Factors Affecting Wine Purchase Decisions and Presence of New York Wines in Upscale New York City Restaurants

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Substantial industry and winery efforts in recent years have centered on improving access of New York wines into upscale restaurants in New York City (NYC), albeit with limited success. A survey of upscale restaurants and wine stores in NYC was conducted to identify important attributes influencing wine purchase decisions and to better understand the primary factors affecting the level of New York wines included on restaurant wine lists. Larger restaurants with higher entrée prices and a larger dependence on wine sales were shown to include fewer New York wines, while restaurants serving higher proportions of Riesling, Cabernet Franc, and domestic wines included more. A wine's collective regional and varietal reputation was found to influence overall wine purchasing decisions, indicating that marketing efforts targeted on these attributes may be a beneficial strategy.

Consumer interest in locally grown food products has increased sharply in recent years. This interest has translated into increased demand for local products through direct marketing channels and local food markets for both raw products and processed products made with local ingredients (Hardesty 2008). This study focuses on the demand for New York (NY) wines in restaurants and retail wine stores in New York City (NYC). These market segments show significant opportunities for NY wines and for improving NY's image as a quality wine-producing state.

A strong tradition of regional support has enabled most wineries in the world to sell their products in nearby urban centers. For example, California wines dominate the majority of wine lists at restaurants in San Francisco. Wines produced in NY, however, have traditionally been shut out of the upscale NYC market. Nearly 60 percent of gross revenue at NY wineries is earned directly from consumers in the winery tasting room, while only 13 percent comes from direct sales to restaurants and retail shops (USDA-NASS 2005).

The New York Wine and Grape Foundation has expended significant efforts in recent years in funding research and extension programs aimed at helping growers improve quality, as well as in promoting NY's quality wine-producing regions through various marketing programs. Recent efforts tailored to the hospitality industry have included promotional programs with NYC restaurants that pair NY wines with menus created using NY farm products (i.e., the *New York Wines and Dines* program). Despite this program and other public and private efforts, stakeholders in NY's fine wine sector are questioning why their products are not more broadly accepted in their closest urban market.

Accordingly, the objectives of this study are twofold. The first is to assess the importance of various wine product attributes and sommelier preferences in influencing typical wine purchase decisions. The second objective is to specifically focus on NY wines and estimate how various restaurant characteristics influence the level of NY wines included on a restaurant's wine list. The empirical results should help improve the understanding of wine selection criteria for upscale, urban restaurants and provide useful management and marketing recommendations to NY wine industry stakeholders.

The paper continues with a brief assessment of the NY premium wine industry and implications for increased exposure in large urban markets. This is followed by a description of the data collected and survey methodology. The modeling framework follows, along with the empirical results and summary conclusions.

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Market Presence

Market impediments for premium NY wines could be underscored by the long-standing association of NY with high-volume jug wines made using native and French-hybrid grapes. In addition, overall NY grape production is dominated by *Vitis labrusca* varieties (e.g., Concord, Niagara), well known for use in grape juice beverages and lower-valued wine products. USDA-NASS (2006) estimated that only seven percent of total NY grape production in 2006 was from *Vitis vinifera* grapes, varieties known for ultra premium wine production.[1] However, this is up from five percent in 2001 and represents a 37 percent production increase (USDA-NASS 2006). *Vitis vinifera* plantings vary across wine producing regions in the state, including about 12 percent of total acres in the Finger Lakes region, 73 percent in the Hudson Valley, and all wine acres on Long Island.

The metropolitan NYC area is the second biggest wine market in the U.S. after Los Angeles, and is number one in imported wines, consuming roughly 30 percent of America's total (Wine Market Council 2009). This is both a blessing and a curse for small independent NY wineries, whose brands are legitimized when served in taste-making upscale NYC restaurants. Competition for these restaurant accounts is fierce, particularly at the ultra-premium price points where the wine industry is replete with product differentiation, and there are lingering doubts by consumers that local wines can justify the same prices as imports. Consider that in 2001 there were 900 wineries in the state of California alone producing a combined 5,300 distinct wine labels, including over 1,000 Cabernet Sauvignons, 800 Chardonnays, and 600 Merlots (Moran 2001). Wines from lesser-known locales that offer value and innovation are being sought out (Walker 2002), but attentiveness to meeting the needs of restaurants is critical for continued success (Lockshin 1999).

Some grape-growing appellations have become synonymous with excellence in particular varietals. For example, Oregon has a niche with Pinot Noir that its two neighbors, Washington and California, cannot claim. New Zealand has distinguished itself with Sauvignon Blanc, and Argentina has increasingly become associated with high quality Malbec. These connections between place and grape are common, and are generally believed to confer some degree of regional identity. However, the extent to which regional grape associations enable greater success in the restaurant market has not been systematically tested.

General end-use consumers make wine purchase decisions based on layered cognitive brand associations that act as extrinsic cues for what is inside the bottle, such as region of origin, grape, label design, and price (Quester and Smart 1998). Since consumers have varying levels of product involvement, they have been observed placing higher importance on extrinsic collective quality indicators rather than on personal or quantifiable appraisals of specific product attributes (Atkinson 1999; Combris, Lecocq, and Visser 1997; Holbrook and Corfman 1985; Lockshin and Rhodus 1993; Monroe and Krishnan 1985; Wade 1999; Zeithaml 1988). In certain shopping situations where the consumer has not tasted a wine and has no information on the history of the winery label, the reputation of a well-established growing region becomes an important part of the decision and can reduce point-of-purchase anxiety, even if it means paying more money than for a similar bottle from a newly emerging wine region (Greatorex and Mitchell 1988; Landon and Smith 1997; Tustin and Lockshin 2001).

The restaurant situation is unique in the sense that consumers are generally faced with a more limited selection of wines from which to choose, and thus their choices are intrinsically linked to what the restaurant determines to be the most appropriate for their particular restaurant and the customers they target. While the end-use consumer is still important, sommeliers experience wine differently, using intrinsic cues such as flavor, aroma, and color to guide buying decisions. Since it is this cohort that ultimately chooses the wines included in their restaurant selections, it is important to focus on their particular preferences when considering improving the availability of NY wines within this market channel.

