Explaining Market Prices for Grapes: Location, Variety, Market Power and Contracted Quality

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1. Introduction

There has been considerable research examining wine prices over time and across quality characteristics in a hedonic framework (Bombrun and Sumner (2003); Combris, Lecocq, and Visser (1997); Costanigro, McCluskey, and Mittelhammer (2005); Nerlove (1995); Oczkowski(1994); and Schamel and Anderson (2003). These papers examine the effect of wine characteristics on the price of wine, but generally are not able to identify underlying markets as discussed in Rosen's classic paper (1974). There seems to have been much less attention paid to market prices for winegrapes. This paper examines the pattern of prices of grapes crushed primarily for wine in California over the decade from 1991 to 2000. We then relate this to the analysis of wine prices in California over a part of that period (Bombrun and Sumner (2003)).

For the winegrape price analysis we employ a unique and under-utilized set of data that allows us to observe essentially the whole population of winegrape prices over this period. While a very large number of price observations are available, the set of explanatory variables is limited and the nature of the observations is complex.

The first set of questions we ask is primarily descriptive. What accounts for variation in winegrape prices and, in particular, what do location and variety contribute to the observed variation? We next examine the role of contracted limits or price incentives associated with measurable quality in setting prices. Finally, we are able to examine some hypotheses about monopsony power of buyers across markets and winegrape differentiation within location/variety markets.

A reduced-form price equation has a set of variables related to market demand and market supply on the right-hand-side. In our case, we can interpret the quality-related characteristics of location and variety as defining sub-markets for grapes and suggesting price relationships between sub-markets. We then observe, within these sub-markets, characteristics of the price-contract and the degree of market power. We do not measure explicit market demand shocks that occur over time, nor do we include measures of supply shocks in this paper. To the extent that shocks are time-related and consistent across varieties and districts, year-fixed effects capture some of these influences. The same is true for industry-wide annual supply shocks.

2. The California winegrape industry

Grapes are an important crop in the United States and in California. Grapes comprise the largest U.S. cash crop among fruits. California accounted for about 90 percent of the value of all grapes and about 95 percent of the winegrapes in the United States. Winegrapes alone accounted for about $ 1.6 billion or about 6.6 percent of California agricultural production value in 1999 measured in farm prices. Thus, in addition to their intrinsic academic and aesthetic interest winegrapes are important economically (Sumner et al. (2004)).

Winegrapes are grown in most major cropping areas of California, from the north to the south and from the coast to inland. The state is classified into17 geographically-based crush districts, many of which are single counties or small groups of counties. Unlike appellations or American Viticultural Areas (AVAs) crush districts are not defined to describe grape production locations on wine labels and have no legal status in that regard. But, these crush districts are used for grape price data collection and for pricing. The majority of grapes are sold in forward contracts and it is common that the contract price is referenced to the crush district average price (Goodhue, Heien, Lee and Sumner (2002) and (2003)).

In the year 2000 grape price survey conducted by the California Agricultural Statistics Service (CASS), there were 146 separate varieties used for crush in the state, but most are used in very small quantities. Of these, six are classified as raisin grape varieties, 35 are table grape varieties, 39 are white wine grape varieties and 66 are red wine grape varieties. Despite the great number of grape varieties crushed, 10 major varieties account for about 80 percent of total crush, and 15 varieties account for more than 90 percent of the crush.

The California winegrape industry comprises many growers and buyers. The CASS has a database of about 12,000 growers supplying grapes for crush. This number accounts for about 20% of total number of farmers in California. In 2000 there were about 800 wineries in the state and that number has grown to more than 1500 in 2005. Many wineries also grow grapes and many buy no additional grapes. Our survey of winery grower contracting indicate that about 90 percent of California winegrapes are sold directly to wineries through forward contracts between growers and wineries (Goodhue, Heien, Lee, and Sumner (2002)). However, many small wineries do not participate in this market at all, while larger wineries buy most of the grapes they crush on the open market.

