

Introduction

Last month, I presented to the El Dorado Winegrowers' association. The topic of the presentation was the economics and pricing dynamics of the market for El Dorado wine grapes. Just last year, the UC Davis Extension service put out one of their characteristically detailed and accurate [cost studies](#) for the Sierra Nevada Foothills, which illuminated the challenge of planting and operating a profitable vineyard in the region.

I enjoyed giving the presentation for three reasons. First, I stayed in Placerville, which is a lovely wine country town that I hope to return to. Second, I have done only a small amount of work with the El Dorado region, so it was great to get a chance to learn more. Finally, the audience was wonderful. I never had a presentation provoke so many questions and so much conversation, pushback and information-sharing. Following are the main takeaways from the presentation and discussion.

Analysis of the Cost Study

The cost study, prepared by Lynn Wunderlich from UC Davis Extension and supported by Karen Klonsky and Don Stewart from UC Davis, included some worrisome news for growers in the region. According to the cost study, the total cost of developing and operating a vineyard in the region, for the situation depicted in the cost study, was \$8,414. If a grower produces 4 tons and is paid \$1,300 per ton, then he is operating at a loss of \$3,214 per acre.

Of course, the cost study does not depict a one-size-fits-all situation. Instead, it serves as a baseline from which one can easily plug in his own revenue and expense assumptions to determine the economic viability of his vineyard. Still, the study depicts as challenging an economic environment as I have seen for a vineyard.

Table I shows average yields per acre over time. Average yields per acre for the Foothills ([USDA-NASS Grape Pricing District 10](#)) were only 2.41 t/ac in 2015 (at the time I did my research, 2016 numbers were not yet available). Worse yet, yields clearly seemed to be falling at a compounded annual growth rate (CAGR) of -2.52%.

TABLE I: IMPLIED TONS PER ACRE FOR DISTRICT 10.

SOURCES: CRUSH REPORTS TABLE 6; ACREAGE REPORTS TABLES 8 & 9.

Year	T/ac	Year	T/ac
2015	2.41	2004	2.98
2014	2.9	2003	2.95
2013	3.38	2002	3.69
2012	3.7	2001	3.85
2011	2.78	2000	3.85
2010	2.82	1999	3.42
2009	3.03	1998	3.09
2008	2.53	1997	4.49
2007	3.26	1996	4.32
2006	3.41	1995	4.34
2005	3.18	1994	4.13

In El Dorado, yields were lower, averaging only 2.1 t/ac in 2015. I had hypothesized that the reason for falling yields was due to aging vineyards that were not being redeveloped for financial reasons. This hypothesis received some confirmation from the audience. In any case, these figures indicated an even more challenging environment than the Cost Study did.

On the other hand, as stated before, not every vineyard operation's cost structure or revenue model looks like the cost study's base case. Furthermore, El Dorado received higher average prices than the average for the district. The average price for all El Dorado wine grapes was \$1,502 per ton - \$202 higher than the figures used in the cost study for District 10.

Included in the cost study is a useful ranging analysis, a portion of which is presented below, in Table 2. Each chart shows profitability, at different combinations of yield and price, by successively broader definitions of expenses.

TABLE 2: RANGING ANALYSIS FROM UC DAVIS EXTENSION COST STUDY, 2016

Net Return per Acre above Operating Costs for Wine Grapes

PRICE (\$/ton)	YIELD (Ton/acre)						
	3.25	3.50	3.75	4.00	4.25	4.50	4.75
Grapes							
1000.00	-1,068	-876	-683	-491	-299	-107	85
1100.00	-743	-526	-308	-91	126	343	560
1200.00	-418	-176	67	309	551	793	1,035
1300.00	-93	174	442	709	976	1,243	1,510
1400.00	232	524	817	1,109	1,401	1,693	1,985
1500.00	557	874	1,192	1,509	1,826	2,143	2,460
1600.00	882	1,224	1,567	1,909	2,251	2,593	2,935

Net Return per Acre above Cash Costs for Wine Grapes

PRICE (\$/ton)	YIELD (Ton/acre)						
	3.25	3.50	3.75	4.00	4.25	4.50	4.75
Grapes							
1000.00	-1,688	-1,496	-1,304	-1,112	-919	-727	-535
1100.00	-1,363	-1,146	-929	-712	-494	-277	-60
1200.00	-1,038	-796	-554	-312	-69	173	415
1300.00	-713	-446	-179	88	356	623	890
1400.00	-388	-96	196	488	781	1,073	1,365
1500.00	-63	254	571	888	1,206	1,523	1,840
1600.00	262	604	946	1,288	1,631	1,973	2,315

