



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Distribution Channel Choices of Wineries in Emerging Cool Climate Regions

**Lin Sun, Miguel I. Gómez, Fabio R. Chaddad,
and R. Brent Ross**

The number of wineries in nontraditional cool climate regions of the United States has increased dramatically in the last decade. We examine factors influencing distribution channel choices by these wineries, including winery characteristics, marketing strategies, and the extent of vertical and horizontal integration. Using a survey of winery operators in Michigan, Missouri, and New York, we developed fractional logit models to test hypotheses regarding their distribution channel choices. We find that the share of wine sold through intermediated channels increases with winery size, years of operation, increased vertical and horizontal integration, and greater promotional intensity and levels of self-reported marketing challenges.

Key Words: cool climate regions, distribution channels, marketing, wine

The number of wineries in nontraditional regions has increased dramatically in the past decade (Wine Institute 2013). Most of these new wineries produce small wine volumes;¹ for example, more than 80 percent of the wineries established in New York State after 2000 had average annual production of between 1,000 and 2,000 gallons (Ropel, Smith, and Reuber 2009). Contributors to this trend include grape growers who have decided to vertically integrate into winemaking and nonfarmer investor-entrepreneurs who have opted for a rural lifestyle. The surge in small wineries is also a response to a need to diversify farm businesses and complement crop and livestock production with value-added processing and retail enterprises. This recent development of wineries in cool climate regions is well represented in Michigan, Missouri,

¹ A winery is classified as small by the Michigan Liquor Control Commission when its annual production volume is less than 50,000 gallons.

Lin Sun is a graduate student and Miguel I. Gómez is the Ruth and William Morgan Assistant Professor in the Dyson School of Applied Economics and Management at Cornell University. Fabio R. Chaddad is an assistant professor in the Department of Agricultural and Applied Economics at the University of Missouri. R. Brent Ross is an assistant professor in the Department of Agricultural, Food, and Resource Economics at Michigan State University. Correspondence: *Miguel Gómez* • 321 Warren Hall • Ithaca, NY 14853 • Phone 607.255.8159 • Email mig7@cornell.edu.

The authors gratefully acknowledge the support of the National Institute of Food and Agriculture, U.S. Department of Agriculture, through Award 2011-68006-30815.

This paper is included as part of the special issue of *ARER* related to the workshop "Beverage Markets and Policy" organized by the Northeastern Agricultural and Resource Economics Association (NAREEA) in Ithaca, New York, on June 22 and 23, 2013. The workshop received financial support from the Food and Agricultural Marketing and Policy Section of the Agricultural and Applied Economics Association, the Food Industry Management Program at Cornell University, and Zwick Center for Food and Resource Policy at University of Connecticut. The views expressed are the authors' and do not necessarily represent the policies or views of the sponsoring agencies.

Table 1. Emerging Wine Industries in Michigan, Missouri, and New York

	Michigan	Missouri	New York
Number of wineries (2009)	100 up from 17 in 1995	97 up from 31 in 2000	240 up from 113 in 2000
Wine volume (gallons in 2009)	1.4 million	1.1 million	28.7 million
Number of grape growers	711	393	1,438
Wine grape acreage	2,100	1,600	11,000
Wine grape production	5,300 tons	4,400 tons	172,000 tons
Wine industry economic impact	\$790 million (in 2005)	\$1.6 billion	\$2.5 billion

Data sources: Number of wineries, number of grape growers, wine grape acreage, and wine grape production – National Agricultural Statistics Service, U.S. Department of Agriculture (2011). Wine volume – U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau (2013). Impact of the wine industry: Michigan – Michigan Grape and Wine Industry Council (2011); Missouri – Stonebridge Research (2010); New York – New York Wine and Grape Foundation (2011).

and New York. Table 1 indicates that the number of wineries in those states increased threefold between 1998 and 2010. These emerging wine regions are playing a prominent role in rural economic development in those states. As noted in Table 1, in 2010 alone, the wineries involved more than 2,500 grape growers, about 15,000 acres planted to grapes, and 437 wineries that produced about 31 million gallons of wine (Table 1).

In this study, we develop a conceptual framework to examine factors that influence the distribution channel choices made by operators of wineries in emerging regions, including winery characteristics, elements of their marketing strategies, and their degree of vertical and horizontal integration. Subsequently, we employ data from a survey of wineries in Michigan, Missouri, and New York to develop econometric models that allow us to test hypotheses regarding distribution channel choices.