3. Grape price information sources and definitions

Most of the data used in this paper are from the past 10 years of the *Grape Crush Report,* published annually by the California Agricultural Statistics Service. Information is supplied by buyers as part of a mandatory reporting requirement. When grapes are delivered to the crush point, each batch is recorded with information on district where grapes are grown, variety, base price per ton, a "brix code" and tonnage. Data are reported by district and variety, with a separate report of base price and tonnage sold at each distinct price and brix code. Individual deliveries or transactions within a variety and district are summed together, if they have the same price and brix code.

Understanding these data requires some discussion of the brix code. Most processors set some set of maximum or minimum limit on the level of brix or premiums or penalties for deviations from a range. All this brix related information, brix limit and the level of premiums or penalties, are summarized in brix codes. The most common brix code is 0010, which means that no limits, bonuses or penalties are specified. Other common codes include, for example, brix code = 2570, defined as no premium with a penalty of 5% (of base price) per degree of brix below 20, which is used in district 13 for Thompson Seedless grapes. Here in Napa County, district 4, brix code = 1080 is used to specify an acceptable brix range of 23 degrees to 25 degrees with no price incentive. In year 2000 alone, there were more than 700 distinct brix codes used for price reporting, and some codes have changed from year to year. As noted below, about 30 percent of the observations or 25 percent in tonnage reported have no specified limits, bonuses or penalties in the price contract. Strikingly, only about 0.5 percent of the observations or 3.6 percent in tonnage was delivered under pricing contracts that specified a bonus. The remaining 69 percent of the observations and 71 percent of the tonnage specified brix limits or penalties in the pricing contract.

We limited our analysis to 15 major varieties that are crushed in substantial quantities and most of which are crushed in many locations. Our data set spans the 10-year period, 1991-2000. Sample size is 51,073 observations of distinct grape sales with quantities and prices. For all the prices reported below, observations are weighted by the number of tons associated with that price observation.

Prices in our sample are the "base prices paid to growers," not the actual transaction price that incorporates bonuses or penalties as actually applied. (Actual prices are available only at the

aggregated district/variety level.) It turns out, however, that average price adjustments from the base prices are very small in all district/variety combinations. Table 6 in the *Grape Crush Report* presents the weighted average grower returns by district for each variety. We chose 1995 at random and calculated the weighted average by district for our 14 varieties (not including Sauvignon Blanc). Out of 238 (14*17) prices, about 20 percent had the exactly same prices between the weighted average base price and the weighted average "grower returns." For the rest, about 95 percent of district/variety markets had the weighted averages of base prices higher than the weighted averages of grower returns by less than one percent. Of course, we know that penalties are far more common than bonuses in the contracts. These calculations indicate that applied penalties dominate and average net penalties are quite small on average. We interpret this to mean that, in the case of California winegrapes, base prices are very near to actual grower returns per ton.

Table 1 provides a brief description of our 10 year-data, summarized by variety and by district. The table reports the total number of observations, total volume crushed, the weighted average price and the coefficient of variation of price for each district and for each variety.

We supplemented our published *Grape Crush Report* data by obtaining the number of buyers for each district and variety. The buyers are self-reported to CASS. That means we do not know if a particular listed buyer is affiliated with another listed buyer who is also purchasing in the same district. For example, a large winery may buy grapes under several wine labels and use different buyer identifications for each. Our data do not allow us to capture this information. We also have no data on prices paid or quantity purchased by each buyer. Unfortunately, data on the number of buyers were not available for years 1993 and 1995, and we do not have such data for Sauvignon Blanc. The numbers of buyers varied relatively little (or smoothly) over time. Therefore, for the missing years, we used the average of the two adjoining years for that variety and district. However, with no buyer data for Sauvignon Blanc for the entire sample period, we excluded the Sauvignon Blanc variety from the sample for any analysis that includes the number of buyers.

