



Does “Organic” Make a Difference in the Wine Industry?



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Background

The economic nature of organic products is becoming increasingly interesting topic these years. In this paper, we undertake the empirical test of the “organic” effect on prices in the wine industry.

Two kinds of “Organic Wine”:

◆ Organic Grape Wine

Formal definition of it is “Wine which is made from grapes that have been grown without the use of chemical fertilizers, pesticides, fungicides and herbicides”. Therefore, the raw materials of it are organically grown grapes. One point should be notice about organic grape wine: it can include added sulfites, a preservative in wines which has strong antimicrobial properties and some antioxidant properties, even though only in extremely small quantities. They serve as important factors for the quality of wine. Consequently, people treat “organic grape wine” as high quality product because of its “green” and stable characteristics. Winery or vineyard in the US can inform consumers about their organic raw materials by getting an organic **crop** certificate from USDA.

◆ Organic Handling Wine

Organic handling wine is also made from organic grapes but is sulfite free. However, even though some people consider wines without preservative as more natural products, eliminating sulfites can reduce the quality of the wine because the wine is not stable and has much less aging potential. As a result, if a wine is connected with organic handling, it will be considered as inferior good. Also, similar to organic grape wine, producers of organic handling wine can indicate their organic role by obtaining organic **handling** certificate from USDA. In this paper, this term has the same meaning as “organic wine”.

Objective

Investigate how organic claims affect wine prices and whether organic attributes interact with other product characteristics.

Theoretical Context

Hedonic price model (Rosen, 1974)

According to this model, the price of wine, P , is assumed to be described by a hedonic price function, $P = P(z)$, where z is a vector of attributes.

The hedonic price of an additional unit of a particular attribute is determined as the partial derivative of the hedonic price function with respect to that particular attribute. Each consumer chooses an optimal bundle of attributes and all other goods in order to maximize utility subject to a budget constraint. For continuously varying attributes, the chosen bundle will place the consumer so that his or her indifference curve is tangent to the price gradient, $\partial P/\partial z_j$, for each attribute. Therefore, the marginal willingness to pay for a change in a wine attribute is equal to the derivative of the hedonic price function with respect to that attribute. Finite differences represent marginal willingness to pay for discretely varying attributes.

Data

The data set of all wines is derived from 17 years (1991-2007) of ratings scores reported in the Wine Spectator magazine (online version) for California and Washington red wines.

◆ Three sub-samples are included:

- (1) 633 observations of organic grape wines (OGW),
- (2) 200 organic handling wines (OHW) and
- (3) 11988 not organic grape/handling wines (NOG/HW).

◆ Non-binary Variables:

- (i) price of the wine adjusted to 2000 values by a consumer price index (CPI) for alcohol;
- (ii) score obtained in expert sensory evaluation by the Wine Spectator’s experts;
- (iii) number of cases produced, and
- (iv) years of aging before commercialization.

◆ Indicator variables:

- (i) Regions of production: The regions of production for California wines include Napa Valley, Bay Area, Sonoma, South Coast, Carneros, Sierra-Foothills, Mendocino and other California, while Washington wines were not separated by regions. These geographical partitions are those adopted by the Wine Spectator to categorize the wines.
- (ii) Wine varieties: Varieties include Zinfandel, Pinot Noir, Cabernet Sauvignon, Merlot, and Syrah grapes, as well as wines made from blending of different varieties (non-varietals).
- (iii) Presence of label information: “reserve”, “vineyard” and “estate produced”.
- (iv) Vintage: Year of production is available for each wine.

Methodology

Hedonic model is in use. Model specification is ultimately an empirical matter, the regression function is the following:

$$price^{-0.25} = \beta_0 + \beta_1(\text{Score}) + \beta_2(\text{Score})^2 + \beta_3(\text{Age}) + \beta_4(\text{Age})^2 + \beta_5 \ln(\text{Cases}) + \sum_{i=1}^8 \beta_{3+i}(\text{Region}_i) + \sum_{i=1}^5 \beta_{13+i}(\text{Variety}_i) + \sum_{i=1}^3 \beta_{18+i}(\text{Label}_i) + \sum_{i=1}^9 \beta_{21+i}(\text{Vintage}_i) + \varepsilon_i \quad (1)$$

- ◆ Form of the dependent variable is decided by Box-Cox transformation.
- ◆ Score and Age are standardized to avoid multicollinearity.
- ◆ Region and Variety are dummy coded.
- ◆ Label provides some detailed information about the wine

There are three different models need to be estimated:

- (I) Model using all wines data. This data set includes organic grape wines, organic handling wines and other wines (the whole data set, 12821 obs)
- (II) Model only including data of organic grape wines (sub-sample 1, 633 obs)
- (III) Model utilizing data without organic grape wines and organic handling wines (sub-sample 3, 11988 obs)

Equation (1) is the fitted estimation equation for both model (II) and (III), but for model (I), there is a little change: three more terms are added to the right side of this equation.

$$price^{-0.25} = \beta_0 + \beta_1(\text{Score}) + \beta_2(\text{Score})^2 + \beta_3(\text{Age}) + \beta_4(\text{Age})^2 + \beta_5 \ln(\text{Cases}) + \sum_{i=1}^8 \beta_{3+i}(\text{Region}_i) + \sum_{i=1}^5 \beta_{13+i}(\text{Variety}_i) + \sum_{i=1}^3 \beta_{18+i}(\text{Label}_i) + \sum_{i=1}^9 \beta_{21+i}(\text{Vintage}_i) + \beta_{31}(\text{OG}) + \beta_{32}(\text{OH}) + \beta_{33}(\text{OG}^* \text{ES}) + \varepsilon_i \quad (2)$$

All three models are estimated via OLS.