Data

Exploratory interviews were conducted with NY winery stakeholders in May 2001 to gather opinions about the NYC marketplace and frame the study within a practical management context. Written surveys were developed and administered

[1] *Vitis vinifera* varieties grown in New York include Cabernet Franc, Cabernet Sauvignon, Chardonnay, Gerwürztraminer, Merlot, Pinot Noir, and Riesling.

in October 2001 using the Tailored Design Method (Dillman 2000), including pre-survey notice letters, two follow-up reminder postcards, and follow-up phone calls to non-respondents. The survey targeted decision-makers regarding their wine list selections and consisted of questions related to respondent demographics, perception of NY wines, and scaled preferences for various wine styles, regions of origin, grapes, prices, and other product attributes.[2] Subjects were asked to indicate their level of agreement with a range of attitudinal statements about NY wine, and a five-point Likert scale was used for most questions to allow for quantitative assessments. Sommeliers were also asked to submit a copy of their restaurant's wine list along with the completed questionnaire.

The respondent pool was limited to CEOs, owners, chefs, sommeliers, wine directors, and general managers of fine dining restaurants and wine purveyors in the five boroughs of NYC. A judgment sample of nearly 300 establishments was compiled using recommendations from the New York Wine and Grape Foundation, the New York Restaurant Association, the International Wine Center, and various food- and wine-related periodicals. While a larger target sample was preferred, the sample size was limited by study budgetary constraints.

Prior to our administering the survey, several establishments asked to be removed from the study. Also, several establishments were destroyed during the September 11, 2001 terrorist attacks, and dozens more were shut down, either permanently or temporarily. The survey was sent out in late October to the remaining sample of 215 establishments, of which 184 were restaurants and 31 were wine stores. Ultimately, 54 restaurants returned usable surveys (29.3 percent) along with 15 wine stores (48.4 percent), an overall response rate of 32.1 percent (N = 69). In addition, of the 54 restaurants returning surveys, 40 also included complete copies of their wine lists (21.7 percent).

All respondents were asked to rate the influence of 23 attributes on their overall wine purchasing decisions, from 1 being "not important" to 5 being "extremely important." The attributes are listed in Table 1 and ranked by their average response scores over the entire sample. In addition, the percentage of total respondents classifying each attribute in the top two importance categories are also included.

Tastings and personal appraisal (*TAST*) was the most important attribute, followed closely by a wine's value or profit potential (*VALU*) and a desire for regional wine variety (*VARR*). A wine's price category (*PRIC*) and desires for a broad range of prices (*VARP*) and qualities and tastes (*VART*) were also ranked relatively high. Beyond personal assessments, it is clear that a variety of offerings is important across several dimensions. Customer requests (*CUST*), personal relationships (*PRSD* and *PRSW*), and a region's or variety's reputation (*REPR* and *REPG*) were ranked in the middle, while attributes relating to promotional offers (*SALE*, *PROM*), and media articles, scores, and competitions (*SPEC*, *MEDW*, *MEDR*) were less important.

The restaurants in the sample had average annual sales (*SALES*) of $6.4 million, ranging from $0.5 million to $20 million, with nearly 19 percent of sales attributable to wine sales (*WINEPERC*) on average (Table 2).[3] Types and styles of cuisine ranged widely among restaurants, although 39 percent identified themselves as either American (*AMER*) or Contemporary (*CONTEMP*). French restaurants (*FRENCH*) made up approximately 20 percent of the sample, followed by 11 percent Italian (*ITALIAN*), seven percent seafood (*SEA*), and the remainder (23 percent) divided among Steakhouses (*STEAK*), eclectic (ECLEC), and Mediterranean, Indian, and health-conscious eateries (*OTHER*). Dinner entrée prices ranged from $6.95 to $150.00, with the average low entrée price (*LOWENTREE*) at $23.21 and an average high entrée price (*HIGHENTREE*) of $39.46.

The restaurant wine lists featured a cumulative total of 6,719 wines from around the world, or approximately 120 wines per restaurant (Table 2). The average price across all wines was $86.62 per 750mL bottle, with reds (*AVGREDP*) averaging $95.79 ($90.69 domestic and $101.80 import) and whites (*AVGWHITEP*) averaging $57.88 ($53.09 domestic and $59.56 import). Nearly sixty percent of wine

[2] While the somewhat dated nature of the survey is recognized, the data is unique in its collection and the empirical analysis with respect to restaurant market penetration in the New York wine industry has not been previously evaluated in the literature. With current industry-association efforts specific to this issue, we argue the empirical results are particularly timely and salient for future planning and application.

[3] In the case of missing data, values were determined by computing sample averages across all restaurants for which the data existed (Kovar and Whitridge 1995).

list selections were imported, and of those imported wines, nearly 58 percent were French (*PFRANCE*), 28 percent Italian (*PITALY*), and the remaining 14 percent divided among Spain (*PSPAIN*), Australia (*PAUSTRL*), and the rest of the world.

Domestic selections on wine lists were dominated by California wines (88 percent), followed by Oregon and Washington (*PORWA*, seven percent), New York (*PNY*, four percent), and all other states (less than one percent). Red NY wines in this sample were priced, on average, below those from other U.S. states, particularly CA; however, average white wine prices were more similar (Figure 1). Similar comparisons exist relative to imported wines, with an even larger price premium (on average) for red wines relative to NY (Figure 2).

Before assessing the relative market penetration of NY wines, it is useful to understand the overall value

Table 1. Sample Average Rankings of Attributes Influencing Overall Wine Purchase Decisions of Upscale New York City Restaurants and Wine Stores (N = 69).

Variable	Attribute Description	Mean Score[a]	Top Two Percent[b]
TAST	Tastings/personal appraisal	4.66	90.00
VALU	Value/profit margin potential	4.14	77.14
VARR	Variety of regions	4.13	77.14
PRIC	Price category	3.99	74.63
VARP	Broad range of prices	3.90	71.43
VART	Variety of qualities and tastes	3.89	65.71
CUST	Customer comments/requests	3.70	61.43
PRSD	Relationship with wholesaler/distributor	3.47	60.00
REPB	Winery or name-brand reputation	3.44	50.00
PRSW	Relationship with winery/winemaker	3.40	52.86
REPR	Wine region reputation/prestige	3.40	51.43
REPG	Grape varietal reputation/prestige	3.33	51.43
INNO	Product is new or innovative	3.06	37.68
WOMT	Word-of-mouth	3.00	31.43
SALE	Discounts offered by wholesaler/distributor	2.91	30.00
DISS	Dissatisfied with current list/want a change	2.68	26.15
CONT	Contact from winery marketing representative	2.52	14.49
PROM	Wine tastings or promotions by distributor	2.46	25.71
SPEC	*Wine Spectator* rankings/scores	2.42	14.49
MEDW	Winery media articles or competition medals	2.41	11.59
RECM	Wholesaler/distributor recommendations	2.37	11.43
MEDR	Region media articles or competition medals	2.25	10.14
ORDR	Standing order with wholesaler/distributor	2.04	14.29

[a] A 5-point Likert scale was used to rank the importance of each attribute in influencing wine purchase decisions, where 1 was "not important" and 5 was "extremely important." The Mean Score represents a simple average across all oberservations (N = 69)
[b] Top Two Percent represents the percentage of total respondents selecting one of the two highest importance rankings (i.e., 4 or 5).