The Grape Crush Survey includes data on tons crushed by district and variety. We also have begun to augment our data with information from the *California Grape Acreage Survey,* which reports bearing and non-bearing acreage by variety for each county. For years before 1994, this process is complex because several of the Crush Districts combine parts of more than one county. In these cases, approximations are required to allocate these acreage figures from counties to crush districts. We also can supplement our data with county figures on grape yields. Appropriate quantity supplied figures must be considered with care because current year unanticipated production shocks would not be expected to affect contracted prices. Further, anticipated supply movements are likely to have a significant endogenous component.

4. Issues and Hypotheses

Prices range from less than $100 per ton to more than $9,000 per ton. Thus, there is considerable variation in the dependant variable to explain. And, with more than 50,000 observations that amount to a relatively complete population of prices for our 15 varieties for the decade, we have many observations. Nevertheless, our analysis is limited by relatively few relevant and well-measured explanatory variables. This section discusses several hypotheses related to winegrape prices that we explore in the econometric section that follows.

a) It is widely understood that winegrapes vary widely in quality and some of this quality variation is represented by vineyard location and grape variety. Our first set of questions relates to, how much of the total price variation in California is accounted for by crush district, by

variety, and by the combination of variety and crush district. Which is more important, district or variety? Our interest here is mainly descriptive, but these decomposition results are important for understanding the basic patterns that drive the overall wine grape prices in the state. We also want to understand how much variation is left to be explained by other factors after we control for district and variety. We also include year fixed effects, which explain three percent of sample variation.

b) We next consider whether higher quality is associated with more product differentiation, holding constant the variety and district. We assume product quality and the level of product differentiation can be captured in the winegrape price structure and that observed price represents product quality. Variation in quality often leads to differentiation in products. However, product differentiation relates to buyer preferences, and not quality directly. In the case of winegrapes, once one accounts for location and variety, it is reasonable to assume that quality directly leads to price differentiation.

One way to investigate the hypothesis of a positive relationship between quality and differentiation may be by examining the coefficient of variation of price in sub-samples with different average prices. We do this by comparing the coefficients of variation of price across varieties and districts. We also examine the number of distinct price/brix code observations per district and variety and the tons per observation as proxies for winegrape differentiation holding constant district and variety.

c) We test how prices may be affected by market power using data on number of buyers. Although this indicator is imperfect, nonetheless, if market power is important, we expect that whenever the number of buyers competing for a particular variety (or quality) of winegrapes in a district is small, the price would be lower than otherwise. Note that in our data many several district/variety sub-samples have more than 40 buyers. We would expect no buyer market power in sub-markets with so many buyers. However, the issue is not so simple because if there is considerable product differentiation holding district and variety fixed, then monopsony power could still obtain.

d) Other hypotheses may also be related to number of buyers. One hypothesis relates how this number of buyers itself may reflect product differentiation and specialization. Under this hypothesis, a large number of buyers indicated relatively high product differentiation and thus higher quality grapes. Further, even given a large number of sellers in every district for the varieties in our sample, seller market power could also exist. We may hypothesize that if sellers are relatively specialized and differentiated (as say for Cabernet in Napa) a large number of potential buyers in the market may allow seller to capture market power rents, implying a higher price as number of price observations is small relative to the number of buyers.

e) Our measure of brix code suggests several hypotheses. The complexity of the data on brix code means we were not yet able to fully exploit how detailed differences in these contract specifications affect price. But, if the restrictions and penalties lower the expected received price for any given base price, then as a compensating differential, holding other factors constant, contracts with penalties or restrictions will tend to have a higher base price. Likewise, those observations with bonuses specified in the brix code will tend to have a lower base price.

A second brix code effect may also be present. Contracts that specify a bonus or penalty may signal lower buyer trust and a lower average quality grower, holding other observable characteristics constant. This suggests that if there is substantial unmeasured variation, not associated with brix code, the presence of any restriction, bonus or penalty is associated with a lower price. A third hypothesis is simply that for high quality grapes in California, sugar, as

measured by brix, is not an important grape characteristic. Therefore, in some regions, the presence of bonuses, penalties or restrictions related to brix may be associated with lower quality.