Net Return per Acre above Total Costs for Wine Grapes

PRICE (\$/ton)	YIELD (Ton/acre)						
	3.25	3.50	3.75	4.00	4.25	4.50	4.75
Grapes							
1900.00	-2,065	-1,648	-1,231	-814	-396	21	438
2000.00	-1,740	-1,298	-856	-414	29	471	913
2100.00	-1,415	-948	-481	-14	454	921	1,388
2200.00	-1,090	-598	-106	386	879	1,371	1,863
2300.00	-765	-248	269	786	1,304	1,821	2,338
2400.00	-440	102	644	1,186	1,729	2,271	2,813
2500.00	-115	452	1,019	1,586	2,154	2,721	3,288

I used these figures to estimate the yields necessary to turn a profit, given the average El Dorado price of \$1,502 and, conversely, the price necessary to turn a profit at average yields of 2.1 t/ac. Table 3 below depicts the yield or price necessary to overcome the different break-even points, if the other input is fixed at the 2015 average:

TABLE 3: ESTIMATED BREAK-EVEN PRICES AND YIELDS, EL DORADO VINEYARDS

SOURCE FOR EXPENSES: UC DAVIS EXTENSION COST STUDY, 2016

	OpEx	Cash Cost	Total Cost
Yield fixed @ \$1,502/t	3 tons	3.5 tons	6 tons
Price fixed @ 2.1 t/ac	\$2,250	\$2,500	\$4,000

I then used my [Grape Data Tool](#) and [El Dorado County Wine Grape Surveys](#) to estimate the percentage of grapes from El Dorado that receive these prices. I also used basic statistical analysis to estimate how often El Dorado vineyards would, in aggregate, achieve the yield cut-offs indicated. As Table 4 clearly shows, the economic environment for vineyards in the region is a difficult one. Again, however, many farmers may have lower costs than those indicated by the cost study, which would lower the price and yield break-even points.

These estimates are only valid if the market remains roughly the same as now. For instance, if a grower in El Dorado signs a large contract to sell grapes at \$4,000 per ton, then a greater percentage of El Dorado grapes, of course, will meet the various cutoffs. Similarly, if a large, new vineyard is planted that is set up well for high production, then the average yield for the region will be higher more often.

TABLE 4: STATISTICAL EXAMINATION OF RANGING ANALYSIS, EL DORADO VINEYARDS

SOURCE FOR EXPENSES: UC DAVIS EXTENSION COST STUDY, 2016

	OpEx	Cash Cost	Total Cost
Likelihood region will achieve yield cutoff	1.04%	.002%	<.0001%
Percentage of grapes sold above price cutoff	2%	1%	0%

Trends

Prices, of course, change from year to year. Since 2008, the average price for wine grapes from El Dorado has been rising at a CAGR of 2.2% in nominal terms. In real terms, calculated as constant 2015 dollars, this is an increase of 1.0% per year (see Table 5 and Figure 1). Though this is a modest increase in real (e.g. inflation-controlled) terms, such an increase is far from given. Sonoma County Chardonnay prices have, for instance, been slowly losing ground in inflation-adjusted terms over the past few decades.

TABLE 5: ANNUAL AVERAGE PRICE, ALL EL DORADO WINE GRAPES, IN NOMINAL AND CONSTANT 2015 DOLLARS

Year	Price	In 2015 Dollars
2015	\$1,502	\$1,502
2014	\$1,458	\$1,458
2013	\$1,449	\$1,479
2012	\$1,497	\$1,543
2011	\$1,295	\$1,363
2010	\$1,279	\$1,390
2009	\$1,267	\$1,392
2008	\$1,265	\$1,390
CAGR:	2.2%	1.0%