Table 2. Average Restaurant and Wine List Characteristics in New York City Restaurant Sample (N = 40).

Variable	Description	Average or Percentage
Restaurant characteristics:		
SALES	Annual gross sales ($000)	$ 6,361
WINEPERC	Percentage of total sales attributed to wine (%)	18.8%
CUISINE	Type of restaurant cuisine:	
	AMER = 1 if CUISINE = "American"; else = 0	0.185
	CONTEMP = 1if CUISINE = "Contemporary"; else = 0	0.204
	ECLEC = 1 if CUISINE = "Eclectic"; else = 0	0.056
	FRENCH = 1 if CUISINE = "French"; else = 0	0.204
	ITALIAN = 1 if CUISINE = "Italian"; else = 0	0.037
	SEA = 1 if CUISINE = "Seafood"; else = 0	0.074
	STEAK = 1 if CUISINE = "Steakhouse"; else = 0	0.037
	OTHER = 1 if CUISINE = "Other"; else = 0	0.130
LOWENTREE	Price of the lowest priced dinner entrée on the menu ($)	$23.21
HIGHENTREE	Price of the highest priced dinner entrée on the menu ($)	$39.46
Wine list characteristics:		
NUMWINE	Total number of all wines on the wine list	118.9
PDOMESTIC	Percentage of total wines made in the USA (%)	42.5%
PNY	Percentage of domestic wines from NY	4.1%
PORWA	Percentage of domestic wines from OR and WA (%)	7.0%
PFRANCE	Percentage of imported wines from France (%)	57.6%
PITALY	Percentage of imported wines from Italy (%)	28.3%
PAUSTRL	Percentage of imported wines from Australia (%)	4.0%
PSPAIN	Percentage of imported wines from Spain (%)	2.8%
PGRMNY	Percentage of imported wines from Germany (%)	7.3%
PRED	Percentage of total wine list that is red wine (%)	65.5%
PRIESLING	Percentage of all wines made from white grape varietals that were made from Riesling (%)	5.71%
PCBFRANC	Percentage of all wines made from red grape varietals that were made from Cabernet Franc (%)	1.44%
AVGREDP	Average price of all red wines ($/750 ml bottle)	$95.79
AVGWHITEP	Average price of all white wines ($/750 ml bottle)	$57.88

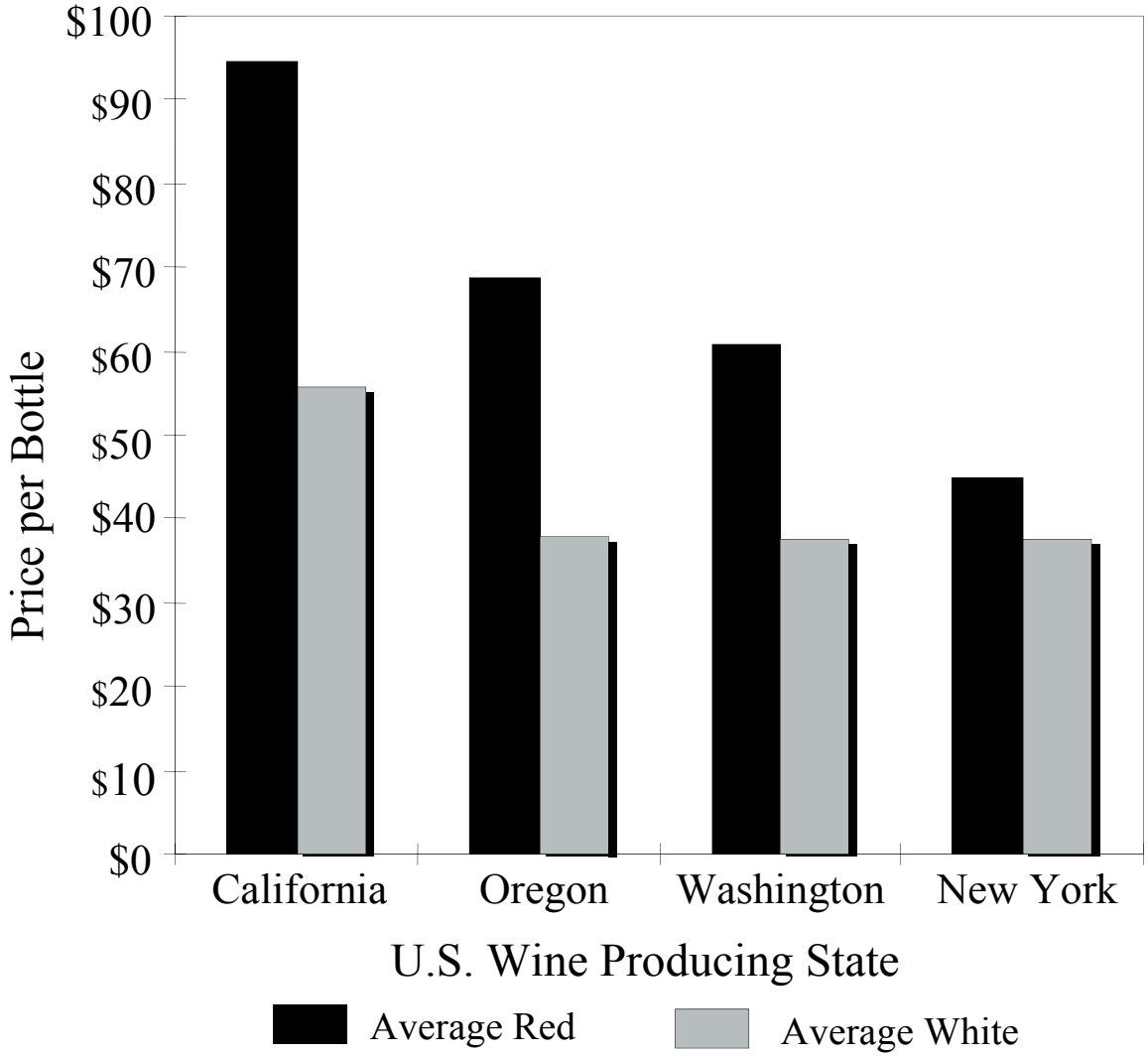

Figure 1. Average Restaurant Wine Prices (per 750 mL Bottle), New York versus Other Domestic States.