5. Empirical analysis

Two important attributes of winegrapes are the vineyard location and variety. As shown in table 1, using all 10 years of data crush district weighted average prices range from $210 to $1615 across the 17 districts, while the variety averages range from $168 to $1230 across our 15 varieties.

The average price of grapes in our sample has trended up over time from about $330 per ton to about $550 per ton during 1991-2000. During the decade, the share of the four major high-priced varietals (Chardonnay, Cabernet Sauvignon, Merlot and Pinot Noir) has grown from about 15 percent of the crush to about 35 percent of the crush (in tonnage). The regional composition, measured by the share of the grapes grown in coastal districts, has changed very little over time.

Table 2, shows overall weighted means for variables used in the regression analysis presented next. All observations are weighted by the number of tons for that sale and means are calculated over the 238 (=14 varieties* 17 districts) distinct variety and district combinations. There is a weighted average of about 49 observations per district/variety with an average of about 25 buyers. About 19 percent of the observations occurred in district/variety markets with fewer than 10 buyers and 13 percent had more than 40 buyers in the sub-market. About 69 percent of the observations are in the low priced districts of the southern San Joaquin Valley and only about 7 percent in the Napa/Sonoma districts.

Table 3 reports initial analysis of covariance in the form of regressions on a series of binary variables. This linear regression allows us to examine the partial effects of each vaiable holding effects of other variables constant. Column 1 shows that year dummies alone account for only 3 percent of the variation in the sample. The R^2, which is a measure of goodness of fit, indicates that crush district dummies account for 75 percent of price variation when added to the year effects, whereas varieties alone explain 57 percent of price variation when added to year effects. The year, district and variety effects together account for 82 percent of the total sample variation, leaving 18 percent of the variation as within category variation. This regression helps us understand how these grape and market characteristics determine grape prices. They are useful to appreciate that knowing the location of the grapes accounts for most of the price variation but that variety does add a significant amount of explanatory power. Thus given a farms location, variety planted is a important determinant of price.

In table 3 the pattern of fixed effects are consistent with the expectations of knowledgeable observers. That is, across districts, Napa (the left out district 4) has the highest prices, with the coastal districts having higher prices than the inland region. District 13, which comprises Fresno and nearby areas, has the lowest prices. Across varieties, (with Zinfandel as the left out variety), Pinot Noir commends the highest price effect followed by Merlot and Cabernet Sauvignon. Thompson Seedless, a raisin variety that is grown in the San Joaquin Valley, is the low-price grape among the 15 varieties listed. When the district fixed effects are added the variety pattern changes slightly and now Merlot has the highest price effect followed by Cabernet Sauvignon.

To investigate effects associated with market power we included the number of buyers in the model with all year, district and variety fixed effects. The result was a very strong positive buyer effect whether entered as a linear, quadratic, log or exponential term. But, if buyers compete in each district/variety sub-market, we would expect market power to dissipate as the

number of buyers increases past some relatively small threshold, that is, adding the 25th buyer to the market would do less than adding buyer number 4 to the market. We therefore also explore specifications that place more weight on relatively few buyers.

Table 4, shows the coefficients associated with number of buyers specified as a linear term plus two dummy variables, one for number of buyers less than or equal to 10 and a second indicating more than 40 buyers in the sub-market. Table 4 presents the regression results from three different specifications. All specifications indicate that buyer effects are very significant. For the second specification, we find that each added buyer adds $2.73 to the base price of grapes, but that the 10 or fewer buyer category adds an additional $41 to the price. At the upper end, the category of more than 40 buyers in the market reduces price by $94 in lump sum.

