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**What Drives Local Wine Expenditure in Kentucky, Ohio, Tennessee
and Pennsylvania? A Consumer Behavior and Wine Market
Segmentation Analysis**

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Abstract

This study explores wine expenditure driven factors for consumers in the United States by employing a four-state consumer behaviors study. A market segmentation method is applied to investigate spending patterns of wine consumers in Pennsylvania, Ohio, Kentucky, and Tennessee. Determinants including market segmentation measurements, lifestyle factors and demographic variables are investigated and compared for their significance in driving local wine expenditure, local wine purchase probability, and local wine to total wine expenditure ratio. This study also recommends market strategic insights for wine business stakeholders.

Key Words: local wine, market segmentation, wine expenditure

JEL Classification: Q1, M3

Wine consumption is rising globally at about one percent per year over the past decade, despite a long-term decline in consumption in western European wine-producing countries. As the most important wine-consuming country in the world by both value and volume, the United States has largely contributed to this increase. It consumes 13% of all wine produced globally, accounts for 35% of overseas wines sales, and surpassed France in wine consumption for the first time in 2010. In accordance with the New York Daily News, the International Wine and Spirit Research (IWSR) predicts that the U.S. will increase its wine consumption by 12 percent between 2012 and 2016.

While the demand in the wine market is increasing, the wine supply in the U.S. wine market also increases, including wine from its domestic wine producers. Numbers of U.S.

wineries are increasing year by year. Between 1999 and 2010, the number of wineries increased dramatically from 2,688 to 6,668, at an annual compound growth rate of just smaller than 10%.

The amount of wine production and the number of wineries in the northern Appalachian states such as Kentucky, Ohio, Tennessee and Pennsylvania, have also increased significantly during the past decade. According to a wine statistical report in 2009 from the Alcohol and Tobacco Tax and Trade Bureau(2010), California comprised 89.196% of the wine production from the U.S.; Kentucky comprised 0.280% of the wine production from the U.S.; Ohio comprised 0.155% of the wine production from the U.S; Pennsylvania comprised 0.115% of the wine produced in the U.S.; and Tennessee encompassed 0.040% of the total wine production in the U.S. According to Wines and Vines (2013), there were 3,532 wineries in California, 166 wineries in Pennsylvania, 142 wineries in Ohio, 66 wineries in Kentucky (Thornberry 2012) and 40 wineries in Tennessee in 2012. In this article, wine produced in a state winery is referred to as local wine. These wineries are referred to as local wineries.

There are a few challenges to the local wine and wineries in this Northern Appalachian region. First, local wine market share is very small in the U.S. market. The U.S. Department of Commerce estimates that in 2010 California wine accounted for 61% of all wine sold in the U.S. market; imported wines accounted for 31%; and wines from the other 49 states accounted for 8% (Hodgen 2011).

Second, local wineries are using limited marketing channels; their wine sales rely heavily on tourism or on premise sales. Visitation to wineries has often been cited as an important way to contribute to a substantial proportion of a winery's total sales - particularly for small wineries that do not have much access to other distribution outlets. In their research, Folwell and Grassel (1989), Henahan and White (1990) found that many wineries in New York and Washington rely

almost exclusively on tasting rooms to distribute their wines. Dodd (2012) reported that seven of the 19 wineries in Texas selling wine through a tasting room sold over 60% of their total sales at the winery.

Third, competition is fierce since foreign producers are increasingly aiming for the U.S. market since wine consumption is decreasing in western European wine-producing countries, such as France and Italy, as drinking habits shift.

To be competitive in the wine market, understanding consumers and developing effective marketing strategies are crucial. This article explores wine expenditure driven factors for consumers in the United States by employing a four-state consumer behaviors study. In order to better understand wine consumers' needs and buying habits, it is necessary to have a comprehensive understanding of wine consumers' characteristics, and segment consumers based on different market needs, to reach with specific marketing instruments (Rouzet and Seguin, 2004), such as target marketing. A principal concept in target marketing is that those who are targeted show a strong affinity or brand loyalty to that particular brand. Building brand loyalty is essential to local wine promotion.

Marketers apply different methods to segment consumer markets. Market segmentations could be geographic segmentation, psychographic segmentation, behavioral segmentation, and segmentation by benefits, and so on.

There is an abundance of literature on segmenting wine markets. Some of the most extensive wine segmentation research came from Australia. Costanigro, McCluskey et al. (2007) argued different prices mean different products and segmented the wine market into price categories. Their results confirmed that implicit prices for attributes differ across price categories and at least two different wine classes exist: "consumption wines" and "collectible wines."

