Looking for Locapours: Using Zagat Survey Data to Examine Restaurant Demand for Local Wine

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There is increasing interest in local foods among consumers in the United States and a rise in offerings of local products in restaurants. We use Zagat survey data and restaurant-specific menu information to estimate factors that influence the availability of New York State (NYS) wine in 1,401 NYS restaurants. We focus on wine because its production region is clearly labeled on menus and there is a burgeoning industry in NYS. Our econometric results indicate that decor ratings, cuisine styles, certain wine list characteristics, and distance to wine regions have statistically significant impacts on the likelihood of NYS restaurants serving local wine.

Key Words: beverages, limited dependent variable models, local markets, New York State, restaurants, wine, Zagat survey

Consumers have become increasingly interested in purchasing local foods in recent years (Feenstra 1997, Allen et al. 2003, Delind 2006, Feagan 2007, Kingsolver, Kingsolver, and Hopp 2009, Smith and MacKinnon 2007). Research suggests that consumers have embraced the local food movement because of numerous perceived benefits from it for human health, the environment, and economies in local communities (Kingsolver, Kingsolver, and Hopp 2009, Smith and MacKinnon 2007). Rising sales of food and beverage products distributed through direct marketing channels such as farmers' markets, farm stands, and community-supported agriculture arrangements (Economic Research Service (ERS) 2010) are one indicator of the growing demand for locally produced goods. To date, much of the literature on local food has focused on demand by final consumers, but purchasing of local food by intermediate consumers, such

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as schools, hospitals, grocery stores, and restaurants, has also been expanding. Restaurants in particular now frequently offer locally produced foods and beverages, at least in part to cater to the increased interest in these products among their customers.

The source of increasing demand for local foods and beverages is a subject of debate. Some studies (Eastwood, Brooker, and Gray 1999, Kezis et al. 1998, Govindasamy, Italia, and Adelaja 2002, Wolf, Spittler, and Ahern 2005) have found evidence that the demand comes primarily from a few select socioeconomic groups while other studies (Kolodinsky and Pelch 1997, Onianwa, Wheelock, and Mojica 2005, Zepeda and Li 2006) have found that income and other demographic variables often associated with affluence do not affect purchases of local food. The conflicting results may be related to regional differences in consumer tastes, product availability, or problems with the survey instruments used in the studies. We aim to resolve such issues by focusing on local products served in restaurants across various price points, and we use data from an existing restaurant review guide to avoid problems commonly associated with conducting surveys.

Economic research regarding local food has primarily focused on estimating willingness to pay (WTP) by final consumers for various types of local food products (e.g., Zepeda and Li 2006, Darby et al. 2008, Carpio and Isengildina-Massa 2009, James, Rickard, and Rossman 2009, Onken, Bernard, and Pesek 2011). Most of this research suggests that final consumers are willing to pay a premium for locally produced foods, but consumers have various definitions of what constitutes "local." The debate on the definition of local has spurred another vein of research that examines consumer perceptions of the definition of local foods and beverages.[1] For example, Darby et al. (2008) found that consumers placed similar value on (and thus did not distinguish between) foods produced "nearby" and foods produced "in the state." The authors argued that state boundaries act as natural geographical regions for consumers in defining local. Conversely, when testing five geographic definitions of local food, Burnett, Kuethe, and Price (2011) found that final consumers' WTP increased as the geographic scale of the production region decreased from multiple states to a single county. As Darby et al. (2008) noted, these types of discrepancies may further complicate consumers' definitions of local when a state or county covers a large area. We endeavor to shed new light on the definition of local by examining the presence of specific types of New York State (NYS) wines (red wines predominantly from Long Island and white wines produced in Long Island and the Finger Lakes region) in restaurants in specific locations in New York.

Little attention has been directed to understanding intermediate consumers' demand for local foods and beverages. Dunne et al. (2011) studied intermediate consumers' definitions of local food, Feenstra et al. (2011) explored supply chains in farm-to-institution interactions, and Hardesty (2008) examined channels for marketing local produce to colleges and teaching hospitals. Studies that have explored restaurant demand for local food have consisted mostly of case studies focusing on purchasing patterns (e.g., Strohbehn and Gregoire 2003) and supply chain management (e.g., Sharma et al. 2012) or involved interviews with a small number of restaurant owners (e.g., Gultek, Dodd, and

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[1]   While there is no legal or universally accepted definition of local food, the U.S. Department of Agriculture's Economic Research Service (2010) provides a reasonable measure of local as production that occurs within the state.

Guydosh 2005, Preszler and Schmit 2009). Gultek, Dodd, and Guydosh (2005) examined Texas restaurateurs' attitudes regarding local wine using a mail survey with 112 subjects. They found positive attitudes toward local wines overall. A wine's taste, bottle design (attractiveness), and brand characteristics had the greatest influence on whether restaurant owners' chose to carry the wine. Price was not a significant factor in their results.

Our primary objective is to better understand demand for locally produced goods by restaurant owners and to determine how these intermediate consumers define local products. Restaurants are a particularly interesting intermediate consumer since the products they offer should reflect demand for the products by final consumers in general. In essence, restaurants are the quintessential consumer of foods and beverages. We focus specifically on wine because other products are composed of multiple ingredients, some local and some not, making it difficult to determine whether a product can be appropriately labeled as local. In addition, wine is one of the best examples of a restaurant menu item for which the region of production is clearly identified. We focus on restaurants in NYS because there is a burgeoning wine industry there and local wines are available at many of the state's restaurants.