that restaurants place on the preferential inclusion of wines made from some grape varieties over others. Surveyed restaurants were asked to rate (on the same five-point scale) the importance of various grape varieties to their overall wine sales volume. As shown in Table 3, Chardonnay received the highest average rating (4.40) across all restaurants, followed by Merlot (4.23), Cabernet Sauvignon (4.17), and Pinot Noir (4.08). At the bottom of the ratings were Riesling (2.68), Cabernet Franc (2.21), and Gewürztraminer (2.03). These ratings present both opportunities and obstacles from the NY perspective. While significant plantings of both Chardonnay and Merlot exist in NY, red wine varieties have not been as well received compared to those from other domestic regions and imports. In addition, significant industry attention has been paid to promoting the quality Riesling wines produced in NY, but this variety rates among the lowest of importance with respect to sales volume of NYC upscale restaurants in the sample.

Restaurants in the sample were categorized by the number of wines (*NYWINE*) on their wine lists: non-users, with zero NY wines on their wine list (N = 11); light users, with between one and four

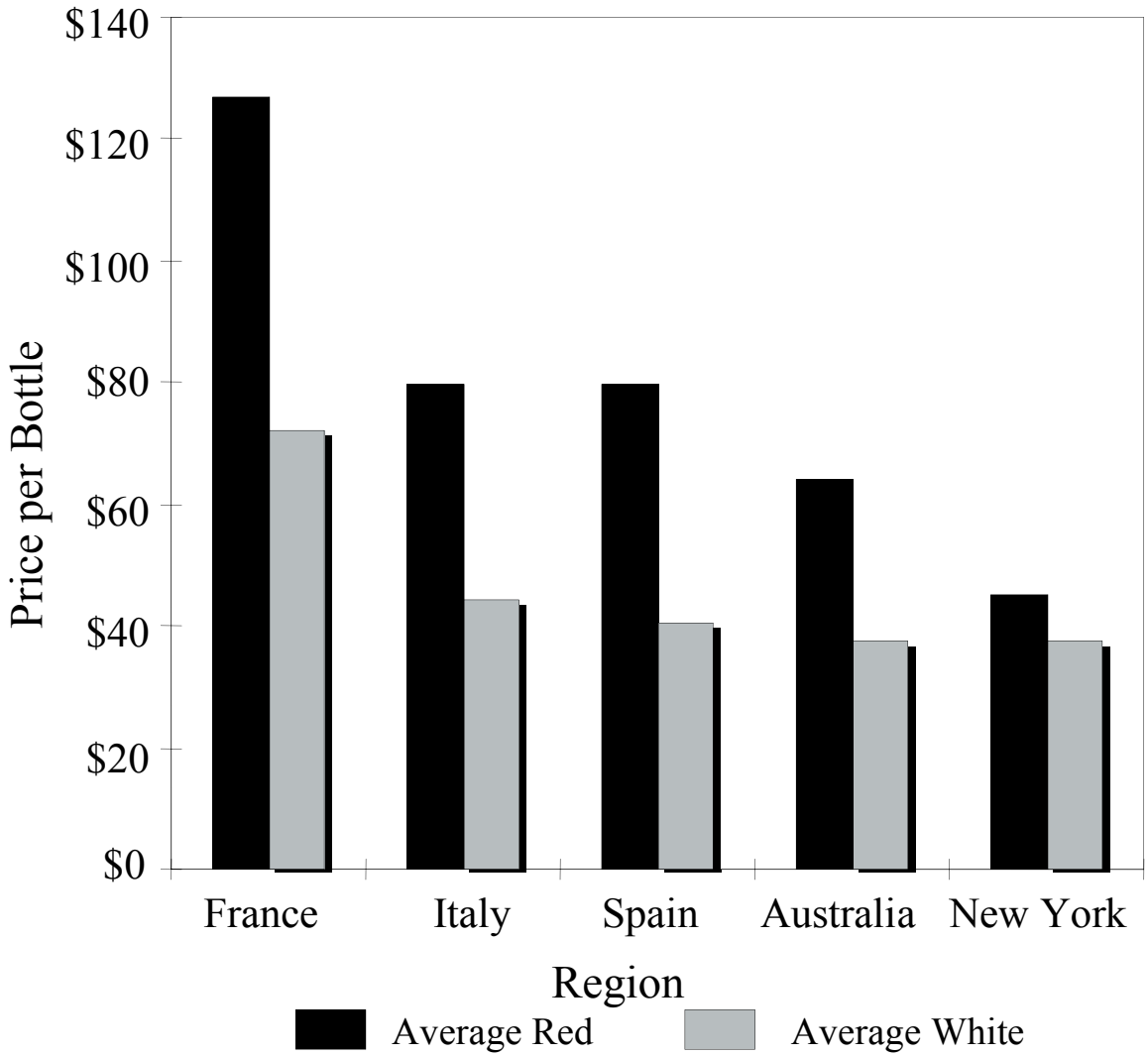

Figure 2. Average Restaurant Wine Prices (per 750 mL Bottle), New York versus Imports.

NY wines (N = 19); and medium/heavy users, with five or more NY wines (N = 10).[4] As expected, restaurants with higher numbers of NY wines placed higher importance on Chardonnay and Riesling; however, the red varieties and remaining white varieties showed mixed results (Table 3).

[4] The three categories of the NYWINE variable were based on the absolute number of NY wines on a list, not the proportion of the total. For example, a restaurant with 16 NY wines would be considered a medium/heavy user whether the total list had 20 wines or 200.

Empirical Models

Two analytical approaches were used in addressing the research objectives. For all respondents, factor analysis was used to better understand and interpret responses on the importance of various attributes in wine purchasing decisions (N = 69). For the restaurant data including wine list information, a cumulative logit model was estimated to better understand the factors attributing to the number of NY wines on their respective wine lists (N = 40).