Therefore, they argued that these classes identify separate products that fulfill different needs and should be considered separately. Wine Market Council (2003) proposed five major behavioral wine segments of the U.S. population by rate of consumption: super-core (who consume wine daily), core (who consume wine at least two or three times per month), marginal (who consume wine at least two or three times per quarter), non-adopters (who do not drink wine but drink other alcoholic beverages), and non-drinkers (who do not drink any alcoholic beverages). Lancaster and Stillman (2009) segmented wine consumers into four categories based on generation: Traditionalists, born between 1900 and 1945; Baby Boomers, born between 1946 and 1964; Generation Xers, born between 1965 and 1977; and Millennials, born between 1977 and 2000. Bruwer and Li (2007) proposed that there are five wine market segmentations, differing in size and level of involvement with wine in the South Australian wine market based on the wine-related lifestyle (WRL) instrument. Within the U.S. wine market, geographic segmentation demonstrated that most wine consumers live near major cities, such as San Francisco, Los Angeles, Miami, Seattle, and Chicago (Tinney 2004).

In this article, five market segmentation measurements are utilized. First, consumer expenditure refers to the buying and spending habits of consumers in an economy. It is the product from quantity purchased and the price. So this article employs market segmentations with wine purchase frequency and wine prices in terms of wine expenditures. Second, “local” involvement segmentation is applied, because consumers value “local” when making a purchase decision. “Local” involvement refers to how frequently consumers purchase locally produced foods. It is showed in the study of Hu, Woods, and Bastin (2009) that consumers value “local” even more than the organic attribute. Also, the wine product investigated in this article is local wine and the 1609 consumers were recruited from the local wine producing states: Pennsylvania,

Ohio, Kentucky, and Tennessee. Based on the two reasons above, “local” involvement is selected as one of the segmentation measurements. In addition, wine purchase is a daunting procedure as it is an experience good and wine knowledge facilitates this process. So this article includes wine knowledge, and past local wine experience as other two market segmentation measurements. Therefore, the five market measurements employed are wine purchase frequency, wine prices, wine knowledge, past local wine experience, and “local” involvement levels.

This expenditure study includes three research subjects: local wine purchase probability, local wine expenditure, and local wine to total wine expenditure ratio. The above five market segmentation measurements are applied to investigate and compare their effectiveness in influencing these three research subjects.

This article has a few significant contributions. It contributes to the understanding of U.S. wine consumers’ characteristics and expenditure patterns. It proposes market strategy for the development of local wine. Information of wine consumer characteristics would benefit whoever attempts to enter or compete in the U.S. market. By addressing questions on local wine expenditure patterns, this article facilitates state wine marketers or wineries to increase their local wine revenue, enhance their market share, and acquire more consumers. In addition, a market segmentation method combined with econometric analyses is innovative, and it contributes to the methodology for wine research.

Data and Sample

The research data was collected using a survey questionnaire electronically distributed through Zoomerang by Market Tools, Inc., a marketing research company. Respondents were double pre-screened to make sure they were 21 years old or above to satisfy the age limits to consume wine required by law; and to ensure they were wine consumers, they were screened by their wine

consumption frequency within the last 12 months. Participants were recruited from Pennsylvania, Ohio, Kentucky and Tennessee. A total of 1609 consumers fully completed the survey satisfying the requirement of 1600 in total, and each state had at least 400 participants.

Survey respondents were asked about their wine consumption and purchasing habits in the past 12 months. There were 627 respondents (39% of 1609) who indicated that they had tried local wine in the past 12 months, and 490 of them provided specific dollar amount spent monthly on local wine. These 490 consumers are selected for a sample to study local wine expenditure.

Among the 490 respondents, 309 (83.5%) spent a non-zero amount of money on local wine every month. Therefore, their local wine purchasing probability was 83.5% after a wine trial. Their average monthly local wine expenditure was \$17.2, the minimum expenditure was \$0, and the maximum expenditure was \$105.

In this sample, 81 consumers (16.5% of 490) had a zero local wine expenditure ratio, which means they tried local wines but had zero dollars spent monthly on local wines; 55 consumers' (11.2% of 490) local wine expenditure ratio was one, which means that their expenditure on wine was all spent on local wines; 354 consumers (72.2% of 490) had their average monthly local wine expenditure ratio between zero and one.