It is hard to attribute this pattern of coefficients to market power. A sub-market with 5 buyers rather than 15 would have a price that was $15 (=41-26) per ton higher—not what we would expect from monopsony power. At the extreme upper end of the number of buyer spectrum, in districts such as Napa for popular varieties such as Chardonnay, there are more than 100 buyers. Assuming 100 buyers, in these cases, the price is higher by $137 (=(100*2.6-94)-(11*2.6)) than the case of a district/variety sub-market with 11 buyers. This may well be associated with high product differentiation indicating higher quality, or large numbers of buyers competing for specialized products in micro-markets where sellers have some market power.

In specifications of the brix code effects, we examined separate effects for the bonus impact and the penalty/restriction impact. However, with such a small share of the sample observations specifying a bonus, these results do not provide definitive interpretations. In the specifications in table 4, we consider only two cases, either any brix restrictions (brix code K0010) or not (brix code=0010). Our results show a negative effect of a contract that specifies any bonuses, penalties or restrictions associated with brix. Such a provision lowers the price of grapes by about $13 (for specifications I and II). We also consider a more complex specification by interacting the brix code variable with variables indicating the coastal districts including districts 1, 2 ,3, 4, 6, 7, 8) or the southern San Joaquin Valley (districts 12, 13,14). The results are that including a brix code in the price contract lowers price by $84 per ton in the coastal districts, raises the price by $16 in the southern San Joaquin and lowers the price by $57 in the rest of the state. Thus, where quality tends to be low, including explicit brix factor conditions in the contract (mainly penalties) raises the base price consistent with a compensating differential. In the rest of the state the signaling hypotheses seems to dominate.

Finally, table 4 examines the effect of number of observations in the sub-market on price. The idea here is that sub-markets with many distinct price/brix code cases would be more likely to have more product differentiation and that this could indicate higher quality or more potential for market power on the part of sellers (holding number of buyers constant). We indeed find that the more observations in the sub-market the higher the base price.

This data analysis measures the role of grape and market characteristics in winegrape prices. The results are consistent with those of Bombrun and Sumner (2003) that show how location, year and grape variety are also key variables for explaining wine price variation in California. Further work to link the winegrape results with the wine results is underway.

6. Conclusions

In this paper we have presented some results describing the pattern of winegrape prices in California. We find that location, as indicated by crush district, is the most important factor accounting for variations in winegrape prices over the last decade. Of course, variety is also important. Beyond those two factors, number of buyers in a sub-market, whether the contract

included provisions on sugar content of the grapes and number of distinct price/brix code observation in the sub-market all affect price significantly, but marginally. We find that available data do not suggest important market power impacts. We also find mixed results for effects of contract restrictions on grape prices. However, there are indications that regions with more product differentiation have higher prices, we suggest that such differentiation is an indication of higher average grape quality in an area.

In further work we plan to sharpen the hypotheses examined and investigate the impacts of supply shocks by including additional variables that are available on the time series and across varieties and districts.

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**Table 1. Volume Share, Price/ton, Coefficient of Variation of price
by Variety and District: Ten year weighted averages**

	Volume share	Weighted price($)/ton	CV
VARIETY			
Barbera	0.038	261	0.39
Cabernet Sauvignon	0.071	1015	0.64
Carignane	0.027	290	0.57
Chardonnay	0.115	1005	0.49
Chenin Blanc	0.076	223	0.52
French Colombard	0.203	176	0.25
Grenache	0.045	202	0.38
Merlot	0.044	1041	0.57
Pinot Noir	0.012	1230	0.47
Rubired	0.033	323	0.22
Ruby Cabernet	0.021	302	0.30
Sauvignon Blanc	0.023	656	0.45
Syrah(shiraz)	0.005	823	0.69
Thompson seedless	0.165	168	0.14
Zinfandel	0.121	480	0.61
DISTRICT			
District 1	0.019	1107	0.45
District 2	0.004	1007	0.37
District 3	0.045	1394	0.38
District 4	0.032	1615	0.43
District 5	0.004	910	0.46
District 6	0.004	1187	0.35
District 7	0.029	1107	0.36
District 8	0.024	1108	0.42
District 9	0.012	445	0.61
District 10	0.004	773	0.41
District 11	0.128	542	0.38
District 12	0.106	311	0.56
District 13	0.454	210	0.45
District 14	0.118	234	0.55
District 15	0.001	527	0.51
District 16	0.002	772	0.43
District 17	0.014	599	0.33