Our focus on wine was further motivated by the observation that, while the "locavore"[2] movement has inspired NYS restaurants to focus on local and seasonal ingredients in their cuisine, there has been no corresponding "locapour"[3] movement. Local wines have not yet received the same enthusiasm and attention among restaurateurs in NYS as local foods (Molesworth 2011). Overall, since we are interested in the presence of local products on restaurant menus, we believe that focusing on wine will allow us to examine this question most directly.

We draw our sample of restaurants from the 2012 Zagat survey database and use the survey to identify restaurant-specific characteristics and expert rating scores for each restaurant. The data from Zagat is supplemented with information that we collected to describe the food and beverage items available at each restaurant. This unique data set is ideally suited to a study of determinants of local beverage demand by restaurants in NYS. We use these data to estimate how restaurant characteristics impact the presence of local wines on restaurant menus. We provide results for all of the restaurants included in the analysis and subsets of results for specific types of wines and for specific regions within the state.

Data

In recent years, there has been a sharp rise in the number of restaurant review guides available to consumers, and many are available online. Online review websites such as Yelp, Trip Advisor, and Zagat provide detailed information and ratings for restaurants across a wide range of price categories and cuisine types. Zagat's survey is a particularly rich source of restaurant ratings for locations in the United States in general and for NYS and New York City (NYC) in particular.[4] The Zagat survey data set provides numerical scores for

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[2] Locavore is a commonly used expression that describes someone whose diet consists only or principally of locally grown and produced food.

[3] Locapour is a term coined by Molesworth (2011) and used to describe a person who chooses to purchase and consume locally produced wine.

[4] Zagat provides scores for all of the restaurants it rates in NYS, and the database is available
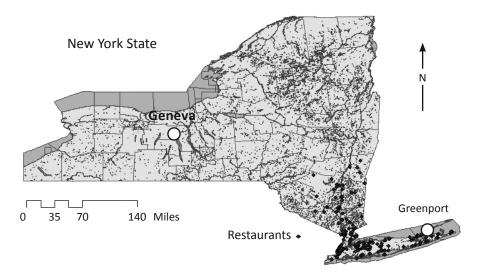
Figure 1. Locations of Restaurants in Our Sample from the Zagat Survey for New York in 2012

restaurants in four categories: food quality, decor, service, and cost. Scores in the first three categories are based on a 30-point scale; cost is based on the average price for a single meal, drink, and tip. In addition, Zagat provides information on the restaurant's location and type of cuisine offered plus lists any special restaurant features.

We provide descriptive statistics for the Zagat data set in Table 1. As shown, of the 5,111 restaurants listed by Zagat in NYS, we were able to retrieve food and alcoholic beverage menus for 1,530 (see Figure 1). In that sample, 95.4 percent of the restaurants served European wine, 78.9 percent served California wine, 55.7 percent served wine from Australia and/or New Zealand, 52.2 percent served wine from Washington and/or Oregon, and 32.1 percent served wine from NYS. Of the 491 restaurants that served NYS wine, 36.4 percent served one offering of NYS wine, 43.5 percent served two to five offerings, and 20.1 percent served more than five offerings. Average Zagat scores (on a scale of 1–30 with 30 being best) for the restaurants in our sample were 21.8 for food quality, 18.9 for decor, and 20.4 for service. The average cost of a meal, drink, and tip was $46 and the range was $13 to $585.

Another important Zagat descriptor is the type of cuisine a restaurant serves. Previous research has indicated that restaurants strongly prefer to carry wines that complement the cuisine they serve and the type of dining experience they want to convey (Davis and Charters 2006, Gultek, Dodd, and Guydosh 2005). Zagat separates cuisine types into 132 categories and often lists several cuisine types per restaurant. To simplify the categories in our framework, we aggregated the Zagat cuisine types into six groups based primarily on a regional orientation—standard American, new American, European, Asian, Latin American, and "other." Each restaurant was assigned to a cuisine type based on the primary type listed by Zagat. As shown in Table 1, of the 1,530 restaurants

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at *www.zagat.com/locations/browse?l=540*. We purchased an annual membership with Zagat to receive access to the scores and additional details about individual restaurants. For more information about the Zagat survey, see *http://support.google.com/zagat/answer/1705271?hl=en*.

Table 1. Descriptive Statistics from the Zagat Survey Data for New York State

	Number	Mean	Std. Dev.	Min.	Max.	Share (percent)
Restaurant Details and Summary of Wines Served						
Restaurants in the Zagat survey in 2012	5,111					
Restaurants without an online wine menu	2,441					
Restaurants with an online menu that do not serve wine	1,140					
Restaurants with an online menu that serve wine	1,530					
Percent of Restaurants That Serve a Region's Wine						
California wine						78.9
West Coast non-California wine						52.2
European wine						95.4
Latin American wine						5.6
Australian/New Zealand wine						55.7
African wine						18.5
New York State wine						32.1
Share of Restaurants Serving New York State Wine						
Serves one offering of New York State wine						36.4
Serves two to five offerings of New York State wines						43.5
Serves more than five offerings New York State wines						20.1
Average Zagat Ratings[a]						
Food quality (scale 1 to 30)	1,426	21.8	2.7	12	29	
Decor (scale 1 to 30)	1,425	18.9	3.4	6	28	
Service (scale 1 to 30)	1,426	20.4	2.6	12	29	
Cost (dollars per meal)	1,401	46.15	27.38	13	585	
Zagat Survey Restaurant Cuisine Groups[a]						
Standard American	363					
New American	286					
European	593					
Asian	118					
Latin American	83					
Other cuisine	87					
Zagat Survey Restaurant Feature Summary[a]						
Total Feature Count	1,530	2.78	1.59	0	11	
Offers natural/organic ingredients feature	1,530					16.5
Offers winning wine list feature	1,530					8.6

[a] This sample includes the 1,530 Zagat-rated restaurants that made their food and beverage menus available online.