This article aims to test effectiveness of the five market segmentation measurements in influencing expenditures. Below is the sample statistics related with the five market segmentation measurements. Among the 490 consumers, 52.7% purchased wine one to three times a month, and 16.7% purchased weekly from all sources. In terms of wine purchase price preferences, 78% of the consumers often bought wines priced between \$7 and \$14 a bottle, 51.2% of the consumers often purchased wines priced \$4 to \$7, 51.4% of the consumers often purchased wines priced \$14 to \$25, and only 20.4% of them often purchased wines above \$25.

Generally, consumers' wine knowledge in the sample was high: 66.2% of the consumers considered their wine knowledge were at or above average.

With regard to the “local” involvement level, about 32.4% of the consumers in the sample often purchased locally produced foods, and around 20.4% of the consumers always purchased “local”. In terms of past local wine experience, about 77.8% of the consumers rated their local experiences as at least somewhat positive.

In addition, consumers' lifestyle and demographic information was collected. Variable description and summary statistics are shown in Table 1.

Methodology

Consumers were asked about their average monthly total wine expenditure and local wine expenditure in the past 12 months. Three research subjects—local wine purchase probability, local wine expenditure, and local to total expenditure ratio—were included to investigate consumers' expenditure patterns. Five market segmentation measurements were developed to compare their effectiveness in influencing expenditures.

The five market segmentation measurements applied and specific variables (in parenthesis) were 1) wine purchase frequency (Mid_level, Core), 2) wine prices (Popular, Super, Ultra, Luxury), 3) wine knowledge (Knlge_avg, Knlge_ab, Knlge_exp), 4) past local wine experience (Bylfof, Bylfaw), and 5) “local” involvement levels (Lwneutral, Lwsompos, Lwverpos). Life style factors included distance perception of local wineries (25to49m, 50to99m, 100morg), wine sweetness preference (Dyorsw), monthly frequency of fresh food preparation at home (Pfd_7orm) and whether the consumer watches food channel or similar television programs monthly (Fch_yes). Demographic information utilized were gender (Fem), generation (Genx, Boomer, Trad), ethnicity (White), years of education (Edu), and household income before

tax (Inc_1000), number of wine-consuming members in the household (Wcon), rural or urban residency (Urban), years at residency (Res_10orm), as well as state of residency (Pa, Ky, Tn).

Local Wine Purchase Probability

Among the 490 consumers, 309 (83.5% of 490) had positive monthly expenditures. This article considers that these 309 consumers were acquired as consumers of local wine. A Probit model is applied to investigate the effectiveness of wine trial in acquiring local wine consumers.

$$(1) \quad \text{The Probit model: } P = p_r [y = 1|x] = \Phi(x'\beta) = \int_{-\infty}^x \phi(z)dz$$

Where y is the dichotomous decision choice on purchasing local wines; x are explanatory variables; β are unknown coefficients to be estimated; p_r is the probability of $y = 1$ as a function of independent variables x ; $\Phi(x'\beta)$ is the cdf of the standard normal distribution.

Model is estimated using the maximum likelihood method. Marginal effects for the Probit model:

$$(2) \quad \partial P / \partial x_j = \Phi'(x'\beta) \beta_j$$

Consumers' decision choice on local wine purchase can be explained by all five market segmentation measurements along with lifestyle and demographic variables. These variables also serve as independent variables in regressions of local wine expenditure and local to total wine expenditure ratio. Table 1 shows the variable description and summary statistics for both dependent and independent variables.

Local Wine Expenditure

Consumers who tried local wines were asked about their monthly local expenditure. The expenditure data had zeroes, and those who had positive local wine expenditures were selected to further provide specific dollar amount spent on local wine. Therefore, this article uses a

Heckman selection model (Heckman 1979) to understand demand and overcome the sample selection bias.

There are two stages in the Heckman selection procedure. Consumers who had positive local wine expenditures in the first stage were selected to answer questions about specific dollar amounts that they spent on local wines in the second stage.

The Probit sample selection equation (first stage):

$$(3) \quad \text{Prob}(T = 1) = \Phi(Z'Y)$$

The expenditure equation (second stage):

$$(4) \quad E(E|T = 1) = X\beta + \rho\sigma\lambda(Z'Y)$$

Where T is the vector of consumers' experience outcome of bought local wines or not; E is the observation vector of consumers' local wine expenditure amount; Z and X are matrixes of predictor variables; Y and β are vectors of regression coefficients.

Local Wine to Total Wine Expenditure Ratio

There are three levels of local wine expenditure to total wine expenditure ratio, low (ratio = 0), middle ($0 < \text{ratio} < 1$), and high (ratio = 1). The middle outcome is a continuous percentage variable. The expenditure ratio is thus censored from below at zero and above at one. So this article applies a Two-limit Tobit model to analyze the expenditure ratio. The Tobit model is the censored normal regression model.