**Table 2. Mean Value of the Variables used in Buyer regression
(weighted by volume)**

Variable	mean	SD
NUMBER OBS		
# of observations	49.5	1207
price/ton	445	9715
Buyer	24.9	602
DBUY10		
=1, if (#of buyers<10)	0.19	8.5
DBUY40		
=1, if (#of buyers>40)	0.14	7.5
TONBYOBS		
(tons/obs)	3646	81462
TONBUYER		
(tons/buyer)	8414	222450
OBSBYBUY		
(obs/buyer)	2	12.6
DBRIX		
=1, if (brix code=/ 0010)	0.75	9.36
Brix with bonus (then =1)	0.035	4
Brix with penalties or limits (then =1)	0.71	9.76
COAST (=1, if dist=1,2,3,4,6,7,8)	0.15	7.66
SJ (=1, if dist=12,13,14)	0.69	9.98
DBCOAST		
=1, if (DBRIX=1 and COAST=1)	0.095	6.33
DBSJ		
=1, if (DBRIX=1 and SJ=1)	0.52	10.8

Table 3. Price Effects of Year, District and Variety

variables	I: year		II: year & district		III: year & variety		IV: year, district & variety	
	Parameter Estimates							
Constant	332.1	(46.9)*	1499.1	(223.5)*	428.6	(71.0)*	1321.8	(205.8)*
Y91	-	-	-	-	-	-	-	-
Y92	9.8	(1.0)	48.1	(9.9)*	34.0	(5.3)*	46.2	(11.1)*
Y93	23.4	(2.4)*	23.0	(4.7)*	-1.1	(-0.2)	9.6	(2.3)
Y94	38.1	(3.8)*	16.4	(3.2)*	-20.9	(-3.1)*	-6.2	(-1.4)
Y95	81.7	(8.2)*	86.3	(17.0)*	21.4	(3.2)*	56.5	(13.1)*
Y96	135.5	(14.2)*	173.3	(35.4)*	106.1	(16.5)*	143.0	(34.1)*
Y97	189.2	(20.8)*	197.2	(42.4)*	112.3	(18.4)*	155.6	(39.0)*
Y98	196.6	(20.8)*	213.5	(44.1)*	90.1	(14.2)*	153.1	(36.9)*
Y99	218.0	(23.0)*	225.8	(46.5)*	70.8	(11.1)*	149.1	(35.7)*
Y00	194.9	(21.5)*	183.6	(39.4)*	24.9	(4.0)*	103.5	(25.8)*
District 1	-	-	-515.6	(-54.5)*	-	-	-434.0	(-53.5)*
District 2	-	-	-622.9	(-36.4)*	-	-	-525.6	(-35.9)*
District 3	-	-	-223.4	(-29.5)*	-	-	-209.3	(-32.3)*
District 4	-	-	-	-	-	-	-	-
District 5	-	-	-722.6	(-42.9)*	-	-	-697.9	(-48.7)*
District 6	-	-	-465.9	(-25.6)*	-	-	-448.4	(-29.0)*
District 7	-	-	-521.0	(-61.9)*	-	-	-507.0	(-70.5)*
District 8	-	-	-519.6	(-58.9)*	-	-	-504.2	(-67.2)*
District 9	-	-	-1194.5	(-106.4)*	-	-	-1052.2	(-108.4)*
District 10	-	-	-844.8	(-49.3)*	-	-	-689.4	(-46.9)*
District 11	-	-	-1096.0	(-169.4)*	-	-	-997.4	(-176.6)*
District 12	-	-	-1301.2	(-197.3)*	-	-	-1087.7	(-181.8)*
District 13	-	-	-1416.7	(-236.7)*	-	-	-1121.3	(-191.8)*
District 14	-	-	-1387.1	(-212.8)*	-	-	-1123.3	(-182.6)*
District 15	-	-	-1066.2	(-25.5)*	-	-	-850.4	(-23.9)*
District 16	-	-	-841.6	(-38.0)*	-	-	-823.9	(-43.7)*
District 17	-	-	-1045.1	(-100.1)*	-	-	-994.3	(-110.6)*
Barbera	-	-	-	-	-216.9	(-27.4)*	-37.3	(-6.8)*
Carignane	-	-	-	-	-179.4	(-19.8)*	-81.4	(-13.5)*
Chardonnay	-	-	-	-	526.7	(94.7)*	275.8	(71.8)*
Cabernet Sauvignon	-	-	-	-	538.4	(84.3)*	286.2	(66.4)*
Chenin Blanc	-	-	-	-	-243.7	(-38.8)*	-110.2	(-25.2)*
French Colombard	-	-	-	-	-291.8	(-59.2)*	-113.9	(-31.1)*
Grenache	-	-	-	-	-270.0	(-36.3)*	-90.0	(-17.4)*
Merlot	-	-	-	-	551.9	(73.1)*	353.1	(70.6)*
Pinot Noir	-	-	-	-	757.7	(58.2)*	126.6	(14.3)*
Rubired	-	-	-	-	-156.2	(-18.7)*	24.9	(4.3)*
Ruby Cabernet	-	-	-	-	-174.4	(-17.2)*	5.1	(0.7)
Sauvignon Blanc	-	-	-	-	187.4	(19.3)*	-84.8	(-13.1)*
Syrah (Shiraz)	-	-	-	-	339.3	(17.2)*	247.2	(19.2)*
Thompson seedless	-	-	-	-	-320.3	(-62.3)*	-132.9	(-33.5)*
R-square	0.03		0.75		0.57		0.82	