Table 3. New York Planted Grape Acreage by Variety and Average Importance Rankings in New York City Restaurant Sample (N = 40).

	NY Plantings[b]		Average Importance Ranking by Level of NY Wine Listings[c]			
Grape Variety (type)[a]	Acres	Percent	All	Zero	1 to 4	5+
Chardonnay (W)	981	2.9	4.40	4.27	4.37	4.60
Merlot (R)	902	2.7	4.23	4.28	4.27	4.10
Cabernet Sauvignon (R)	339	1.0	4.17	4.45	4.26	3.70
Pinot Noir (R)	335	1.0	4.08	4.27	3.90	4.20
Sauvignon Blanc (W)	95	0.3	3.95	3.91	4.21	3.50
Syrah/Shiraz (R)	na	na	3.40	3.46	3.53	3.10
Pinot Blanc, Pinot Grigio/Gris (W)	81	0.2	3.25	3.55	3.47	2.50
Riesling (W)	683	2.0	2.68	2.37	2.74	2.90
Cabernet Franc (R)	498	1.5	2.21	2.27	2.11	2.33
Gewürztraminer (W)	143	0.4	2.03	2.00	2.11	1.90

[a] Grape types are W = White, R = Red; na = no acres reported.
[b] Total grape acres planted in 2006 were 33,692 (Source: USDA-NASS 2006).
[c] Restaurants were grouped by number of New York wines on their wine lists. The number of restaurants in each class was 11, 19, and 10, for zero, one to four, and five or more wines, respectively. A 5-point Likert scale was used to rank the importance of grape variety to wine sales volume, where 1 was "not important" and 5 was "very important."

Factor Analysis

Factor analysis (FA) was utilized to examine the broad underlying patterns within the 23 attribute variables affecting overall wine purchase decisions and to derive a more parsimonious set of factors that still maximizes the information contained in the data. In this way, the relatively large number of observed attributes (23) can be reduced into a smaller set of unobserved (latent), uncorrelated variables called factors, to facilitate a better interpretation of the data. While purely a statistical technique, the approach allows for examining the interdependence and importance among a number of attributes, and provides some direction in selecting relevant restaurant variables for the subsequent logistical regressions.

Consider a set of k observed variables to reduce into a more parsimonious set of underlying factors m. The k observed variables (y_i) can be expressed as a weighted composite of a set of latent factors (F_m) such that

$$(1)\quad y_i = \lambda_{i1}F_1 + \lambda_{i2}F_2 + \ldots + \lambda_{im}F_m + e_i\,,\ i = 1, 2, ..., k,$$

where λ_{im} is the m^{th} factor score (or factor loading) on variable i. Given the assumption that the residuals are uncorrelated across observed variables, the correlations among the observed variables are accounted for by the factors; i.e., any correlation between a pair of observed variables can be explained in terms of their relationships with the latent factors (Pett, Lackey, and Sullivan 2003). Each original variable is standardized to have a mean zero and unit variance to eliminate the influence of scale effects. The residual term, e_i, is therefore assumed with zero mean and variance k, uncorrelated across i and factors F_m.

The key to interpreting what the factors measure is related to the factor loadings; i.e., for each factor F_m, one evaluates which variables load (correlate) the highest on that factor and low on the other factors. In evaluating the high-loading variables, one determines what these variables have in common. In order to better understand the relative importance of

the underlying factors, the computed factor loadings were used as weights in aggregating the component attribute means to compute overall factor mean response ratings.

Logistical Regression

A cumulative logit regression model was used to analyze restaurant and wine list characteristics affecting the number of NY wine list placements, where the probability effects of each independent variable on the categorical placement were determined (Allison 1999).

Assume that the decision maker (n) is a restaurant sommelier in NYC, and he or she determines the set of available alternatives for the restaurant's wine list. The sommelier also evaluates the attractiveness (utility) of each alternative wine (i) and chooses the wine or combination of wines that maximize the restaurant's profit and patrons' enjoyment. The attractiveness of wine i is denoted as V_{in}, which is assumed to depend on a set of attributes of the wine (X_i) and the characteristics of the decision maker or firm (Z_n). V_{in} can be expressed as

$$(2)\quad V_{in} = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_K X_{Ki} + \delta_{i1} Z_{1n} + \delta_{i2} Z_{2n} + \ldots + \delta_{iM} Z_{Mn}.$$

Now let p_{ij} equal the probability that restaurateur i fits into ordered category j of the dependent variable, $j = 1, \ldots, J$ (in our case, $J = 3$). The cumulative probabilities (F_{ij}) predict the probability that restaurateur i is in the j^{th} category or higher, or:

$$(3)\quad F_{ij} = \sum_{m=j}^{J} p_{im} .$$

The cumulative model then has the form:

$$(4)\quad \log\left\{\frac{F_{ij}}{1-F_{ij}}\right\} = \alpha_j + \beta x_i \quad , j = 1, \ldots, J-1.$$

It was hypothesized that variation in the level of NY wine adoption would be a function of both restaurant and wine list attributes described in Table 1; however, given the small sample size (N = 40), it was necessary to limit the number of right-hand-side variables. Explanatory variables that exhibited high degrees of correlation with others were eliminated prior to estimation. For the Cuisine variable, American (*AMER*), contemporary (*CONTEMP*), and eclectic (*ECLEC*) restaurants were subjectively defined in *Zagat* and not reliably distinct enough for inclusion. There were also not enough Steakhouse restaurants (*STEAK*) for its own category, and French restaurants (*FRENCH*) carry predominantly French wines and are not likely to be local-wine adopters. Italian (*ITALIAN*) and Seafood (*SEA*) restaurants were the cuisine styles kept in the model because both types of restaurants have specifically characterized wine selections to match their distinctive foods; however, the expected influence on listings of NY wines is unclear, *a priori*. All other cuisine styles were subsumed within the other category (*OTHER*) as the base category.

Prices for dinner entrées could be a proxy for the sophistication of restaurant clientele, yet the two variables for low- and high-priced entrées (*LOWENTREE and HIGHENTREE*, respectively) were highly correlated and not included in the model specification. Instead, a new variable representing the median entrée price (*MIDENTREE*) was used. Total gross sales volume (*SALES*) and wine's contribution to total gross sales (*WINEPERC*) were also included as important restaurant characteristics. The signs on all three of these variables are expected to be negative.