Local to total wine expenditure ratio: Two-limit Tobit regression

$$(5) \quad Y^* = X\beta + \varepsilon$$

Where

$$Y_i = \begin{cases} Y_i^* & \text{if } 1 > Y_i^* > 0 \\ 0 & \text{if } Y_i^* = 0 \\ 1 & \text{if } Y_i^* = 1 \end{cases}$$

Y is the vector of consumers' local to total wine expenditure ratio; Y^* is the vector of latent expenditure ratio; X is the observation matrix of predictor variables; β is a vector of regression coefficients; ε is a vector of error terms.

The marginal effects are calculated to interpret the parameters. Marginal effects for the censored sample:

$$(6) \quad \partial E(Y) / \partial X = \beta \Phi(X\beta / \sigma)$$

Where $\Phi(X\beta)$ is the cdf of the standard normal distribution; σ is reported in the regression results by STATA.

Results

Local Wine Purchase Probability

Probit regression coefficients and marginal effects in Table 2 showed that larger wine purchase frequencies did not significantly affect consumers' purchase probability particularly on local wine.

In terms of price segmentation, consumers who bought super-wine (\$7 - \$14) or ultra-wine (\$14 - \$25) sometimes or often in the past 12 months, their local wine purchase possibility would increase by 9.12% and 6.08% respectively, compared with those who purchased wine in these price categories less frequently.

For the wine knowledge segmentation measurement, expert wine knowledge consumers had 32.4% lower purchase probability than consumers with below average wine knowledge.

Past local wine experiences had fairly positive effects on consumer's purchasing decisions. Compared with consumers who had below neutral experiences, the local wine purchase possibility for consumers who had somewhat positive local wine experiences were 16%

larger, and local wine purchase probability was 23.2% larger for consumers who rated their local wine experiences very positive.

Local involvement level also had positive effects on consumers' local wine purchase probability. For consumers who bought locally produced foods often, their local wine purchase possibility was 6.29% higher than that of those who purchased less frequently.

Moreover, other factors also affected local wine purchase possibilities. Two lifestyle factors had significant effects. Perceiving a local winery was within 25 to 49 miles away from residency, and watching food channel monthly positively affected local wine purchase possibility.

Four demographic variables affected the purchase probability. Females and Caucasians were less enthusiastic to purchase local wines. Baby Boomers had lower purchase probabilities than Millennials. Numbers of wine-consuming members in the households positively affected the purchase possibility.

Local Wine Expenditure

Table 2 exhibited results of Heckman regression coefficients and marginal effects in the second stage. The results showed that consumers with higher wine purchase frequencies were inclined to spend more on local wines. Compared with those who purchased wine less than once a month, consumers who purchased wine at least once a month spent \$6.03 more on local wines; consumers who purchased wine at least once a week spent \$13.01 more on local wines.

Wine price also affected local wine expenditures. Consumers who purchased luxury wine (>\$25) sometimes or often spent \$2.82 more than those who purchased wine in this price category less frequently.

Previous positive local wine experiences positively affected local wine expenditures. Consumers who had somewhat positive local wine experiences, their monthly local wine

expenditure were \$7.38 more than that of those who had negative experiences. More positive local wine experiences affected local wine expenditure even more: consumers who rated their experiences very positive spent \$8.90 more monthly than those who rated negative.

Though wine knowledge and local support level affected local wine purchase probability, they did not show significant effects on local wine expenditure. It's surprising that consumers who purchased local food often did not have significant high expenditures on local wine although they were more likely to make a purchase decision suggested by the Probit regression.

The lifestyle factors did not affect local wine expenditure.

A few demographic variables significantly affected local wine expenditure. Females were less enthusiastic about local wines not only on the purchase probability, also on the expenditure amount. Consumers with more education years also tended to spend less on local wines. Interestingly, Pennsylvania consumers and Tennessee wine consumers had higher local wine expenditures compared with Ohio consumers.

Local Wine to Total Wine Expenditure Ratio

Table 2 showed the Two-limit Tobit model regression results and marginal effects.

Wine purchase frequency and price positively affected local wine expenditure. However, they did not have significant effects on the expenditure ratio. Probably because they had relatively the same amount and same direction in affecting local and total wine expenditure that their effects on the expenditure ratio were offset.

The highest wine knowledge negatively affected the expenditure ratio, same as that on influencing local wine purchase probability. Wine experts were less likely to purchase local wine which probably was the reason had a 19.1% lower expenditure ratio than that of consumers with below average wine knowledge.