Emerging wine regions have the potential to become economic vectors of rural development because they foster the growth of related industries such as tourism and hospitality (Carlsen 2004, Hall et al. 2000). Northern Michigan, for example, was ranked third on a list of the best “undiscovered” wine destination regions in the world by *Wine Enthusiast* in 2011 (Wyatt 2011). Most cool climate wineries, however, are relatively new (less than ten years old), small (wine production of between 1,000 and 3,000 cases), and geographically dispersed over a wide area, and their operators are relatively inexperienced. The success of these wineries will likely depend on demand for their products and a regional reputation (Schamel 2009), but they face a formidable task in attracting customers and developing relationships with distributors.

A major marketing challenge for wineries in emerging regions is the selection of distribution channels for wine sales. These wineries often have small marketing budgets that impede participation in intermediated channels. In addition, many of the non-*vinifera* grape varieties that are well-adapted to cool climates (e.g., Norton and Marquette grapes) are not well known to consumers, who have previously established preferences for *vinifera* wines. Vintners who

want to expand the geographic distribution of their wines also must often work within a complex three-tier distribution system that can limit their ability to access nonlocal markets.² It can be particularly difficult in a nontraditional region to develop relationships with wholesalers and manage alternative distribution channels.

The difficulties associated with distribution channels are not unique to wineries in nontraditional regions; regional food producers in general find it difficult to connect to mainstream supermarket distribution systems. King, Gómez, and DiGiacomo (2010) posited that the problem arises because supermarkets tend to favor large suppliers and, consequently, long-distance movement of products for a variety of reasons, including reliability of supply and lower prices for goods from large operations. Martinez et al. (2010) further identified barriers that prevent local food producers from entering the market and expanding distribution, including producers' limited training in marketing, lack of a distribution infrastructure, and uncertainties regarding regulation.

Although the marketing issues associated with small regional wineries are many, we focus on understanding factors that influence the distribution channels chosen for wineries in emerging cool climate regions since the mix of distribution channels used is critical for success. Schamel (2009), for example, argued that a winery's long-term success depends not only on demand for and the reputation of its products but also on the operator's ability to develop relationships with customers and distributors. Many owners of wineries in cool climate regions view effective distribution as the most challenging part of their business. In our discussions with winery owners in northern New York, for example, one individual clearly expressed the difficulties they face when managing distribution channels: "I sell at several farmers' markets. These customers ask me to sell locally so that they can purchase wine from me frequently. But when I go to liquor stores to sell my wine, they want nothing to do with me because I am small and a northerner."³ Another obstacle to participation in intermediated channels is perceptions about the quality of cool climate wines, as described by a New York winery owner: "When I go to restaurants and liquor stores, I must beg them to use my wine, and it is costing me a 30–40 percent discount to put the product on the shelf. I feel it is time to craft the wine for quality. And after people come to your tasting room and taste your wine, the word will go out. Then I would say to intermediaries that I cannot supply wine at a 30–40 percent discount, only at a 20 percent discount."⁴ From these statements, it is clear that the distribution channels are a critical component of a winemaker's marketing strategy.

The importance of distribution channels is widely understood, but little empirical work has been done to identify the factors that influence distribution channel choices among winemakers in emerging cool climate regions. To fill this gap in the literature, we first develop a conceptual framework and set of hypotheses regarding factors that influence distribution channel choices. Next, to test the hypotheses, we collect data from owners of 86 wineries located in the cool climate regions of New York, Michigan, and Missouri. We then implement a fractional logit model (Papke and Wooldridge 1996) in which the dependent variable is specified as the proportion of sales of wine

² In New York State, wine cannot be sold in grocery stores.

³ Meeting minutes (Gómez and Sun 2011).

⁴ Meeting minutes (Gómez and Sun 2011).

to each of four distribution channels—tasting rooms, distributors, restaurants, and direct shipments to wine consumers. The estimated model parameters provide the basis for a systematic analysis of factors that influence the share of wine products distributed to each channel and identification of the specific challenges faced by winemakers in cool climate regions.

Literature Review and Hypotheses

As noted in Coughlan et al. (2006), distribution channels are essential to the marketing strategies of firms. In recent years, however, distribution channels have received relatively less attention from analysts compared to the other three elements associated with the marketing mix (prices, products, and promotion). Gattorna (1978) reviewed several economic approaches applicable to studies of firms' distribution channel choices. He found that microeconomic approaches generally adopted optimization models and focused on the efficiency and cost of alternative channels. Institutional approaches can also be used to examine the legitimacy of an intermediary in the distribution channel and reliance on transactional and exchange economies. Functional approaches emphasize that intermediaries exist because they serve certain functions for producers and consumers. Those functions include transporting, stocking, searching for and assorting goods, and persuading consumers. All of these elements are relevant to the study of distribution channel choices by small wineries in an emerging region.