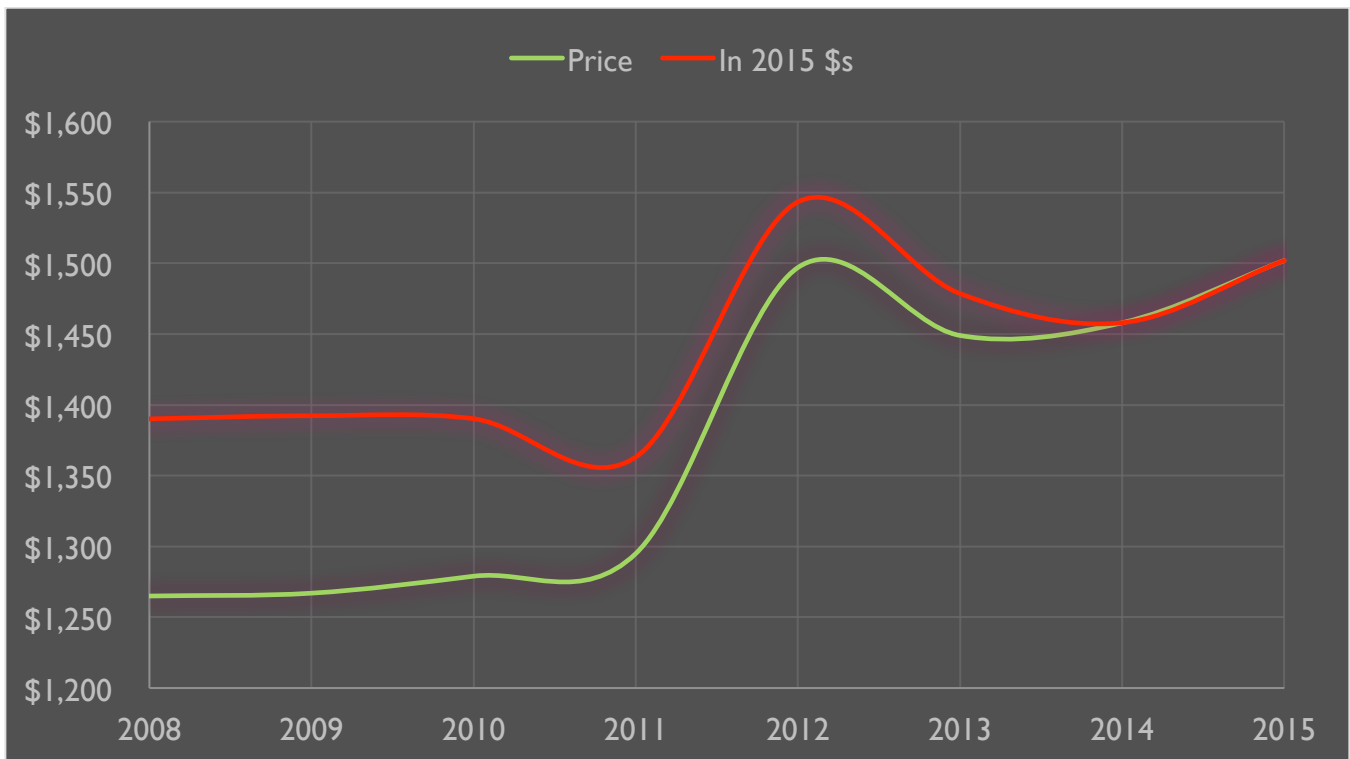


FIGURE 1: Annual Average Price, All El Dorado Wine Grapes, in Nominal and Constant 2015 Dollars

Since we have only six years of data, I ran a time-series regression to try to evaluate how likely this trend is to be just a random, temporary aberration. The results are given in Table 6. This simple analysis predicted a price

of \$1,542 for 2016 in nominal terms and \$1,521 in 2015 dollars. The average price for 2016 was \$1,561, indicating better-than predicted growth. The prediction was low by roughly 1%. Furthermore, the p-values and correlation indicate a relatively high degree of validity for descriptive purposes. Or to translate that, it seems that, barring a shift in market dynamics, this growth rate is likely close to the true, long-term rate.

TABLE 6: REGRESSION RESULTS LOOK GOOD

<i>Regression Analysis</i>	<i>Price</i>	<i>In 2015 Dollars</i>
Coefficient	\$40/yr	\$19/yr
Correlation (Multiple R):	0.89	0.70
P-Value Intercept:	0.0032	0.0606
P-Value Trend:	0.0029	0.0534

Often, in the wine industry, growers feel that their prices rise at a faster pace than the Consumer Price Index upon which national estimates of inflation are based. Typically, upon researching this, I am unable to agree with this view. There are two notable exceptions that I have found. The first is Napa, where expense inflation has been outpacing the CPI considerably and for a long time. The second is Sonoma County, which has seen Napa-like dynamics since at least 2012. Of course, there are regions I have not looked at and, since I cannot track costs in real time, the past few years may have seen this dynamic change.