Past non-negative local wine experiences had positive effects on the expenditure ratio. Compared with consumers who had negative local wine experiences, the expenditure ratio of consumers who had neutral local wine experiences was 19.5% higher; the expenditure ratio of consumers who had somewhat positive local wine experiences was 26.5% higher; the expenditure ratio of consumers who had very positive local wine experiences was 34.2% higher.

Higher “local” involvement level positively affected the expenditure ratio. The expenditure ratio of consumers who purchased locally produced foods often was 11.6% higher than that of consumers who purchased “local” less frequently. However, purchased “local” always did not show a significant positive effect.

Consumers who prepared fresh food 7 times or more at home monthly had an expenditure ratio 6.43% higher than that of those who prepared less frequently.

Three demographic variables had significant effects on the expenditure ratio. Female consumers’ expenditure ratio was 6.10% lower than that of male consumers. Urban consumers had a 7.83% lower expenditure ratio than rural consumers. There was also a state difference. Pennsylvania consumers had an 11.2% higher expenditure ratio on average than Ohio consumers.

Conclusions and Discussions

In this article, a Probit model was applied to investigate local wine purchase probability, a Heckman model was utilized to analyze local wine expenditure quantity, and a Two-limit Tobit model was employed to evaluate local wine to total wine expenditure ratio. The average local wine purchase probability was 83.5% after a trial; average monthly local wine expenditure was \$17.2; and 16.5% of the 490 consumers had a zero expenditure ratio, 11.2% had a one expenditure ratio, and 72.2% had their expenditure ratio between zero and one.

The study proves the assumption that consumers' expenditure patterns were driven differently by the market segmentation measurements, life style factors, and demographic variables.

After a comparison of the absolute marginal effects of the five marketing segmentation measurements, life style factors and demographic variables, this article showed that the segmentation measurements played the most important role in driving the expenditure patterns. Each of the five segmentation instruments had different influencing power towards different research subjects. The important influencing factors were the ones that had relative larger marginal effects. The important factors for local wine purchase probability listed according to importance highest to lowest were: 1) wine knowledge, 2) past local wine experience, 3) wine prices, 4) generation, 5) local winery miles perception, and 6) "local" involvement levels. As to the local wine expenditure, important factors were: 1) wine purchase frequency, 2) past local wine experience, 3) wine prices, and 4) gender. For the local to total wine expenditure ratio, important determinants were: 1) past local wine experience, 2) wine knowledge, 3) "local" involvement levels, and 4) residency area. There were also significant state differences for the investigated expenditure subjects.

Implications

Wine consumption is rising globally although it is decreasing in western European wine-producing countries over the past decade. The increase of consumption is largely contributed by the United States. Understanding the U.S. wine consumer characteristics and their expenditure patterns are important to anyone who is entering or already participating in this promising market. This article provides information about market segmentation, consumer acquisition, as well as strategic insights, which are crucial in increasing wine sales, gaining market share, and being

competitive in the market. Meanwhile, this article offers firsthand valuable information to local wine marketers and wineries.

This article investigated consumers' local wine purchase probability, local wine expenditure as well as local wine to total wine expenditure ratio. These research subjects have crucial economic and market implications. Targeting consumers who have larger local wine purchasing possibilities could help acquire consumers of local wines and increase wine sales. Understanding local wine expenditure driven factors are essential, because the more consumers spend on local wine, the more revenues local wineries or stakeholders can possibly obtain. Consumers' local to total wine expenditure ratio reflects the market share of local wine in this region. Increasing market share could also increase the competitiveness in the market. In addition, a comprehensive consumer characteristics provided in the study helps whoever wants to engage or already participate in the wine businesses to better understand the U.S. wine consumers especially those in the northern Appalachian region, and further to make their strategic decisions to position or promote their wine products.

Based on the results, this article provides market insights for wine businesses. In order to increase local wine purchase probability, this article proposes to target to Millennial and generation X consumers who are not wine experts, had positive past local wine experiences, sometimes or often purchase wines priced between \$7 and \$25, believe local wineries are those within 25 to 49 miles away from their residency, and often purchase locally produced foods. To enhance local wine sales, it suggests to target male consumers, who purchase wine at least once a month, had somewhat or very positive local wine experiences, and sometimes or often purchase wine priced above \$25. Consumers who are more likely to have higher local to total wine

expenditure ratio are those who are not wine experts, had non-negative local wine experiences, often purchase locally produced foods, and live in rural area.