Table 2. Summary Statistics for Prices and Offerings of Red, White, and Sparkling Wines for Selected Regions

Region	White Wines			Red Wines			Sparkling Wines		
	Mean	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**
California									
Price ($/bottle)	54.74	9.67	411.30	89.59	11.00	1,281.93	54.23	12.00	380.00
Offerings	5.48	0	216	15.09	0	575	0.36	0	13
West Coast Non-California Region									
Price ($/bottle)	47.42	16.00	205.00	72.90	20.50	480.71	59.27	24.00	198.00
Offerings	0.6	0	10	1.74	0	80	0.07	0	3
New York State									
Price ($/bottle)	41.79	17.00	102.54	52.57	10.99	230.00	59.04	16.00	120.00
Offerings	0.69	0	38	0.59	0	44	0.08	0	7
East Coast Non-New York Region									
Price ($/bottle)	51.03	27.00	95.00	64.41	25.00	120.00	51.00	38.00	60.00
Offerings	0.06	0	24	0.09	0	64	0	0	1
European Region									
Price ($/bottle)	58.11	10.00	741.29	101.61	15.00	2,278.31	114.27	18.00	1,336.06
Offerings	19.04	0	683	36.90	0	1,317	5.64	0	221
Latin American Region									
Price ($/bottle)	35.55	17.00	150.00	47.94	10.00	420.00	40.89	24.00	75.00
Offerings	0.46	0	12	1.86	0	129	0.02	0	4
Australian / New Zealand Region									
Price ($/bottle)	44.08	11.00	290.00	68.99	10.00	775.00	48.41	26.00	125.00
Offerings	0.92	0	57	1.40	0	94	0.02	0	4
African Region									
Price ($/bottle)	42.16	19.00	125.00	58.30	14.00	210.00	41.95	20.00	66.00
Offerings	0.18	0	31	0.19	0	24	0.01	0	8
Other Regions									
Price ($/bottle)	60.96	21.00	509.00	78.14	21.00	480.00	59.33	38.00	92.00
Offerings	0.17	0	16	0.38	0	230	0	0	1
All Regions									
Price ($/bottle)	49.91	0	688.40	80.71	0	1,688.35	97.99	0	1,336.06
Offerings	27.60	0	762	58.27	0	1,770	6.22	0	221

Note: This sample includes the 1,530 Zagat-rated restaurants that made their food and beverage menus available online.

in our sample, 363 served standard American, 286 served new American, 593 served European, 83 served Latin American, and 87 served other cuisine.

Zagat considers 44 special features for restaurants. These include physical features such as bars and patios, food-related features such as vegetarian options and specific food preparation techniques, and other attributes such as awards received and the presence of entertainment facilities. The average number of special features per restaurant in our sample was 2.78 and ranged from 0 to 11. We were particularly interested in two of the special features: use of natural/organic ingredients and presence of a "winning" wine list (i.e., a wine list that had received accolades from a critic in one of the various wine publications). We include those two features in our empirical model since we expect that they will impact the presence of local wines on restaurant menus. Of the restaurants in our sample, 16.5 percent offered natural/organic ingredients and 8.6 percent had winning wine lists.

We augmented the Zagat data for the 1,530 restaurants in our sample with information on their food and alcoholic beverage (beer and wine) offerings from menus we collected from their websites. We collected the number of entrees offered on the menu, the number and types of beers available, and the varietals, costs, and regions of origin for all wines listed on the menu. We restricted our data to wines sold in 750-milliliter bottles (or larger) and did not include wines available by the glass. Each wine was assigned to one of six varietal groups (white, red, sparkling, rosé, dessert, and fortified) and either to one of four domestic regional groups (California, West Coast non-California, NYS, and non-NYS East Coast) or to one of five international groups (Europe, Latin America, Africa, Australia/New Zealand, and other).

Table 2 shows summary statistics for prices and quantities of white, red, and sparkling wines in restaurants in our sample by region. The mean price per bottle for white wines ranged from $35.55 for wines from Latin America to $58.11 for wines from Europe. Mean prices varied by region regardless of wine type, and red and sparkling wines generally have commanded higher prices than white wines. The range of minimum to maximum price is large for every region and is especially large for wines from Europe and California. The count of wines by type and by region shows that European wines are the most common in NYS restaurants, followed by California wines. For our 1,530 restaurants, there was an average of 92 bottles of wine in NYS restaurants, and the maximum number of bottles of wine per restaurant exceeded 300 in approximately 5 percent of the observations.[5] The average price of NYS white wines was $41.79 (ranging from $17.00 to $102.54), and the average number of NYS white wines per restaurant menu was 0.69 bottles (ranging from 0 to 38 bottles). The average price of NYS red wines was higher at $52.57 and average number of bottles per restaurant was 0.59. For NYS sparkling wines, the average price was $59.04 and the average number of bottles per restaurant was 0.08. Overall, the price range for NYS wines was among the narrowest but the range of the number of offerings was in line with ranges observed from many of the other regions other than Europe and California.