I have limited information on expenses over time in El Dorado, which is a smaller appellation, outside of my usual area of focus. Because vintages are so variable, a great deal of data is necessary to properly measure growth. I do have some proprietary data, however, that indicates that expenses are rising at roughly the same rate as CPI. Furthermore, I interpolated expense growth from the 2000 and 2016 cost studies, summarized in Table 7 below.

TABLE 7: EXPENSE INFLATION, BASED ON DAVIS COST STUDY, BY CATEGORY

	Labor: Hand	Labor: Machine	Land	All	CPI
2000	\$8.04	\$12.06	\$10,000	\$5,956	0.73
2015	\$16.00	\$22.00	\$20,000	\$8,414	1.00
CAGR:	4.39%	3.83%	4.43%	2.18%	1.99%

Note that, while labor costs have risen, total costs seem to have stayed much closer to CPI. For those who already own their land, total inflation and CPI are essentially equal. Furthermore, these landowners have an asset that, based on the cost study, is appreciating at a rate that is higher than inflation and, in fact, higher than the price growth of the grapes from that land. Due to the limited amount of data, I cannot swear by these conclusions, but they are supported by the preponderance of evidence.

Bottle Prices and the Beckstoffer Rule

Despite the bright spot of real price growth and real asset value appreciation, the fundamental economics of winegrowing in El Dorado still constitute a difficult environment for profitability. To understand why this is, I first examined whether buyers have been paying growers a fair price for their grapes. A common rule of thumb for setting a fair grape price is the Beckstoffer Rule¹, established by Andy Beckstoffer. The rule states that a fair price for a ton of grapes is 100 times the retail bottle price for wine made from those grapes. Based off this rule, I use a measurement I refer to as the Beckstoffer Ratio², which is the percentage of the Beckstoffer Rule price that is paid for a ton of winegrapes. Table 8 shows average prices for El Dorado wine reviewed by the *Wine Spectator* between 2008 and 2014:

TABLE 8: AVERAGE BOTTLE PRICE BY YEAR, WINE SPECTATOR-REVIEWED EL DORADO WINES

Vintage	Average Price
2014	\$31.44
2013	\$34.08
2012	\$35.61
2011	\$28.45
2010	\$29.40
2009	\$23.91
2008	\$25.45

The prices in this chart do not, of course, accurately characterize all El Dorado wines and winegrapes. Instead, they are likely a sample of some of the region's best or best-recognized wines. Still, I could not find evidence that any El Dorado grapes at all were being sold for \$3,000 or more. The preponderance of evidence is that this sub-sample does not conform to the Beckstoffer Rule and that growers were being paid sub-Beckstoffer Rule prices.

I tracked down the amount paid per ton for the winegrapes from three El Dorado wines – the wines' identities are confidential – and, comparing this to the bottle prices, calculated the Beckstoffer Ratio to vary between 50% and 55%. These were still for *Wine Spectator*-reviewed wines, however.

Luckily, Mike Owen of Crystal Basin Cellars sent me data that he had collected of a much broader sample of wines from El Dorado. Using this data and making various rough assumptions about El Dorado grapes that are bottled as other appellations, such as "California," I estimate that the true Beckstoffer Ratio for the whole El Dorado region was likely around 70%.

Even a 70% Beckstoffer Ratio indicates that a discount of 30% is being applied to the Beckstoffer Rule for El Dorado. One possible explanation for this may be that the Beckstoffer Rule is only applicable in certain situations. To be clear, I am not sure Mr. Beckstoffer intended for the rule to be applied broadly, or even to be

¹ Beckstoffer Rule's calculation for the fair price for a ton of grapes is $Y = 100 * X$, where Y is the price paid per ton and X is the retail price per bottle of wine made from those grapes.

² Beckstoffer Ratio = $\text{Bottle Price} / (100 * \text{Grape Price per Ton})$.

applied to grapes that he did not grow. In Napa and Sonoma Counties, Anderson Valley, Santa Cruz Mountains and other AVAs with strong brand value, the Beckstoffer Rule may describe reality rather accurately. Wines with these appellations mentioned on their labels are easier to sell. Consumers seek out these AVAs, so less sales and marketing resources need to be dedicated to preventing inventory stagnation. Perhaps regions without such well-regard AVAs need to divert money away from product expense to invest in sales and marketing.