We follow Gattorna (1978) to identify factors that are associated with channel choices of winemakers. Microeconomic theory suggests that winery characteristics (e.g., their size and years of operation) may influence the cost of participating in a specific channel. For example, it may cost more, on average, for small wineries to participate in wholesale distribution channels. Similarly, according to the institutional approach, transactional and exchange economies created by intermediaries may vary with the extent of vertical and horizontal integration. In terms of the functional approach, a firm may outsource certain marketing functions such as stocking and promotion to intermediaries, particularly when those marketing activities are difficult to accomplish.

In Figure 1, we offer a conceptual framework by which to examine how microeconomic, institutional, and functional factors influence a winery's distribution channel choices. We identify four broad factors that affect winery distribution channel choice. First, we argue that there are specific, measurable winery characteristics that influence the distribution channel mix and are associated with the cost of participating in a given channel: the number of years the winery has been in operation and the winery's size. For example, consider the choice between selling bottles of wine in a tasting room versus selling wine through distributors. Since winemakers receive higher per-volume prices from sales in a tasting room, they may be able to participate in intermediate channels only if their production volumes are large enough to benefit from economies of scale. Second, we posit that a winery operation's degree of vertical integration, represented by the share of the winery's own grapes used in production, can impact the transactional and exchange economies of a distribution network and therefore affect distribution channel choices. Vertical integration matters because it materially influences a winery's ability to control the quality of its grapes and wines. Third, we hypothesize that the degree of horizontal

integration, as represented by the extent to which a winery collaborates with other wineries in a region, influences channel choices. Horizontal integration could create transactional and exchange economies for individual wineries by allowing a winery to access intermediated distribution channels. This could be particularly important for wineries that produce small volumes. Finally, we argue that existing marketing efforts and perceived marketing challenges can impact a winemaker's future decisions about whether to outsource or maintain certain marketing functions. This traditional "make or buy" question will also be closely tied to the choice of distribution channels.

We note that similar conceptual frameworks have been employed in the literature related to food distribution. For example, Lesser and Roller (1982) examined three factors—physical characteristics, operating practices, and labor management—to explain productivity in grocery distribution centers. Zuurbier (1999) argued that choices of vertical coordination systems depended on a variety of factors that included the nature of the relationships in the distribution channel and characteristics related to the firms, industries, products, and institutions in the channel.

Winery Characteristics

The relationship between winery size and distribution channel choices has been extensively researched. Dodd (1999) found that direct distribution channels were the most effective strategy for wineries in nontraditional regions because they allowed winemakers to control the quality of their products and because

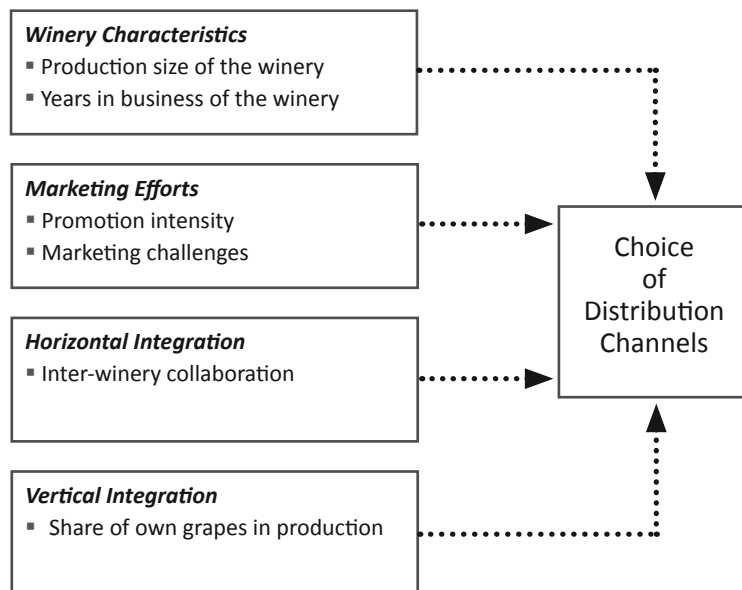


Figure 1. Conceptual Framework for Winery Distribution Channel Choices

Distribution Channel Choice = f(winery characteristics, marketing efforts, level of vertical and horizontal integration).