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[5]   We estimated additional models in which we eliminated observations that involved relatively large wine lists. In the results reported here, we removed approximately 5 percent of the sample restaurants because they offered 300 or more wines. Overall, this affected the magnitude of some of the estimated coefficients but did not change the general thrust of the results found when we used all of the restaurants in the sample.

Methodology

Our framework uses the Zagat data and restaurant-specific menu information to identify factors that influence restaurants' demand for local wine. We use data for the 1,401 restaurants in NYS that served wine and had a full set of scores in the Zagat survey. Our model considers the impact of reputation (using the Zagat scores), cuisine types, restaurant attributes, characteristics of the wine menu, and the restaurant's location.

Because we are ultimately interested in demand for local wine by restaurants, our conceptual framework relies on a multimarket modeling approach that allows us to explore links between the items on a restaurant's menu and procurement activities in the restaurant business. Restaurants use food ingredients, beverages, and various durable and intangible goods as inputs in production of products that they sell to final consumers. Restaurant owners consume these inputs as they develop their brands and expand their customer bases. This is particularly true when restaurant owners develop wine lists (Berenguer, Gil, and Ruiz 2009). Therefore, we consider restaurant demand for local wine as a derived demand that is influenced by conditions in related input and output markets.

Our conceptual framework follows work by Muth (1964) and subsequent multimarket models that have been widely used in agricultural economics to study a range of issues (e.g., Gardner 1975, Alston, Norton, and Pardey 1995). We adopted the simplest model—one output and two input factors of production. The output is the restaurant meal and dining experience; the inputs are local wine and an index of all other inputs, which include intangible goods (such as reputation scores), durable goods (such as the building and location), and nondurable goods (such as foods and other beverages purchased).

We modified the model used in Muth (1964) slightly. We use superscript l to describe the input market for local wine and superscript k to describe the market for all other inputs. Equation 1 shows that consumer demand for the output, denoted as Q, is a function of the price in the output market, which is denoted by P. Equation 2 shows that production of the output is a function of the quantity of each input. Demand for input quantity X^m when $m = (k, l)$ and each factor is paid the value of its marginal product is shown in equation 3. Equation 4 shows the factor supply for input m.

(1) $$Q = f(P)$$

(2) $$Q = q(X^l, X^k)$$

(3) $$W^m = P(dq(X^l, X^k)/dX^m) \text{ where } m = (k, l)$$

(4) $$X^m = g(W^m)$$

By totally differentiating equations 1 through 4 and converting them to elasticities in equations 5 through 8, we formulate a system of equations that can be used to examine proportional changes in prices (denoted by E(P) and E(W^m)) and proportional changes in quantities (denoted by E(Q) and E(X^m)) in a multimarket setting. The model relies on parameters to describe the demand elasticity for the output (η), supply elasticities for the inputs (ε^m), and cost shares for the inputs (s^m). With this system of equations, we can simulate how

exogenous shocks in demand for the output (ψ) or in the supply of an input (ω^m) impact the economic variables across the output and input markets.

$$(5) \qquad \mathrm{E}(Q) = \eta[\mathrm{E}(P) - \psi]$$

$$(6) \qquad \mathrm{E}(Q) = s^l\mathrm{E}(X^l) + s^k\mathrm{E}(X^k)$$

$$(7) \qquad \mathrm{E}(W^l) = \mathrm{E}(P) - s^k/\sigma\mathrm{E}(X^l) + s^k/\sigma\mathrm{E}(X^k)$$
$$\mathrm{E}(W^k) = \mathrm{E}(P) - s^l/\sigma\mathrm{E}(X^k) + s^l/\sigma\mathrm{E}(X^l)$$

$$(8) \qquad \mathrm{E}(X^m) = \varepsilon^m[\mathrm{E}(W^m) + \omega^m]$$

Equation 8 demonstrates that the derived demand for each input can be influenced by changes in demand for the output product as well as by changes in supply conditions in the input markets. In our case, the restaurant meal and dining experience is the output. The input of interest is local wine, X^l, and the other input, X^k, includes a variety of other factors used to produce the restaurant meal. Changes in demand for the output can be impacted by a restaurant's reputation, including expert ratings of the restaurant. Changes in supply for the other inputs are driven by restaurant-specific attributes, food ingredients, and beverage choices (other than local wine). We collected data for these variables and consider their impact on the derived demand for local wine by restaurants in our empirical model.

We employ two modeling strategies to examine derived demand for local wine i by restaurant j, denoted as X^l_{ij}. First, we use a binary logit model to assess determinants that influence a restaurant owner's decision to offer local wine. Second, because we hypothesize that the degree to which a restaurant owner includes local wine on the menu is important, we use a count model to estimate how the determinants impact the number of local wines offered. Specifically, we use a zero-inflated Poisson (ZIP) model because it is designed to be used with data sets that have a large number of zero observations. By providing results from both a logit model and a count model, we present a more complete analysis of the determinants of derived demand for local wine by restaurants.