Cohort Comparison

To understand whether a 70% Beckstoffer Ratio constituted a reasonable price for El Dorado grapes, I decided to look at Beckstoffer Ratios for other areas. Specifically, they needed to be areas where quality wines were grown; the local AVAs did not provide significant marketing value; and sufficient and reliable data was available. Though *Wine Spectator* scores constitute a skewed sample, they provided a way to be consistent when comparing across AVAs, so long as the samples are skewed in a similar manner across these AVAs. I looked only at the 2013 vintage, with samples sizes for each area varying from between 5 to 13 wines. The results can be found in Table 9 below:

TABLE 9: BECKSTOFFER RATIO COHORT COMPARISON, WINE SPECTATOR-REVIEWED WINES, 2013 VINTAGE

County	Grape Price	Bottle Price	Beckstoffer Ratio
El Dorado	\$1,449	\$34.08	43%
Lake	\$1,519	\$31.30	49%
San Benito	\$1,382	\$31.80	43%
San Luis Obispo	\$1,337	\$30.40	44%

Lake County’s Beckstoffer Ratio sticks out, which has three possible causes: its proximity to Napa, where a shortage of Napa grapes has propped up Lake County prices; the growing recognition of the Red Hills sub-appellation; the fact that many of Lake County’s best grapes are blended into Napa wines, which garner higher prices than Lake County’s best wines. Putting aside Lake County’s figures, El Dorado is right in line with San Benito and San Luis Obispo. This is an indication that the market dynamics in El Dorado do not disadvantage growers more than in similar areas. It adds legitimacy to the idea of a “Beckstoffer discount” for wines from lesser-known appellations, at least within a certain price window³.

The next issue to explore was whether El Dorado winemakers are obtaining a sufficiently high price for their wine. To be clear, I am not exploring whether prices are high enough to support costs or are a “fair” price for the labor, love and expense put into the making of the wine. Instead, I want to determine if El Dorado’s pricing dynamics are out of line with similar regions.

The figures below need some explanation. They show average prices and scores for various cohort regions (a broader selection than above.) The IfScore is an interpolation from the available data of what a wine with a

³ Since I looked at a narrow range of appellations, with certain characteristics, I would not generalize this conclusion to other market segments. For instance, this analysis should carry little weight if one is judging the pricing dynamics of \$6 bottles of wine and San Joaquin Valley grapes.

score of 88.54 (the average for El Dorado), would be priced in each region. By comparing this to the actual, average El Dorado price, we get some idea of whether El Dorado prices are higher or lower than other regions' prices.

TABLE 10: COHORT PRICE & SCORE COMPARISON, WINE SPECTATOR-REVIEWS WINES, 2013 VINTAGE

El Dorado	Avg Score	88.54	
	Avg Price	\$34.08	
Lake	Avg Score	87.70	IfScore:
	Avg Price	\$31.30	\$29-30
Marin	Avg Score	88.29	IfScore:
	Avg Price	\$45.86	>\$46
Contra Costa	Avg Score	88.20	IfScore:
	Avg Price	\$28.40	\$28-29
San Benito	Avg Score	89.40	IfScore:
	Avg Price	\$31.80	\$37-44
San Luis Obispo	Avg Score	87.40	IfScore:
	Avg Price	\$30.40	>\$33
Ventura	Avg Score	86.33	IfScore:
	Avg Price	\$30.67	>\$39

Unfortunately, the data set is far from ideal. The possibility exists that the *Wine Spectator's* standards for accepting a wine review increases the homogeneity of scores and prices. If, however, this effect is not present, or at least not strong enough to render a comparison meaningless, then we see that El Dorado wine prices look to be in line with the cohort as a whole. Prices are stronger than in Contra Costa and Lake Counties; in line with San Luis Obispo County; and more competitive than Marin, San Benito and Ventura Counties. Marin may be an unfair comparison, since their concentration in Pinot Noir and proximity to Sonoma County could

support prices that are higher than their quality would otherwise command. In any case, I have not found evidence that El Dorado winegrowers have much room to increase the ratio of their price to the retail bottle price, nor a strong indication that El Dorado winemakers have room for large price increases. Another way to boost grower revenue, however, is to increase yields.