Source: Author's creation based on literature review.

of valuable associated services provided by tasting rooms. Direct channels also allow winemakers to manage the brand image and other intangible aspects of their wines. Moreover, direct channels facilitate development of long-term, mutually beneficial relationships with customers. Kolyesnikova (2007) asserted that the three-tier wholesale distribution system (typically defined as production-distribution-retail) commonly adopted by large wineries is too expensive for new wineries located in nontraditional regions. The study also found that new wineries tend to emphasize tasting rooms because they often generate higher margins and that participation in intermediated channels tends to also involve adherence to strict and costly regulations. These earlier studies suggest that small producers in emerging cool climate regions will opt for direct distribution channels such as tasting rooms.

With respect to the number of years of operation, Dodd (1995) argued that newly established wineries in nontraditional regions are often not initially patronized by local wine retailers and therefore face considerable difficulty in selling wine through that distribution outlet. This finding suggests that wineries in nontraditional regions may rely on direct sales to customers given skepticism by local distributors about the quality of their products.

Given the findings of these prior studies, the following hypothesis regarding the effect of winery characteristics on the selection of distribution channels by owners of nontraditional cool climate wineries is proposed.

H1: Wineries that are younger and smaller sell a larger share of their wines through direct channels (i.e., tasting rooms and direct shipments) than larger, older wineries.

Marketing Efforts

In our review of the literature, we found no studies that examined the effect of the perception of marketing as a challenge to business success on producers' distribution channel choices. However, Hollebeek and Brodie (2009) pointed out that wine sales through a tasting room generate considerably higher levels of interaction between customers and service staff than retailing through supermarkets. Gurau and Duquesnois (2008) showed that the costs associated with developing and maintaining a personalized relationship with customers are often significant and that successful application of direct marketing techniques requires extensive knowledge and good intuition and improves with experience. Both studies emphasize that a direct sale approach requires substantial marketing knowledge, skill, and experience. A winemaker who lacks that skill and experience may perceive marketing as a significant challenge and choose not to pursue direct sales.

Regarding the intensity of promotional activities, Folwell and Grassel (1995) noted that promotions in wine tasting rooms tended to be effective for both onsite retail sales and generating consumer awareness, which prompts future sales in restaurants, grocery stores, and other retail outlets. However, the fact that restaurant sommeliers and wine servers can influence customer choices by virtue of their recommendations cannot be ignored. The penetrating power of existing promotions can largely be offset by recommendations from wine servers. Therefore, intensive promotion is more common among wineries that sell a large share of their products directly to consumers through tasting rooms and direct shipments. Wine producers who do not promote their products

as intensively may sell a larger share of their wines through intermediated channels such as restaurants and distributors. Given these factors, the following hypothesis is proposed.

H2: Wineries that rank marketing as a primary challenge sell a smaller share of their products through direct distribution channels; wineries that intensively promote their products sell a smaller share of those products through institutional and intermediated channels.

Horizontal Integration

Wargenau and Che (2006) found that successful collaborative alliances give winemakers access to joint promotion, production, and advertising. Marsh and Shaw (2000) suggested that well-orchestrated collaboration among wine producers offers a way to create an “export culture” because it provides a space in which to identify shared economic interests and overcome otherwise prohibitive transaction costs, including the typically high cost of entry into intermediated channels (Kolyesnikova 2007). Schamel and Santos-Arteaga (2013) found that cooperative wineries, through better coordination, could improve their products’ quality and reputation. Consequently, we argue that wineries that improve the quality and reputation of their products through collaboration are more likely to market those products in intermediated channels.

H3: Wineries that have a greater degree of horizontal integration sell a larger share of their products through intermediated channels.

Vertical Integration

Anderson and Weitz (1986) argued that firms can exert greater control over product distribution through greater vertical integration and thus gain a strategic advantage over competitors. For example, a winery that uses more of its own grapes has greater control over the grapes’ quality. By increasing their control over key raw materials, firms may be able to differentiate their offerings and/or charge lower prices than their competitors. Wine producers agreed with researchers that having greater control over their supply of grapes can increase competitiveness. According to one of the cool climate winery owners from New York, “we didn’t have enough supply of grapes last year in our region. And it is difficult to maintain our relationship with liquor stores because you cannot just supply them for a month and then say that we are running out of grapes.”⁵ Vertical integration also leads to greater concentration of ownership over the value chain, which in turn leads to a higher-quality output (Economides 1999). For example, Pennerstorfer and Weiss (2012), in a study of the Austrian wine sector, found empirical evidence that wines produced by cooperatives, which are ownership-diluting organizations, tended to be of significantly lower quality than wines from other producers. Therefore, we posit that a relatively high degree of vertical integration increases the share of a winery’s sales through distributors since the winery can deliver a stable

⁵ Meeting minutes (Gómez and Sun 2011).