Equation 9 outlines our empirical specification. We estimate the restaurant owner's decision to offer local wine—the derived demand for local wine by restaurant owners. In the logit model, X^l_{ij} equals 1 if local wine is offered and 0 otherwise; in the count model, X^l_{ij} equals the number of local wine offerings on the menu. Variables for the determinants in the model describe the restaurant's reputation ($\mathbf{R}_i$), attributes of the restaurant and its region ($\mathbf{A}_i$), the types of cuisine offered ($\mathbf{C}_j$), and attributes of the restaurant's wine list ($\mathbf{B}_j$).

$$(9) \qquad X^l_{ij} = \alpha + \lambda_i\,\mathbf{R}_i + \gamma_i\,\mathbf{A}_i + \delta_j\,\mathbf{C}_j + \phi_j\,\mathbf{B}_j + \mu_{ij}$$

In equation 9, λ_i is a vector of parameters that describe the effect of the restaurant's reputation with variables representing the four Zagat survey scores (food, decor, service, and cost). γ_i represents a vector of parameters describing the effect of restaurant and regional attributes. The restaurant attributes are the selected Zagat-defined special features, and the regional attribute is a dummy variable that defines the location of the restaurant. We

use dummy variables to identify the region as upstate New York, Manhattan, or Long Island, and each is considered relative to the other four boroughs of NYC (Brooklyn, the Bronx, Staten Island, and Queens), which we refer to as the outer boroughs. Five dummy variables describe the restaurant's cuisine type (standard American, European, Asian, Latin American, and other), and each is considered relative to new American cuisine, which is omitted. The vector δ_j represents the parameters that describe the effect of cuisine type on local wine demand by restaurants. Lastly, ϕ_j is a vector of the parameters that characterize the effect of a restaurant's wine list on its demand for local wine. The vector $\mathbf{B}_j$ includes information from wine lists that describes the number of offerings of the six wine types (white, red, sparkling, rosé, dessert, and fortified) at the restaurant and the number of offerings of domestic wines produced outside NYS. Lastly, μ_{ij} is the overall error term, which is assumed to follow a normal distribution with mean zero.

Results and Discussion

Our baseline results come from the logit and count (ZIP) models. In addition, we estimate logit models that compare demand for red and white wine from NYS and examine demand in specific NYS regions. In all of the model specifications, we estimate the effects of restaurant reputation and meal price (via Zagat scores), cuisine group, restaurant attributes, wine menu details, and regional attributes on the derived demand for wine by restaurants.

  Table 3 presents the baseline results from data for the 1,401 restaurants in NYS that made menus available online and had Zagat scores for all four of the restaurant reputation categories. The results are reported for the logit model that estimates the presence of local wines on a restaurant's menu, associated marginal effects from the logit estimation, the ZIP specification that estimates the number of offerings of local wines on a restaurant's menu, and marginal effects for the ZIP model.

  Overall, the results in Table 3 show that Zagat's decor rating is the only reputation variable that has a statistically significant effect on restaurant demand for local wine. The marginal effect for that rating is 0.0137 in the logit model, indicating that a one-point increase in the rating leads to a 1.3 percent increase in the likelihood of a restaurant serving NYS wine. The marginal effect in the ZIP model is 0.0689, indicating that a one-point increase in the rating leads to a 6.9 percent increase in the likelihood of offering an additional NYS wine. These results suggest that restaurants with higher decor rankings may be more likely to pay close attention to details and that those types of restaurants are more likely to place local wines on their menus. In the ZIP model, the marginal effect for the Zagat food quality rating is also positive and statistically significant. The marginal effects for all of the cuisine types are negative, indicating that restaurants that primarily offer new American cuisine (the omitted category) are the most likely to include local wines on their menus. The marginal effects are most negative for European and Asian cuisines, so NYS restaurants offering those cuisines are least likely to include local wines. The number of Zagat's special features given to a restaurant and captured as restaurant attributes in our analysis is significant in the logit specification but not in the ZIP model. Results from both models show that restaurants that offer natural and organic foods have a greater number of offerings of local wines.

Table 3. Results from the Logit and Zero-inflated Poisson (ZIP) Models with Marginal Effects on Likelihood of Offering Local Wine