Results and Discussions

Results from AW Model

Variables	Estimates	P-value
Intercept	0.4139	0.0000
Sscore	-0.0071	0.0000
Sscore2	-0.0004	0.0000
Agesc	-0.0117	0.0000
Agesc2	0.0007	0.0064
Lncs	0.0124	0.0000
Napa	-0.0534	0.0000
BayCentral	-0.0316	0.0000
Sonoma	-0.0351	0.0000
SouthCoast	-0.0254	0.0000
Carneros	-0.0376	0.0000
SierraFoothills	-0.0174	0.0000
Mendocino	-0.0156	0.0000
WA	-0.0029	0.0577
Nonvarietal	-0.0415	0.0000
Pinotnoir	-0.0346	0.0000
Cabernet	-0.0307	0.0000
Merlot	-0.0254	0.0000
Syrah	-0.0077	0.0000
Reserve	-0.0110	0.0000
Vineyard	-0.0082	0.0000
Estate	-0.0056	0.0077
y91	0.0396	0.0001
y92	0.0412	0.0000
y93	0.0316	0.0010
y94	0.0269	0.0042
y95	0.0173	0.0454
y96	0.0095	0.1761
y97	0.0031	0.3812
y98	-0.0089	0.1925
y99	-0.0032	0.3755
y00	-0.0080	0.2166
y01	-0.0011	0.4608
y02	-0.0089	0.2200
y03	-0.0092	0.2249
y04	-0.0024	0.4154
y05	-0.0046	0.3389
OG	-0.0024	0.1171
OH	0.0325	0.0000
OG*ES	-0.0279	0.0002

Results from OGW Model

Variables	Estimates	P-value
Intercept	0.3092	0.0000
Sscore	-0.0033	0.0000
Sscore2	-0.0002	0.0019
Agesc	-0.0082	0.0003
Agesc2	0.0002	0.3148
Lncs	0.0193	0.0000
Napa	-0.0317	0.0039
BayCentral	-0.0226	0.0439
Sonoma	0.0171	0.3782
SouthCoast	-0.0045	0.5861
Carneros	0.0039	0.4044
SierraFoothills	0.0570	0.0016
Mendocino	0.0264	0.0150
WA	0.0812	0.0000
Nonvarietal	0.0020	0.3493
Pinotnoir	-0.0085	0.0704
Cabernet	-0.0320	0.0000
Merlot	-0.0006	0.4572
Syrah	0.0153	0.0033
Reserve	-0.0118	0.0022
Vineyard	0.0028	0.2349
Estate	-0.0384	0.0000
y91	0.0475	0.0009
y92	0.0488	0.0003
y93	0.0423	0.0018
y94	0.0402	0.0021
y95	0.0235	0.0428
y96	0.0162	0.1090
y97	0.0079	0.2776
y98	0.0050	0.3542
y99	0.0041	0.3801
y00	0.0012	0.6461
y01	0.0037	0.3917
y02	-0.0030	0.4117
y03	-0.0063	0.3235
y04	-0.0038	0.4177
y05	-0.0060	0.3256
Estate	-0.0069	0.0004
y91	-0.0857	0.0000
y92	0.0876	0.0000
y93	0.0782	0.0000
y94	0.0730	0.0000
y95	0.0643	0.0000
y96	0.0572	0.0000
y97	0.0519	0.0000
y98	0.0417	0.0000
y99	0.0464	0.0000
y00	0.0414	0.0000
y01	0.0447	0.0000
y02	0.0207	0.1053

Conclusion

From interpreting estimation results and computing implicit prices for each factor, we have got a deeper understanding about the economic nature of organic grape wines and organic handling wines.

1. Organic grape wines are considered as more quality wines while organic handling wines are treated as inferior products. Moreover, organic grape wine whose label information contains “estate” can claim even more price premium.
2. Comparing organic grape wines (OGW) and wines without any organic attributes (NOG/HW) give us following conclusions.

- (1) Estate can be treated as an advantage for organic grape wine producers since it causes almost five times of price premium comparing to conventional wines.
- (2) Organic grape is a prior factor in determining wine’s price. If a wine is made from organic grape, it will likely have price premium no matter where it is from and what grape made it.
- (3) Certain regions and variety may not be suitable for producing organic grape wines.