The percentage of wines from Oregon and Washington (*PORWA*) was eliminated because similar information was captured more completely by the percent of domestic wines variable (*PDOMESTIC*). Since NY wine is a domestic wine, we would expect the sign on this relationship to be positive. The percentages of wines from France (*PFRANCE*), Italy (*PITALY*), and Australia (*PAUSTRL*) were eliminated for the same reason that California was not included on the initial list of variables: wines from these regions are so ubiquitous in the NYC market that the low variability in wine-list presence would be insufficient to elicit any significant statistical response. The percentages of wines from Spain (*PSPAIN*) and Germany (*PGRMNY*) were kept in the model because they have a small market presence, similar to NY wine, and there was considerable variability in the presence of wines from these regions. Since foreign wines likely displace domestic (including NY) wines, we initially expected the signs to be negative; however, potential similarities in wine characteristics across selections may be preferred, so, ultimately, the expected sign is unclear.

The proportion of red wine (*PRED*), Riesling (*PRIESLING*), and Cabernet Franc (*PCBFRANC*) were hypothesized to be significant factors for local wines based on the amount of acreage planted to these varietals in NY. Since NY is less known for reds, we expect its sign to be negative, but positive relationships are expected for the Riesling and Cabernet Franc variables. Finally, the average white wine price (*AVGWHITEP*) was eliminated, as it was highly correlated with the average red wine price (*AVGREDP*), so only one of the price variables was necessary. Since NY wines were generally lower-priced in our sample, we expect the relationship here to be negative. The full empirical model estimated was[5]

$$(5)\quad \log\left\{\frac{F_{ij}}{1-F_{ij}}\right\} = \alpha_j + \beta_1 \text{ITALIAN}_i + \beta_2 \text{SEA}_i + \beta_3 \text{SALES}_i + \beta_4 \text{NUMWINE}_i + \beta_5 \text{WINEPERC}_i + \beta_6 \text{MIDENTREE}_i + \beta_7 \text{AVGREDP}_i + \beta_8 \text{PSPAIN}_i + \beta_9 \text{PGRMNY}_i, \quad j = 2, 3.$$

Empirical Results

Factor Analysis

Four subjective statistical criteria were used to select the appropriate number of factors from the 23 attribute variables (Table 1). First, the minimum proportion of variance explained by factors was set at 0.60. Second, given that the original variables are standardized and thus have unit variances, a useful factor must have an eigenvalue greater than one. Third, the number of factors selected should demonstrate diminishing marginal returns with respect to their eigenvalues as the number of factors increases. Finally, the factors extracted must be conceptually meaningful to facilitate broader interpretation.

The solution satisfying all criteria included seven factors and explained nearly 69 percent of the total sample variation. To understand which attributes were correlated with each other, a component (factor) score correlation matrix was constructed such that each attribute is assigned a correlation coefficient, or factor loading, with each factor. The attributes and their associated factor loadings with each assigned factor are displayed in Table 4, along with our general interpretation and naming of what each factor represents.[6]

The computed factor mean response ratings indicate that the most important factor influencing wine purchase decisions by our sample upscale NYC restaurants and wine stores is a wine's *quality for price point*, or the quality-value tradeoff. This factor (factor mean = 4.05) represents attributes associated with a wine's value or profit-margin potential (*VALU*) and price category (*PRIC*). Closely following was the factor related to *product diversity* (3.96), including attributes associated with variety in tastes (*VART*), prices (*VARP*), and regions (*VARR*), and dissatisfaction with the current wine selection (*DISS*). A wine's *collective reputation* was ranked third (3.42), representing the reputation or prestige of a wine-growing region (*REPR*) or particular grape variety (*REPG*). The factor labeled *tasting is believing* (3.34) was ranked fourth, and reflected a wine's word-of-mouth familiarity (*WOMT*), tasting or personal appraisal (*TAST*), contact with a winery representative (*CONT*), and the newness or innovativeness of the wine (*INNO*).

Factors of relatively less importance included *personal relationships* (3.15) that related to personal relationships with wholesalers/distributors (*PRSD*) or the winery/winemaker (*PRSW*), as well as wholesaler/distributor wine recommendations (*RECM*). The amount of *consumer exposure* was also ranked lower (2.77), reflecting attributes associated with a winery's (*MEDW*) or region's (MEDR) media exposure or competition medals, *Wine Spectator* rankings (*SPEC*), a winery's brand reputation or prestige (REPB), and restaurant customer comments or requests (*CUST*). Finally, *promotions* were found to be the least important factor (2.67) affecting wine purchase decisions.

[5] While the empirical model is technically of sufficient rank, the authors recognize the limited degrees of freedom issue (N = 40 observations with 13 explanatory variables). As such, the results are sensitive to the sample size and inference is limited to the specific sample. The issue is lessened some with the final model that excludes insignificant variables (see the results section for details). Even so, we argue that the results still provide useful preliminary results and potential implications, and provide a framework for further study. Increasing the sample size through an additional survey is recommended but is beyond the scope of the current study. We leave this for future research.

[6] Factor analysis was conducted using the data-reduction/factor-analysis function in SPSS. The principal component analysis function was used with varimax (orthogonal) rotation and Kaiser normalization.

Table 4. Factor Definitions and Ranking of Their Influence on Overall Wine Purchase Decisions of Upscale New York City Restaurants and Wine Stores.

Factor Description	Factor Mean[a]	Attribute (Factor Correlation)	Attribute Description
Quality for price point	4.05	VALU (0.82)	Value/profit margin potential
		PRIC (0.79)	Price category
Product diversity	3.96	VART (0.77)	Variety of qualities and tastes
		VARP (0.76)	Broad range of prices
		VARR (0.46)	Variety of regions
		DISS (0.38)	Dissatisfied with current list/want a change
Collective reputation	3.42	REPR (0.76)	Wine region reputation/prestige
		REPG (0.65)	Grape varietal reputation/prestige
Tasting is believing	3.34	WOMT (0.74)	Word-of-mouth
		TAST (0.72)	Tastings/personal appraisal
		CONT (0.61)	Contact from winery mktg. representative
		INNO (0.50)	Product is new or innovative
Personal relationships	3.15	PRSD (0.83)	Relationship with wholesaler/distributor
		RECM (0.66)	Wholesaler/distributor recommendations
		PRSW (0.54)	Relationship with winery/winemaker
Consumer exposure	2.77	MEDW (0.88)	Winery media articles or competition medals
		MEDR (0.83)	Region media articles or competition medals
		SPEC (0.80)	*Wine Spectator* rankings/scores
		REPB (0.58)	Winery or name brand reputation
		CUST (0.52)	Customer comments/requests
Promotions	2.67	SALE (0.80)	Discounts offered by wholesaler/ distributor
		ORDR (0.73)	Standing order with wholesaler/distributor
		PROM (0.51)	Wine tastings or promotions by distributor

[a] Factor means computed as average of attribute mean scores, weighted by factor loading coefficients.