There are state differences amongst the four states. Wine marketers or wineries are suggested to make their market strategies with consideration of regional differences. Tennessee consumers' local wine expenditure was higher compared with Ohio. Kentucky consumers were not sufficiently penetrated towards local wine that their local wine purchase probability, expenditure and the expenditure ratio were not prominent. Pennsylvania consumers were inclined to have higher expenditures on local wine, and prone to have higher expenditure ratios on local wine, compared with Ohio consumers. The market strategies applied in the promotion of Pennsylvania or Tennessee local wine could be inspirations for wine marketers from other states to develop market plans infused with unique features of each state.

In conclusion, this article contributes to wineries, wine business people, including new entrants and incumbent business players, as well as whoever interested in wine markets in the U.S, to understand wine consumers and their expenditure patterns. This article helps local wineries and marketers identified wine consumption driven factors and further proposed market insights to facilitate wine consumer acquisition, increase market share, and boost revenues of local wine. Its research approach combining market segmentation measurements with econometric analysis is innovative. Also, a local wine research encompassed respondents from four states is valuable in the U.S wine market research.

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Table1. Variable Description and Summary Statistics of Dependent Variables and Independent Variables

Variable	Description	Mean	Std. Dev.	Min.	Max.
Explw ^a	Continuous variable, monthly expenditure on local wine in dollars.	17.214	17.455	0	105
Lwexpratio ^a	Continuous variable, monthly local wine expenditure to total wine expenditure ratio.	0.410	0.325	0	1
Tlw_yes ^a	Dummy variable, 1=tried local state wine, 0= not tried or not sure.	1.000	0.000	1	1
Marginal ^b	Dummy variable, 1= purchased wine for any occasion in the past 12 months less than once a month, 0= other frequency.	0.306	0.461	0	1
Mid_level	Dummy variable, 1= purchased wine for any occasion in the past 12 months 1-3 times a month, 0= other frequency.	0.527	0.500	0	1
Core	Dummy variable, 1= purchased wine for any occasion in the past 12 months at least once a week, 0= other frequency.	0.167	0.374	0	1
Popular	Dummy variable, 1= purchase Popular wine (\$4-\$7) sometimes or often, 0= purchase less frequently.	0.512	0.500	0	1
Super	Dummy variable, 1= purchase Super wine (\$7-\$14) sometimes or often, 0= purchase less frequently.	0.780	0.415	0	1
Ultra	Dummy variable, 1= purchase Ultra wine (\$14-\$25) sometimes or often, 0= purchase less frequently.	0.514	0.500	0	1
Luxury	Dummy variable, 1= purchase Luxury wine (>\$25) sometimes or often, 0= purchase less frequently.	0.204	0.403	0	1
Knlg_b1 ^b	Dummy variable, 1= wine knowledge below average level, 0=other levels.	0.378	0.485	0	1
Knlg_avg	Dummy variable, 1= Wine knowledge at average level, 0=other levels.	0.441	0.497	0	1
Knlg_ab	Dummy variable, 1= Wine knowledge above average level, 0=other levels.	0.161	0.368	0	1
Knlg_exp	Dummy variable, 1= Wine knowledge at expert level, 0=other levels.	0.020	0.142	0	1
Lwblneu ^b	Dummy variable, 1=rate last local wine experience below neutral or negative, 0=other rate.	0.0571	0.232	0	1
Lwneutral	Dummy variable, 1=rate last local wine experience neutral, 0=other rate.	0.165	0.372	0	1
Lwsompos	Dummy variable, 1=rate on last local wine experience somewhat positive, 0=other rate.	0.390	0.488	0	1
Lwverpos	Dummy variable, 1=rate last local wine experience very positive, 0=other rate.	0.388	0.488	0	1
Bylfblof ^b	Dummy variable, 1= purchase locally produced foods never or sometimes, 0= other frequency.	0.471	0.5	0	1
Bylfof	Dummy variable, 1= purchase locally produced foods often, 0= other frequency.	0.324	0.469	0	1
Bylfaw	Dummy variable, 1= purchase locally produced foods always, 0= other frequency.	0.204	0.403	0	1
Les25m ^b	Dummy variable, miles perception for a "local" winery, 1= less than 25 miles, 0= else.	0.192	0.394	0	1
25to49m	Dummy variable, miles perception for a "local" winery, 1= within 25-49 miles, 0= else.	0.222	0.416	0	1
50to99m	Dummy variable, miles perception for a "local" winery, 1= within 50-99 miles, 0= else.	0.329	0.470	0	1