Yields

According to the El Dorado County Wine Growers' Survey, average yields in the region were 2.1 tons per acre in 2015. Such yield figures are often based on less-than-reliable data, but even if yields are actually slightly higher, these are still very low yields. Low yields can be caused by a variety of factors, including site-dependent variables, like soil conditions or vine density; weather conditions for the vintage; operational mistakes; or winemaker demands. Some of these factors are difficult or impossible to control. Some, however, could be changed to boost yields.

Winemakers often institute caps on what yields they will tolerate from growers that they buy from. And growers sometimes plant or manage vineyards to, supposedly, emphasize quality over yields. I am not a viticulturist, but I have been seeing increasing evidence presented by qualified experts that claim that within a certain window of quality and quantity, high yields do not reduce quality. I believe that to be key to improving the outlook for El Dorado growers. I examined the small amount of El Dorado-specific data available to me regarding the influence of yield on quality. Table 11 shows average yields per acre and average *Wine Spectator* scores by year for El Dorado. Figure 2 shows these numbers, normalized to the mean. Yields are derived from El Dorado County agriculture commissioner reports. The sidebar shows the results of regression analysis of the correlation between these two factors.

TABLE 11: WINE SPECTATOR SCORES AND AVERAGE YIELDS FOR EL DORADO, BY YEAR.

Vintage	2014	2013	2012	2011	2010	2009	2008	Mean
Price	\$31.44	\$34.08	\$35.61	\$28.45	\$29.40	\$23.91	\$25.45	\$29.76
Score	89.44	88.54	87.57	87.09	88.25	86.68	88.09	87.95
Yields	2.30	2.60	2.75	1.89	2.18	2.58	2.20	2.36



Regression Analysis:

Correlation = .0298

P-value for yields as predictor of score = .9494.

Coefficient for yields = -0.0922.

FIGURE 2: NORMALIZED VALUES FOR TABLE I I

As is visually apparent from Table I I and confirmed by regression analysis, there was no correlation during the period studied between *Wine Spectator* scores and reported yields per acre. In fact, the coefficient indicates that if there were a correlation, it would be inverse. It seems that one could conclude with a very high degree of confidence that a specific El Dorado vineyard, given appropriate viticultural conditions, could harvest up to 2.75 tons per acre with no harm to quality. I would go further and state that yields could go significantly higher without harming quality. I have performed this type of analysis on various regions and this is a typical outcome. In fact, based on the data I have analyzed and anecdotal evidence, I think that in some cases, hanging a heavier crop allows full flavor maturity to occur before sugar maturity triggers a harvest.

It seems clear that there is a win-win proposition here. Winemakers should not assume that higher yields cause lower quality. They should eliminate or loosen arbitrary yield caps. At the very least, they should experiment with allowing higher yields. Growers should plant and manage vineyards with the goal of producing several tons per acre. Higher yields allow growers to secure supply without paying more money per ton, while growers can generate sufficient earnings and book a profit.

I would not limit this conclusion to El Dorado, but believe that it should be explored across the industry. In some cases, yield limits should be tested and, if found to not boost quality, discarded as a superstition. We do not have an unlimited supply of quality vineyard sites and should strive to produce as much as is possible, without sacrificing desired quality, from those that we have.

One caveat: this recommendation is applicable only to certain situation. Clearly, there is a level at which high yields will hurt quality, I just believe it to be higher than the conventional wisdom indicates. Clearly, there are stylistic decisions that could require lower yields. Clearly, there are vineyards and vintages that cannot improve yields, while adequately ripening fruit.

Conclusions

At the heart of any successful business venture, is the simple formula that Revenue – Expenses = Income. All business decisions should keep this in mind. In our industry, we also need to include in that calculation the lifestyle benefits that guided us into the wine industry in the first place. That said, the economic environment is such that some El Dorado growers may be well-advised to exit the industry. Their financial position, their

vineyard and/or other issues may not allow them to overcome the serious economic challenges of growing in this region.

Those growers who do continue growing grapes should closely monitor the levels and direction of wine prices for producers they sell grapes to. Even if they cannot raise their Beckstoffer Ratio above 70%, they should aim to ensure that they are paid at least this amount and that their payments rise in proportion to the rise in retail prices for wines from their grapes. They should also push hard against yield caps or other arbitrary methods of reducing yields. Furthermore, new plantings and redevelopment should focus on vineyards that can produce high yields.