Variable	Logit Model Coefficients[a]	Marginal Effects[b]	ZIP Model Coefficients[c]	Marginal Effects[b]
Zagat Reputation				
Food quality rating	0.0341 (0.0416)	0.00692 (0.00843)	0.0484*** (0.0172)	0.0523** (0.0262)
Decor rating	0.0676** (0.0282)	0.0137** (0.00569)	0.0685*** (0.0107)	0.0689*** (0.0176)
Service rating	−0.0141 (0.0495)	−0.00285 (0.0100)	−0.0550*** (0.0196)	−0.0462 (0.0312)
Cost (per meal)	−0.00273 (0.00538)	−0.000554 (0.00109)	−0.0109*** (0.00193)	−0.0056 (0.00468)
Cuisine Groups[d]				
Standard American	−0.557*** (0.201)	−0.105*** (0.0352)	−0.0771 (0.0669)	−0.305*** (0.107)
European	−1.138*** (0.188)	−0.217*** (0.0336)	−0.188** (0.0732)	−0.694*** (0.105)
Asian	−1.899*** (0.357)	−0.250*** (0.0262)	−1.459*** (0.427)	−0.870*** (0.0647)
Latin American	−0.860** (0.343)	−0.143*** (0.0449)	0.494*** (0.124)	−0.131 (0.212)
Other cuisine	−1.194*** (0.344)	−0.184*** (0.0372)	−0.536*** (0.200)	−0.628*** (0.0940)
Restaurant Attribute Features				
Natural/organic ingredients	0.324* (0.182)	0.0685* (0.0400)	0.703*** (0.0573)	0.867*** (0.188)
Winning wine list	0.0539 (0.270)	0.011 (0.0558)	0.0653 (0.0722)	0.0149 (0.171)
Total feature count[e]	0.0826* (0.0448)	0.0168* (0.00910)	−0.0117 (0.0163)	0.0369 (0.0275)
Wine Menu Attributes				
White wine	0.0104*** (0.00374)	0.00212*** (0.000763)	0.000461 (0.000766)	0.00702*** (0.00250)
Red wine	−0.00888*** (0.00189)	−0.00180*** (0.000388)	−0.000475 (0.000477)	−0.00681*** (0.00136)
Sparkling wine	0.0245* (0.0131)	0.00496* (0.00265)	0.00762* (0.00417)	0.0236*** (0.00895)
Rosé wine	−0.0143 (0.0395)	−0.00289 (0.00801)	0.0513*** (0.0124)	0.027 (0.0243)
Dessert wine	0.0520** (0.0227)	0.0105** (0.00462)	0.0121*** (0.00374)	0.0466*** (0.0146)
Fortified wine	0.015 (0.0459)	0.00305 (0.00932)	0.00816 (0.00765)	0.00876 (0.0302)
Domestic wine	0.0211*** (0.00356)	0.00428*** (0.000738)	0.000672 (0.000748)	0.0160*** (0.00281)

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Table 3. (continued)

Variable	Logit Model Coefficients[a]	Marginal Effects[b]	ZIP Model Coefficients[c]	Marginal Effects[b]
Regional Attributes – Location[f]				
Upstate	0.452* (0.259)	0.0976* (0.0587)	−0.0102 (0.110)	0.264 (0.180)
Manhattan	−0.186 (0.226)	−0.0379 (0.0462)	−0.0373 (0.104)	−0.172 (0.147)
Long Island	0.980*** (0.246)	0.220*** (0.0583)	1.002*** (0.0980)	1.929*** (0.354)
Constant	−2.638*** (0.780)		−0.0273 (0.300)	
Observations	1,401	1,401	1,401	1,401

[a] The dependent variable in the logit model measures the presence of local wine on the menu; it equals 1 if the restaurant serves any NYS wine and 0 otherwise.
[b] The marginal effect for a binomial independent variable is for a discrete change from 0 to 1.
[c] The dependent variable in the ZIP model is the count of local (NYS) wines.
[d] Cuisine groups are relative to the omitted case of new American cuisine.
[e] This variable does not include the natural/organic ingredients feature or the winning wine list feature.
[f] Regional attributes are relative to the four outer boroughs of NYC (the Bronx, Brooklyn, Staten Island, and Queens).
Notes: Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

The marginal effects for variables for wine menu attributes show some interesting patterns.[6] Demand for local wine by restaurants increases with the number of white wines, sparkling wines, dessert wines, and total domestic (non-NYS) wines selected. Restaurant demand for local wine in NYS decreases as the total number of red wines available on a menu increases. We take a closer look at the differences for local red and white wines in a later part of the analysis. The logit results for the regional dummy variables show that restaurants in upstate New York and on Long Island are more likely than restaurants in the outer boroughs of NYC to include local wines on their menus. Not so, however, for restaurants in Manhattan. We explored some of these regional differences with additional model specifications.

From the baseline results, we find that the number of white wines on a restaurant's wine list has a positive effect on the restaurant's demand for local wine while the number of red wines on the wine list has the opposite effect. This result is intuitively appealing because NYS is better known for its white wines. However, a further analysis that focused on NYS red and white wines separately produced somewhat different results. We present the results of that analysis in Table 4. The first column replicates the original results from Table 3 for NYS wines. The last two columns report results when the presence of NYS white wines and NYS red wines are the dependent variable. Many of the results

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6   Given the various types of wine used as variables in our model, we were concerned about multicollinearity in the estimation. However, test results indicated relatively low correlation coefficients between the explanatory variables, and subsequent results from a variable inflation factor test indicated very limited evidence of multicollinearity. The results of these tests are available from the authors upon request.