100morg	Dummy variable, miles perception for a "local" winery, 1= 100 miles or more, 0= else.	0.257	0.438	0	1
Drorsw	Categorical variable, wine sugar content preference, 1-5=very dry-very sweet.	3.051	1.068	1	5
Pfd_7orm	Dummy variable, 1= prepare fresh food at home 7 times or more a month, 0= prepare less frequently.	0.776	0.418	0	1
Fcha_yes	Dummy variable, 1=watch food channel or similar programs monthly, 0= watch less frequently.	0.782	0.414	0	1
Fem	Dummy variable, gender, 1=female, 0=male.	0.667	0.472	0	1
Geny ^b	Dummy variable, Generation Y or Millennials, 1=birth year 1981-1999, 0=other.	0.104	0.306	0	1
Genx	Dummy variable, Generation Xers, 1=birth year 1965-1980, 0=other.	0.233	0.423	0	1
Boomer	Dummy variable, Baby Boomers, 1=birth year 1946-1964, 0=other.	0.504	0.500	0	1
Trad	Dummy variable, Traditionalists, 1=birth year 1900-1945, 0=other.	0.159	0.366	0	1
White	Dummy variable, ethnicity, 1= White/Caucasian, 0= else.	0.918	0.274	0	1
Edu	Discrete variable, education years.	14.759	2.087	9	18
Inc_1000	Continuous variable, household yearly income before taxes (\$1000).	69.827	39.124	7.5	225
Wcon	Discrete variable, number of wine consumers at home.	1.780	0.597	1	4
Urban	Dummy variable, residency area, 1=city or suburb, 0= else.	0.627	0.484	0	1
Res_10orm	Dummy variable, residency years at local state, 1=10 years or more, 0= less than 10 years.	0.886	0.318	0	1
Oh ^b	Dummy variable, residency state, 1= Ohio, 0=else.	0.273	0.446	0	1
Pa	Dummy variable, residency state, 1= Pennsylvania, 0=else.	0.239	0.427	0	1
Ky	Dummy variable, residency state, 1= Kentucky, 0=else.	0.290	0.454	0	1
Tn	Dummy variable, residency state, 1= Tennessee, 0=else	0.198	0.399	0	1

Note: ^a Variables are dependent variables, others are independent variables; ^b Variables are omitted in regressions. N= 490.

Table 2. Results of Local Wine Expenditure, Local Wine Purchase Probability and Expenditure Ratio

Behavior	Local Wine Expenditure		Local Wine Purchase Probability		Local /Total Wine Expenditure Ratio	
Dependent Variable	Explw (Heckman)		Explw (Probit)		Lwexpratio (Tobit)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Mid_level	10.12*** (2.204)	6.030	0.227 (0.195)	0.0398 (0.0345)	0.0179 (0.0472)	0.0150 (0.0397)
Core	18.52*** (3.180)	13.010	0.434 (0.295)	0.0626* (0.0346)	0.0335 (0.0677)	0.0284 (0.0579)
Popular	-0.574 (1.801)	-0.344	-0.00889 (0.171)	-0.00155 (0.0297)	-0.0541 (0.0401)	-0.0455 (0.0337)
Super	-1.424 (2.438)	-0.864	0.448** (0.189)	0.0912** (0.0443)	0.0748 (0.0475)	0.0618 (0.0386)
Ultra	1.968 (2.200)	1.180	0.346* (0.197)	0.0608* (0.0352)	-0.0195 (0.0453)	-0.0164 (0.0381)
Luxury	4.520* (2.416)	2.816	0.168 (0.267)	0.0274 (0.0406)	-0.0117 (0.0545)	-0.00980 (0.0456)
Knlgc_avg	2.268 (2.058)	1.366	-0.0479 (0.191)	-0.00837 (0.0335)	0.0287 (0.0458)	0.0242 (0.0386)
Knlgc_ab	3.633 (2.852)	2.257	0.121 (0.327)	0.0200 (0.0509)	0.0248 (0.0647)	0.0210 (0.0551)
Knlgc_exp	-1.559 (8.193)	-0.916	-1.108* (0.614)	-0.324 (0.237)	-0.255* (0.155)	-0.191* (0.0996)
Lwneutral	4.550 (4.859)	2.849	0.387 (0.324)	0.0568 (0.04)	0.221** (0.0975)	0.195** (0.0887)
Lwsompos	11.86** (5.443)	7.384	1.031*** (0.308)	0.160*** (0.0463)	0.310*** (0.0906)	0.265*** (0.0780)
Lwverpos	14.19** (6.161)	8.901	1.540*** (0.335)	0.232*** (0.0492)	0.399*** (0.0922)	0.342*** (0.0792)
Bylfof	3.023 (2.084)	1.842	0.394** (0.199)	0.0629** (0.0289)	0.136*** (0.0437)	0.116*** (0.0378)
Bylfaw	2.416 (2.435)	1.479	0.0358 (0.232)	0.00615 (0.0392)	-0.0315 (0.0539)	-0.0263 (0.0447)
25to49m	2.641 (2.859)	1.618	0.491* (0.262)	0.0718** (0.0319)	0.0738 (0.0600)	0.0629 (0.0518)
50to99m	1.063 (2.498)	0.641	0.0845 (0.228)	0.0144 (0.0382)	0.000782 (0.0550)	0.000658 (0.0463)
100morg	0.332 (2.726)	0.200	0.207 (0.251)	0.0338 (0.0384)	-0.0419 (0.0593)	-0.0349 (0.0491)
Pfd_7orm	1.489 (2.166)	0.883	0.00369 (0.199)	0.000642 (0.0347)	0.0778 (0.0478)	0.0643* (0.0388)
Fcha_yes	-2.014 (2.402)	-1.228	0.383** (0.186)	0.0763* (0.0418)	0.0551 (0.0481)	0.0458 (0.0394)
Fem	-3.931* (2.402)	-2.403	-0.506** (0.186)	-0.0794*** (0.0418)	-0.0720* (0.0481)	-0.0610* (0.0394)