( ) t-ratio

* significant at the 5% level

Table 4. Effects of buyer numbers and winegrape characteristics on winegrape prices

Variables	I		II		III		IV	
	Parameter Estimate (t-ratio)							
constant	591.3	(60.7)*	579.0	(59.2)*	630.2	(62.2)*	672.6	(66.6)*
Y92	45.4	(11.7)*	47.5	(12.3)*	45.1	(11.7)*	42.2	(10.8)*
Y93	5.8	(1.5)	5.5	(1.4)	5.8	(1.5)	11.5	(3)
Y94	3.9	(0.9)	2.7	(0.7)	3.2	(0.8)	-1.4	(-0.3)
Y95	62.9	(15.4)*	64.5	(15.8)*	62.9	(15.5)*	42.4	(10.5)*
Y96	115.8	(29.1)*	118.0	(29.8)*	118.6	(30.0)*	99.6	(25.4)*
Y97	118.8	(31.2)*	119.3	(31.6)*	122.0	(32.4)*	105.2	(28.0)*
Y98	88.7	(22.5)*	90.1	(23.0)*	94.5	(24.2)*	89.8	(22.8)*
Y99	82.7	(20.8)*	83.2	(21.0)*	90.7	(22.9)*	84.1	(21.1)*
Y00	5.0	(1.3)	6.9	(1.8)	11.8	(3.1)*	23.8	(6.2)*
District 1	119.2	(12.4)*	121.5	(12.7)*	131.07	(13.7)*	101.6	(10.6)*
District 2	174.1	(9.7)*	167.0	(9.4)*	169.19	(9.6)*	112.5	(6.3)*
District 3	-85.9	(-12.4)*	-83.6	(-12.2)*	-85.37	(-12.5)*	-171.5	(-27.7)*
District 5	66.9	(4.2)*	55.2	(3.5)*	33.62	(2.1)	-22.4	(-1.4)
District 6	191.5	(12.0)*	199.2	(12.6)*	189.66	(12.0)*	98.5	(6.3)*
District 7	45.0	(5.1)*	60.7	(6.8)*	57.144	(6.5)*	-11.2	(-1.3)
District 8	-65.2	(-7.4)*	-30.1	(-3.4)*	-35.25	(-4.0)*	-139.8	(-17.0)*
District 9	-329.4	(-28.3)*	-344.2	(-29.6)*	-364.59	(-29.0)*	-425.3	(-34.0)*
District 10	-137.6	(-9.0)*	-111.1	(-7.3)*	-132.34	(-8.3)*	-244.1	(-15.7)
District 11	-457.2	(-58.5)*	-452.3	(-57.9)*	-464.45	(-48.8)*	-505.8	(-53.3)*
District 12	-422.6	(-47.2)*	-430.9	(-48.3)*	-508.89	(-52.8)*	-547.9	(-56.9)*
District 13	-496.9	(-58.3)*	-492.79	(-57.5)*	-567.18	(-61.2)*	-601.6	(-64.9)*