This category includes wholesaler/distributor sales or discounts (*SALE*), the existence of standing orders with a wholesaler/distributor (*ORDR*), and the availability of other promotions or displays from the distributor (PROM).

In summary, the factor rankings are generally consistent with individual mean response ratings of the attributes. However, by associating several similar (correlated) variables together, a more useful comparison of general constructs affecting wine purchase decisions is provided.

Logistical Regression

The cumulative logit model was estimated using maximum likelihood.[7] To avoid singularity, the zero-adoption *NYWINE* category was excluded. The general model results from Equation 5 are shown on the left side of Table 5. Most explanatory variables are of the expected sign and are significant at the ten-percent significance level. To identify a more parsimonious set of significant variables given the limited degrees of freedom available in the data, a general-to-specific modeling approach was adopted by sequentially reducing the number of originally included but insignificant variables (Tomek and Kaiser 1999). The final model results are reported on the right-hand-side of Table 5. Given differences in the number of explanatory variables, the relative statistical performance of the alternative models was tested using the Akaike Information Criterion (AIC) and Schwartz Criterion (SC) tests.[8] The tests confirm that the final model is statistically preferred, with all estimated coefficients statistically significant at the ten-percent significance level (Table 5).

The resulting coefficients measure the change in the predicted logged odds of a restaurant's *NYWINE* category for a unit change in the independent variables. It is easier to interpret the odds ratios for the estimated coefficients, and they are estimated by taking the exponential of the estimated coefficients from the logit model. The odds ratios are shown in the last column of Table 5. A positive logit coefficient implies an odds ratio greater than one and that the odds of observing a higher level of *NYWINE* category increase with a higher value of the independent variable. Negative coefficients correspond to an odds-ratio estimate between zero and one, which decreases the odds when that variable increases.

For our sample of upscale NYC restaurants, a one-unit increase in the percentage of Cabernet Franc wine listings (*PCBFRANC*) increases the odds of being in a higher *NYWINE* category by over five times (5.05). Alternatively, a one-unit increase in the percentage of Riesling wines listed (*PRIESLING*) raises the odds by 3.77 times. As such, it appears that the combined listings of Cabernet Franc and Riesling have the largest effect on the odds of being in a higher *NYWINE* category. In addition, a one-unit increase in the percentage of German wine listings (*PGRMNY*) more than doubles (2.11) the odds of being in a higher *NYWINE* category. This makes sense because Germany's wine regions have many similarities to the climatic and soil conditions found in NY's Finger Lakes region, an area also known for Riesling. As such, similar NY wines may be well situated to expand this area of a restaurant's wine list.

A one-dollar increase in the average price of red wines (*PRED*) raises the odds of being in a higher *NYWINE* category by nearly 20 percent (1.18). In context, if there is a higher price generally for all red wines, perhaps lower-priced NY wines are used to balance the list. Similarly, a one-unit increase in the percent of domestic wines listed (*PDOMESTIC*) leads to an increase in odds by 17 percent (1.17).

Alternatively, a one-unit increase in the percent of gross sales attributable to wine sales (*WINEPERC*) decreases the odds of falling into a higher *NYWINE* category by nearly 30 percent (or 0.70 times). Thus restaurants like wine bars and bistros, which rely more heavily on wine sales, would appear to be less likely to include NY wines in their selections. In addition, a one-dollar increase in the average entrée price (*MIDENTREE*) lowers the odds by 0.64 times; i.e., restaurants with more expensive entrées appear to carry fewer NY wines.

A one-unit increase in the percentage of Spanish wines listed (*PSPAIN*) lowers the odds of being in a higher *NYWINE* category by almost two-thirds (or

[7] The model was estimated using the PROC LOGISTIC function in SAS, ver. 9.0.

[8] The Akaike Information Criterion (AIC) is expressed as AIC $= -2 \text{Log}L + 2(k + s)$, where k is the number of ordered values for the response, s is the number of explanatory variables, and Log$L$ is the log likelihood model estimate. Similarly, the Schwartz Criterion (SC) is expressed as SC $= -2 \text{Log}L + (k + s)\text{Log}N$, where N is the total number of observations.

Table 5. Ordered Logit Regression Coefficient and Odds-Ratios Estimates for Category of New York Wine Listings at Upscale New York City Restaurants (N = 40).[a]

	Full Model			Final Model			
Variable	Estimate	Std Error	P-value	Estimate	Std Error	P-value	Odds Ratio[b]
Intercept 3	–25.81	14.75	0.08	–12.07	4.80	0.01	
Intercept 2	–3.34	8.33	0.69	1.55	2.45	0.53	
ITALIAN	–5.81	5.90	0.32				
SEA	2.69	3.89	0.49				
SALES	–2.20	1.17	0.06	–1.10	0.57	0.05	0.33
NUMWINE	< –0.01	< 0.01	0.64				
WINEPERC	–0.63	0.36	0.08	–0.31	0.16	0.05	0.73
MIDENTREE	–0.87	0.47	0.07	–0.44	0.19	0.02	0.64
AVGREDP	0.33	0.18	0.06	0.17	0.08	0.03	1.18
PSPAIN	–2.58	1.53	0.09	–1.08	0.55	0.05	0.34
PGRMNY	1.31	0.76	0.08	0.75	0.46	0.10	2.11
PDOMESTIC	0.18	0.11	0.11	0.16	0.07	0.02	1.17
PRED	0.22	0.17	0.19				
PRIESLING	2.57	1.32	0.05	1.33	0.57	0.02	3.77
PCBFRANC	3.67	2.32	0.11	1.62	0.93	0.08	5.05
Model performance tests:							
AIC	46.96			42.22			
SC	72.29			60.80			

[a] The cumulative logit model is estimated with PROC LOGISTIC in SAS, ver. 9.0. The dependent variable, *NYWINE*, is a categorical variable representing the number of New York wines included on the restaurant's wine list. Categories include zero, one to four, and five or more. To avoid singularity, the non-use category is excluded.