Table 4. Marginal Effects from Logit Regression for NYS White and Red Wine

Variable	All NYS Wines	NYS White Wines[a]	NYS Red Wines[b]
Zagat Reputation			
Food quality rating	0.00692 (0.00843)	0.000125 (0.00737)	–0.00122 (0.00594)
Decor rating	0.0137** (0.00569)	0.0115** (0.00484)	0.00621 (0.00393)
Service rating	–0.00285 (0.0100)	0.00938 (0.00874)	0.0087 (0.00708)
Cost (per meal)	–0.000554 (0.00109)	–0.000213 (0.000714)	–0.000679 (0.000930)
Cuisine Groups[c]			
Standard American	–0.105*** (0.0352)	–0.0736** (0.0290)	–0.0383* (0.0228)
European	–0.217*** (0.0336)	–0.207*** (0.0282)	–0.117*** (0.0229)
Asian	–0.250*** (0.0262)	–0.185*** (0.0225)	–0.142*** (0.0157)
Latin American	–0.143*** (0.0449)	–0.129*** (0.0340)	–0.0388 (0.0359)
Other cuisine	–0.184*** (0.0372)	–0.132*** (0.0320)	–0.0953*** (0.0243)
Restaurant Attribute Features			
Natural/organic ingredients	0.0685* (0.0400)	0.0558 (0.0349)	0.0870*** (0.0311)
Winning wine list	0.011 (0.0558)	–0.00939 (0.0432)	0.0204 (0.0361)
Total feature count[d]	0.0168* (0.00910)	0.00599 (0.00780)	0.00395 (0.00616)
Wine Menu Attributes			
White wine	0.00212*** (0.000763)	0.00123** (0.000553)	0.000364 (0.000390)
Red wine	–0.00180*** (0.000388)	–0.000873*** (0.000291)	–0.000597*** (0.000216)
Sparkling wine	0.00496* (0.00265)	0.00358* (0.00193)	0.00251 (0.00156)
Rosé wine	–0.00289 (0.00801)	–0.00122 (0.00657)	0.00142 (0.00489)
Dessert wine	0.0105** (0.00462)	0.00752** (0.00344)	0.00383 (0.00235)
Fortified wine	0.00305 (0.00932)	–0.00893 (0.00664)	–0.00308 (0.00481)
Domestic wine	0.00428*** (0.000738)	0.00159*** (0.000477)	0.00162*** (0.000372)

Table 4. (continued)

Variable	All NYS Wines	NYS White Wines[a]	NYS Red Wines[b]
Regional Attributes – Location[e]			
Upstate	0.0976* (0.0587)	0.121** (0.0565)	0.0444 (0.0436)
Manhattan	–0.0379 (0.0462)	–0.0157 (0.0409)	–0.0125 (0.0337)
Long Island	0.220*** (0.0583)	0.223*** (0.0577)	0.201*** (0.0556)
Observations	1,401	1,401	1,401

[a] The dependent variable in this model measures the presence of local white wine on the menu; it equals 1 if the restaurant serves any NYS white wine and 0 otherwise.

[b] The dependent variable in this model measures the presence of local red wine on the menu; it equals 1 if the restaurant serves any NYS red wine and 0 otherwise.

[c] Cuisine groups are relative to the omitted case of new American cuisine.

[d] This variable does not include the natural/organic ingredients feature or the winning wine list feature.

[e] Regional attributes are relative to the four outer boroughs of NYC (the Bronx, Brooklyn, Staten Island, and Queens).

Notes: Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

in this analysis for white wine are similar to the baseline model, but the marginal effect of the Zagat decor score is not statistically significant for NYS red wine.

The most notable result in Table 4 is for regional attributes. NYS white wines are more likely to be offered in upstate restaurants than in restaurants in the outer boroughs, and both white and red NYS wines are more likely to be offered in Long Island than in the outer boroughs. There is no statistically significant effect for NYS wine in Manhattan. Since the Long Island region produces some white wine and the majority of NYS's red wine, this result suggests that "local" may be quite narrowly defined by restaurant owners. Because we see a positive coefficient for red wine in the Long Island region and no similar effect for red wine in the upstate region, we infer that demand for local red wine (from Long Island) diminishes outside of the Long Island region. Thus, defining "local" as within a state may not accurately reflect consumers' definition of the term, and restaurant owners may associate "local" with a much smaller subregion of a state.

Table 5 reports the results of a restricted model that examines demand for local wine among owners of restaurants in the NYC metropolitan area (Manhattan, the Bronx, Brooklyn, Staten Island, and Queens). Approximately two-thirds of the observations in our sample are from this area,[7] and many winemakers in NYS and elsewhere are keenly interested in selling their wines to restaurants in NYC generally and in Manhattan especially (Preszler and Schmit 2009). We find that the coefficient on the Zagat decor score for Manhattan restaurants remains positive and is statistically significant. In addition, the marginal effect for the Zagat cost variable is negative and

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[7] Of the 1,530 Zagat-rated restaurants in NYS with menus available online, 848 were in Manhattan and 198 were in the four outer boroughs. Of the 1,401 restaurants used in our analysis, 779 were in Manhattan and 159 were in the four outer boroughs.

Table 5. Marginal Effects from Logit Regression for Restaurants in the New York City Area

Variable	Restaurants in Manhattan[a]	Restaurants in the Outer Four Boroughs[a]
Zagat Reputation		
Food quality rating	0.0116 (0.0101)	0.0348 (0.0212)
Decor rating	0.0194*** (0.00709)	0.0129 (0.0147)
Service rating	0.000583 (0.0122)	−0.0558** (0.0235)
Cost (per meal)	−0.00294* (0.00163)	0.0054 (0.00458)
Cuisine Groups[b]		
Standard American	−0.0118 (0.0519)	−0.150* (0.0808)
European	−0.0888* (0.0467)	−0.350*** (0.0883)
Asian	−0.126*** (0.0440)	−0.210*** (0.0527)
Latin American	−0.143*** (0.0440)	−0.0134 (0.139)
Other cuisine	−0.115** (0.0463)	
Wine Menu Attributes		
White wine	0.00151** (0.000671)	0.00566 (0.00535)
Red wine	−0.00187*** (0.000401)	−0.00145 (0.00176)
Sparkling wine	0.00646*** (0.00243)	−0.0013 (0.0159)
Rosé wine	−0.0108 (0.00900)	−0.0319 (0.0204)
Dessert wine	0.0129*** (0.00448)	−0.036 (0.0364)
Fortified wine	0.00371 (0.00764)	
Domestic wine	0.00440*** (0.000820)	0.0107** (0.00486)
Observations	779	159

[a] The dependent variable in this model measures the presence of local wine on the menu; it equals 1 if the restaurants in this location serve any NYS wines and 0 otherwise.