Table 2. Summary of Hypotheses and Proposed Directions of Partial Effects

Variable	Distribution Choice			
	Winery Tasting Room	Distributor	Direct Institution	Shipment
Winery characteristics				
<i>Year</i>	–	+	+	–
<i>Cases</i>	–	+	+	–
Marketing efforts				
<i>Marketing Challenge</i>	–	+	+	–
<i>Promotion Intensity</i>	+	+	?	+
Horizontal integration				
<i>Collaboration</i>	–	+	+	–
Vertical integration				
<i>Own Grape Share</i>	–	+	–	–

supply, be more certain about the cost of grapes, and deliver products that have better and more consistent quality.

H4: Wineries that have a high degree of vertical integration sell a greater share of their products through distributors.

In Table 2, we summarize these four hypotheses and describe how we expected the share of products sold in each distribution channel (winery tasting room, distributor, institution, and direct shipment) to change in relationship to each. This conceptual framework provided guidance for data collection and operationalization of the variables in our empirical model.

Data and Empirical Model

We developed a survey to collect information regarding the characteristics, procurement strategies, marketing strategies (including promotion and distribution channels), and performance of wineries in emerging cool climate regions in Michigan, Missouri, and New York. The survey was conducted from August 1 to November 30, 2011. We sent the survey by mail to winery owners and managers who were responsible for distribution channel decisions.

We asked survey participants to provide information on the percentage of their wineries' sales by volume for four distribution channels: (i) in the tasting room, (ii) to wine distributors, (iii) to institutions (restaurants and food service outlets), and (iv) through direct sales (direct shipments and at farmers markets). They were also asked to report their wineries' number of years of operation and volume of wine produced in the preceding year. In addition, respondents ranked a list of eleven types of challenges faced (including marketing, financing, regulations, and production) from most to least difficult.⁶ To measure promotion intensity, the survey asked winery operators to identify

⁶ Production, marketing, finance, managing the winery, labor-related issues, environmental issues, regulatory issues, quality, access to resources (e.g., information), competition, and "other."

the intensity of their promotional activities using a list provided.⁷ Degree of horizontal integration was addressed with a list of collaborative activities that included grape production, winemaking, marketing, promotion of the winemaking region, shared information, and shared resources (e.g., labor and machinery). Finally, we asked respondents to identify the percentage of (i) their own grapes used in their wines, (ii) grapes acquired in spot market as needed, and (iii) grapes procured via contractual relationships with suppliers. They also reported average sales prices of their wines, the percentage of non-*vinifera* grapes used in production, and whether their wineries had their own brands.

To boost the response rate, regional wine trade associations prepared letters explaining the importance and potential benefits of the study that were sent with the survey instrument to participants. Of the 244 surveys mailed, 86 were returned for a response rate of 35.2 percent, which is comparable to typical rates of response for empirical investigations that collect primary data through surveys. The resulting sample consisted of 73 observations. Thirteen surveys were incomplete for at least one question relevant to our empirical investigation and were dropped.

Based on the information collected in the 2011 survey, we constructed four dependent variables to measure wineries' distribution channel selections: *Winery* was the percentage of wine sales through a tasting room; *Distributor* was the percentage of sales to intermediary distributors; *Institution* was the percentage of wine sold directly to restaurants and liquor stores; and *Direct* was the percentage of wine sold through direct shipments to individual wine consumers and at farmers markets in 2010.

We constructed four major categories of explanatory variables for the elements of our conceptual framework: (i) characteristics of a winery, (ii) intensity of marketing efforts, (iii) degree of horizontal integration, and (iv) degree of vertical integration. The two variables that captured winery characteristics were *Year* ("How long has your winery been in business?") and *Cases* ("What was your total wine production in 2010?").

To measure the extent of marketing challenges faced by winemakers in nontraditional regions, we asked respondents to choose and rank the three most difficult challenges they face from the list provided. Subsequently, we created an ordinal categorical variable called *Marketing Challenge* with a value of 3 when a respondent ranked marketing as the most difficult operational challenge, 2 when marketing was ranked as the second most difficult challenge, and 1 when marketing was ranked as the third most difficult challenge. For all other rankings, the value of *Marketing Challenge* was 0.