	(2.204)		(0.200)	(0.0281)	(0.0426)	(0.0364)
Genx	2.009	1.224	-0.391	-0.0777	0.0734	0.0625
	(3.144)		(0.381)	(0.0843)	(0.0700)	(0.0604)
Boomer	-2.477	-1.487	-0.628*	-0.110*	0.00148	0.00124
	(3.221)		(0.346)	(0.0602)	(0.0678)	(0.0570)
Trad	4.281	2.676	-0.391	-0.0801	0.0596	0.0509
	(3.649)		(0.389)	(0.0912)	(0.0806)	(0.0697)
White	-3.800	-2.384	-0.577	-0.0727**	-0.121	-0.105
	(3.344)		(0.404)	(0.0344)	(0.0735)	(0.0658)
Edu	-0.869*	-0.521	-0.0217	-0.00378	-0.00826	-0.00694
	(0.447)		(0.0418)	(0.00728)	(0.00985)	(0.00828)
Inc_1000	-0.00333	-0.002	0.00126	0.000219	-0.000443	-0.000372
	(0.0242)		(0.00217)	(0.00038)	(0.000528)	(0.00044)
Wcon	-0.0913	-0.055	0.341**	0.0594**	0.0136	0.0114
	(1.590)		(0.142)	(0.0247)	(0.0323)	(0.0271)
Urban	-2.680	-1.624	-0.132	-0.0225	-0.0924**	-0.0783**
	(1.851)		(0.177)	(0.0295)	(0.0408)	(0.0348)
Res_10orm	-0.435	-0.262	-0.273	-0.0413	-0.0943	-0.0812
	(2.859)		(0.317)	(0.0414)	(0.0630)	(0.0555)
Pa	5.984**	3.751	0.162	0.0266	0.130**	0.112**
	(2.404)		(0.224)	(0.0349)	(0.0533)	(0.0468)
Ky	2.869	1.752	-0.0422	-0.00744	0.00728	0.00613
	(2.343)		(0.218)	(0.0388)	(0.0518)	(0.0437)
Tn	4.847*	3.030	-0.0353	-0.00623	-0.0229	-0.0191
	(2.676)		(0.250)	(0.0447)	(0.0588)	(0.0490)
Constant	8.110		-0.0310		0.178	
	(12.63)		(1.007)		(0.236)	
Pseudo R ²			0.259		0.130	
Log Likelihood			-162.881		-310.237	
LR χ^2			113.64***		92.74***	
Correctly predict			85.92%			
Goodness-of-fit			4.28			
(Hosmer-Lemeshow						
χ^2)						
Wald χ^2	101.19***					
Lambda	16.69**					
	(8.156)					
Rho	0.972					
Sigma	17.168				0.391***	
					(0.0159)	
Observations Total	490		490		490	
Obs. Uncensored	409				354	
Obs. Left-censored (0)	81				81	
Obs. Right-censored (1)					55	

Note: Standard errors are in parentheses. Asterisks indicate levels of significance: *** p<0.01, ** p<0.05, * p<0.1.