[b] Cuisine groups are relative to the omitted case of new American cuisine.

Notes: Standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. We do not provide the results for restaurant attributes here, but they are available from the authors upon request.

statistically significant, which suggests that NYS wines are less likely to be available in the more expensive Manhattan restaurants. The effects for cuisine types and wine menu attributes are generally the same as those in the baseline analysis. Restaurants serving new American cuisine are most likely to include local wines on their menus, and a larger number of white, sparkling, dessert, and domestic wines on a menu increases the likelihood of inclusion of local wines. For restaurants in the outer four boroughs, the Zagat score for service is inversely related to restaurant demand for local wine, suggesting that relatively casual restaurants in this region are more likely to offer local wines. The coefficients for European and Asian cuisine are more negative than the baseline estimates and the estimates for Manhattan (and remain statistically significant). Although the wine menu attributes are not significant in the outer borough model, the total number of domestic wines offered positively influences restaurant demand for local wine.

Summary and Industry Implications

While there has been much work examining preferences for local products among final consumers, little attention has been given to intermediate consumers of local foods and beverages. Restaurants are intermediate consumers, and we argue that the foods and beverages they procure provide an excellent proxy for the products that final consumers prefer. Our research contributes to the literature on demand for local products by collecting detailed data on restaurants in NYS and identifying factors that influence derived demand for local wine by restaurants. We tap the Zagat database, which includes standardized restaurant quality scores and additional information about restaurants in a variety of locations that offer a wide range of types of cuisine and price points. Wine is an ideal subject for research on local foods because of its relatively limited ingredients and well-defined regions of origin, which are included in restaurant menus. Furthermore, NYS is a useful region to study given the size of and rising acclaim for its wine sector. Using data for 1,401 restaurants, we estimate the effect that restaurant characteristics (reputation, location, and other attributes) and product characteristics (cuisine type and wine menu details) have on derived demand for local wine by restaurants in NYS. Our analysis also uses information about restaurants' demand for local wine to shed new light on how intermediate consumers define products as local.

   Overall, our results indicate that restaurants' decisions to include NYS wines on their menus increased with higher Zagat decor scores, cuisine categorized as new American, the Zagat restaurant feature related to natural/organic foods, location, a higher count of domestic (non-NYS) wines, and higher counts of white wine, sparkling wine, and dessert wine. The presence of NYS wines decreases with the number of red wine offerings on the menu. A menu that includes natural and organic offerings may signal that the restaurant is more likely to include local food (and beverages) as well. Our results for wine list attributes suggest that local wine is more likely to be found on the menu when the wine list includes many wines that are similar to ones produced in NYS and many domestic wines. Finally, it appears that location matters and that demand for local wines has a limited reach. Our results indicate that the probability of a restaurant including local wine is greatest in the subregions that produce wine. We find that restaurants in Long Island—a region that produces some white wines and the majority of New York's red wines—are most likely to include

local white and red wines. In other regions, demand for local red wines is not apparent.

Our results have important implications for nascent wine production regions in New York and other states. The Zagat decor score is the only reputation variable that has a consistent positive effect on demand for local wine, and we interpret the decor rating as an indicator of a restaurant's ambiance and attention to detail. Thus, restaurants that score highly in this category are more likely to place local wines on their menus and are a market that can be targeted by marketers of local wine. Cuisine type also appears to play a large role in whether restaurants offer local wines. Marketers of local wines should consider targeting restaurants that serve styles of new American cuisine that complement local wines. Our results also suggest that restaurants that serve primarily European or Asian cuisine are less receptive to local wine. Restaurants that generally offer a large selection of white wines and/or domestic wines tend to include local wines as well. Regionally, restaurants in Long Island, the predominant region of red wine production in NYS, are likely to list NYS red wines on their menus, but restaurants in other regions of the state do not exhibit demand for NYS red wines. Thus, the location of the restaurant matters; the "local" effect is highly focused geographically and may not extend across a large state like New York. We also find that upstate restaurants are relatively more likely to include local white wines, which are the dominant type of wine produced in that region. Demand for local wines by restaurants in Manhattan is particularly sensitive to the decor quality score and presence of red wines on the menu.

The results of this study improve our understanding of demand for locally produced wine by NYS restaurants and offer useful guidance for industry stakeholders. We identify key determinants of demand for local wine by restaurants and generate a novel database and framework for assessing demand for local products by restaurant owners—intermediate consumers who are often overlooked in agricultural economics studies despite being substantial purchasers of foods and beverages. Finally, our results indicate that consumers' definitions of "local" may be considerably narrower than the ones typically used by policymakers and food marketers.

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