[b] The odds ratio estimates can be interpreted as the impact of a one-unit increase in that variable on a restaurant's odds of moving into a higher *NYWINE* category. An odds ratio value above (below) one represents a positive (negative) impact on the chances of the restaurant being in a higher category of the dependent variable, *NYWINE*. All estimates are statistically significant at the ten-percent level of significance.

0.34 times). Spanish wines in the sample were about 75 percent red, and often composed of varieties not grown in NY, but it is unclear why Spanish wines would have a negative effect on *NYWINE* while Italian wines do not. Finally, for each additional $1,000 in annual sales volume, the odds of being in a higher *NYWINE* category fall by 0.33 times. The implication is straightforward: larger restaurants generally carry fewer NY wines, all else held constant.

Conclusions

Based on a sample of NYC upscale restaurants and wine retail stores, the factors of price and offering variety across several dimensions were the most influential in wine purchase decisions. However, a wine's collective reputation, both by region and grape variety, was also shown to be important, and well above influences pertaining to shorter-term marketing and promotion strategies and events or media recognition and competitions. Given these results, more explicit marketing and attention toward regional and varietal brand identities of NY wines may be a useful strategy in improving adoption of NY wines by upscale culinary and retail clients.

Among surveyed decision-makers at upscale NYC restaurants, it appears that the type of cuisine and food-pairing preference do not influence the propensity to adopt NY wines, nor does a restaurant's desire to offer a large wine selection or a broad range of wine styles. However, it was clear from this sample that larger restaurants with higher entrée prices and a larger dependence on wine sales were less likely to sell NY wines. Alternatively, the propensity to include NY wines was positively related to restaurants that offered more Riesling, Cabernet Franc, and domestic wine listings. These results may be useful for firms in targeting potential restaurant customers and for the industry in addressing barriers that may be preventing further acceptance of NY wines.

Given the strong growth in consumer demand for local foods, it would be useful to conduct an updated survey and assess any differences over time. In addition, including other urban retail market segments or geographic areas would be beneficial in understanding differences across alternative marketing channels and in assessing changes across differing consumer populations.

References

Allison, P. D. 1999. *Logistic Regression using the SAS system: Theory and Application.* Raleigh, NC: The SAS Institute.

Atkinson, J. 1999. "Meaningless Brands from Meaningful Differentiation." *Journal of Wine Research* 10(3):229–233.

Combris, P., S. Lecocq, and M. Visser. 1997. "Estimation of a Hedonic Price Equation for Bordeaux Wine: Does Quality Matter?" *Economic Journal* 107(441):390–402.

Dillman, D. A. 2000. *Mail and Internet Surveys: the Tailored Design Method*, 2nd ed. New York: John Wiley and Sons.

Greatorex, M. and V. Mitchell 1988. "Consumer Risk Perception in the UK Wine Market." *European Journal of Marketing* 22(9):5–15.

Hardesty, S. D. 2009. "The Growing Role of Local Food Markets." *American Journal of Agricultural Economics* 90(5):1289–1295.

Holbrook, M. B. and K. B. Corfman. 1985. "Quality and Value in the Consumption Experience: Phaedrus Rides Again." In *Perceived Quality*, J. Jacoby and J. C. Olson, eds. Lexington, MA: Lexington Books. 31–58.

Kovar, J. G. and P. Whitridge. 1995. "Imputation of Business Survey Data." In *Business Survey Methods*, B. Cox, D. Binder, A. Christianson, M. Colledge, and P. Kott, eds. New York: John Wiley and Sons. 403–420.

Landon, S. and C. E. Smith. 1997. "The Use of Quality and Reputation Indicators by Consumers: the Case of Bordeaux Wine." *Journal of Consumer Policy* 20(3):289–323.

Lockshin, L. 1999. "Wine Marketing: Science or Science Fiction?" *The Australian and New Zealand Wine Industry Journal* 14(1):65–67.

Lockshin, L. S. and W. T. Rhodus. 1993. "The Effect of Price and Oak Flavor on Perceived Wine Quality." *International Journal of Wine Marketing* 5(2):13–25.

Monroe, K. B. and R. Krishnan. 1985. "The Effect of Price on Subjective Product Evaluations." In *Perceived Quality*, J. Jacoby and J. C. Olson, Eds. Lexingotn, MA: Lexington Books. 209–223.

Moran, T. 2001. "Not Exactly a Surprise: Market is Competitive." *The Modesto Bee*, December 7.

Pett, M. A., N. R. Lackey, and J. J. Sullivan. 2003.

Making Sense of Factor Analysis: The Use of Factor Analysis for Instrument Development in Health Care Research. Thousand Oaks, CA: Sage Publications.

Quester, P. and J. Smart. 1998. "The Influence of Consumption Situation and Product Involvement over Consumers' Use of Product Attribute." *Journal of Consumer Marketing* 15(3): 220–238.

Tomek, W. G. and H. M. Kaiser. 1999. "On Improving Econometric Analyses of Generic Advertising Impacts." *Agribusiness* 15(4):485–500.

Tustin, M. and L. Lockshin. 2001. "Region of Origin: Does it Really Count?" *The Australian and New Zealand Wine Industry Journal* 16(5): 139–143.

United States Department of Agriculture - National Agricultural Statistics Service. 2006. *New York Fruit Tree and Vineyard Survey 2006*. http://www.nass.usda.gov/ny/. Accessed February 23, 2009.

United States Department of Agriculture - National Agricultural Statistics Service. 2005. *New York Winery Survey 2004*. http://www.nass.usda.gov/ny/. Accessed February 23, 2009.

Wade, C. 1999. "Reputation and its Effect on the Price of Australian Wine." *The Australian and New Zealand Wine Industry Journal* 14(4): 82–84.

Walker, M. 2002. "Diners Put Cork on Pricey Wine Sales." *San Francisco Business Times*. April 23.

Wine Market Council. 2009. "The U.S. Wine Market—Consumer Trends and Analysis." http://www.winemarketcouncil.com/. Accessed February 23, 2009.

Zeithaml, V. A. 1988. "Consumer Perceptions of Price, Quality and Value: A Means-End Model and Synthesis of Evidence." *Journal of Marketing* 52(3):2–22.