District 14	-449.8	(-50.0)*	-461.4	(-51.3)*	-534.05	(-55.5)*	-580.1	(-60.6)*
District 15	-136.6	(-4.1)*	-168.7	(-5.0)*	-204.21	(-6.1)*	-257	(-7.6)*
District 16	-77.8	(-4.0)*	-84.7	(-4.4)*	-104.82	(-5.3)*	-169.1	(-8.5)*
District 17	-291.5	(-26.1)*	-301.0	(-27.1)*	-317.59	(-26.0)*	-373.2	(-30.7)*
Barbera	38.4	(7.4)*	21.3	(4.1)*	17.8	(3.5)*	-4.2	(-0.9)
Carignane	10.5	(1.9)	-5.58	(-1.0)	-6.5	(-1.2)	-28.6	(-5.1)
Chardonnay	216.5	(60.4)*	203.19	(55.5)*	202.9	(55.6)*	210.9	(57.5)*
Cabernet Sauvignon	267.9	(67.0)*	254.52	(62.9)*	253.7	(63.0)*	265.5	(65.7)*
Chenin Blanc	-47.8	(-11.8)*	-61.36	(-15.0)*	-62.3	(-15.3)*	-68.7	(-16.8)*
French Colombard	-95.2	(-28.0)*	-106.36	(-31.0)*	-102.9	(-30.1)*	-98.2	(-28.5)*
Grenache	-22.8	(-4.7)*	-46.01	(-9.3)*	-41.3	(-8.4)*	-51.8	(-10.4)*
Merlot	393.2	(85.0)*	377.49	(80.5)*	371.4	(79.5)*	369.7	(78.4)*
Pinot Noir	290.0	(34.6)*	305.93	(36.6)*	299.7	(36.0)*	269.7	(32.4)*
Rubired	77.4	(14.4)*	70.54	(13.1)*	68.5	(12.8)*	49.8	(9.3)*
Ruby Cabernet	75.3	(11.9)*	57.95	(9.1)*	54.9	(8.7)*	39.8	(6.3)*
Syrah(shiraz)	375.7	(31.4)*	370.29	(31.1)*	360.9	(30.4)*	315.9	(26.6)*
Thompson seedless	-110.8	(-29.5)*	-122.46	(-32.5)*	-120.9	(-32.2)*	-100.1	(-27.0)*
DBRIX	-13.4	(-6.8)*	-12.74	(-6.4)*	-57.166	(-10.4)*	-56.8	(-10.2)*
BUYER	1.5	(7.8)*	2.73	(13.5)*	2.76	(13.7)*	8	(93.5)*
NUMBER	2.7	(30.0)*	2.644	(29.3)*	2.59	(28.8)*	..	..
DBUY10			40.84	(15.8)*	40.65	(15.7)*	41.5	(16.0)*
DBUY40			-94.17	(-18.3)*	-92.86	(-18.1)*	-99.3	(-19.2)*
DBCOAST					-27.15	(-3.8)*	-30.4	(-4.3)*
DBSJ					73.479	(12.2)*	74.5	(12.3)*

R-square	0.0.855	0.857	0.858	0.856