase. For example, at a rating of 80, Napa Cabernet Sauvignon enjoys a premium of 165% over equivalently ranked Cabernet Sauvignon from Sonoma. However, for Cabernet Sauvignon rated at 90, the Napa premium falls to 45%. And, as the ratings increases to 94, the Napa premium virtually disappears.

Figure 7 The Affect of Region and Score on Price with Brand and Non Linear Effects



[11] The actual Napa premium at a score of 85 is .2%.

For Zinfandels, the non linear regression results are similar to the results we obtained previously. Although the non-linear terms are statistically significant, they do not meaningfully change the relationship between the Napa and Sonoma hedonic price-score functions. The hedonic price-score function for Sonoma Zinfandel is flatter than the hedonic price-score function for Napa Zinfandel indicating that the marginal effect of score exerts a greater influence on the price for Napa Zinfandels than on Sonoma Zinfandels. Similar to the linear model, the hedonic price-score functions cross at a score of approximately 86 compared to 85 in the linear model. Specifically, at scores of 86 and below, Sonoma Zinfandels enjoy a small premium, while for Zinfandels rated above 86, Napa Zinfandels enjoy a premium.

CONCLUSION

We use a unique data set to estimate the premium afforded to wines produced in Napa County over similar quality wines from Sonoma County. To isolate the affect of region on price, we use *Wine Spectator* ratings to control quality and compare wines produced in Napa with similarly ranked wines produced in Sonoma. Using a fixed effects model to control for unobserved heterogeneity across brands and over time we find a positive and statistically significant effect of ratings on price. With respect to the Napa premium, we consistently find a positive and statistically significant premium for Napa Cabernet Sauvignon over Sonoma County Cabernet Sauvignon, although this premium diminishes with ratings score once we include brand and non-linear effects. For Zinfandels, the results are mixed. While we find a small but statistically insignificant premium for Napa Zinfandels over Sonoma Zinfandels in our simplest model, once brand and non-linear effects are included in the model we find a find premium for Sonoma Zinfandels ranked with score of approximately 85 and below and find a premium for Napa Zinfandels ranked above 85.

As noted above, inclusion of brand fixed effects in the model has significant affects on the results indicating strong brand effects in our sample. These results differ, however, by region and varietal.

The results of this study have implications to how wineries market their wines. That is, should a winery promote its brand, region or the score it received from *Wine Spectator*? For Napa Cabernet Sauvignons with relatively low scores, consumers respond to regional and brand identification more than ratings score. However, as score rises, region becomes less important while brand and score become more important. For Napa Zinfandel, consumers respond to brand and ratings more than region. For wines from Sonoma, both Cabernet Sauvignon and Zinfandel consumers appear more sensitive to brand recognition than either region or ratings.

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