To measure the intensity of marketing promotion, we used responses regarding the eight promotional activities listed in the survey and created a discrete variable called *Promotion Intensity* with an ordinal value of 0 to 8 representing how many of the listed promotions were used by a winery.

The question on collaboration (horizontal integration) listed nine activities and asked respondents to identify the ones in which they participate. The activities were membership in a wine trade association, membership in a local chamber of commerce, membership in a regional wine "trail," and whether winemakers in the region collaborate to procure grapes, produce wine, market

⁷ Promotional activities listed in the survey were arrangements with tour or bus companies, promotions for returning customers, having a customer database, club promotions, maintaining a list serve, producing newsletters, offering price discounts, and "other."

wine, promote the wine region, share information, and share resources. We created an ordinal variable, *Collaboration*, that ranged from 0 to 9 and represented the number of collaborative activities in which the winemaker engaged.

The variable *Own Grape Share* measured the extent of vertical integration via the percentage of grapes used in wine production procured from the producer's own vineyard.

We present the descriptive statistics of our sample in Table 3. On average, 73 percent of the wine produced by the respondents is sold in tasting rooms, making this outlet the dominant distribution channel. This result is in line with industry reports for the three states. All of the winemakers in our sample sold wine through a tasting room, and a number of them employed no other distribution channel. Regarding the explanatory variables, the wineries in our sample had been in operation for an average of 10.7 years and produced a mean of 5,824 cases. Thus, generally, the wineries in our sample are relatively new and small.

Overall, survey respondents ranked marketing as the second or third most difficult challenge they face. Likewise, wineries in our sample engaged in an

Table 3. Descriptive Statistics from the Survey Data

Variable	Description	Mean	Std. Dev.	Min.	Max.
Dependent Variables					
<i>Winery</i>	Percent of wine sales (volume) at the winery	0.73	0.25	0.10	1.00
<i>Distributor</i>	Percent of wine sales (volume) through distributors	0.06	0.15	0.00	0.60
<i>Institution</i>	Percent of wine sales (volume) through liquor stores and restaurants	0.09	0.13	0.00	0.60
<i>Direct Shipment</i>	Percent of wine sales (volume) by direct shipment	0.02	0.03	0.00	0.11
Independent Variables					
<i>Year</i>	Years in business of the winery	10.7	10.7	0.5	47.0
<i>Cases</i>	Production size of the winery	5,824	13,700	100	105,000
<i>Marketing Challenge</i>	= 3 if marketing ranked first = 2 if ranked second = 1 if ranked third = 0 otherwise	1.3	1.3	0.0	3.0
<i>Promotion Intensity</i>	Count of winery's promotion methods	5.8	1.4	3.0	8.0
<i>Collaboration</i>	Count of winery's collaboration methods	6.1	2.1	0.0	9.0
<i>Own Grape Share</i>	Percent of grape input grown at the winery	0.5	0.4	0.0	1.0

Number of observations: 73.

average of about six collaborative activities, but there was substantial variation in the number reported (responses covered the entire range of 0 to 9). In terms of vertical integration, 48 percent of the grapes that winemakers used in production were sourced from their own vineyards. Again, the responses varied widely with some wineries relying solely on their own grapes and others entirely outsourcing grape production.

We employed the fractional logit regression model developed by Papke and Wooldridge (1996) because the dependent variables in our system of equations are fractions (i.e., they represent shares of total winery sales devoted to each distribution channel) that add up to one. Because a fractional response variable is bounded between 0 and 1, the effect of any particular independent variable cannot be constant throughout its range. Therefore, a linear model would provide biased results because it is impossible for a linear model to capture the inherent nonlinearities in fractional responses.

Since our dependent variable is the fractional share of total winery sales for each of the four distribution channels, we specified the following functional form for the expectation, $E(\cdot)$, of choice D_{ij} of winery i for distribution channel j conditional on a vector of explanatory variables, \mathbf{X}_i :

$$(1) \quad E(D_{ij}|\mathbf{X}_i) = G(\mathbf{X}_i\beta)$$

where $G(\cdot)$ is a standard normal cumulative distribution function and β is the vector of parameters to be estimated. We estimated the parameters in equation 1 using a quasi-maximum likelihood function in which the likelihood of an observation is specified as the Bernoulli likelihood function (L_i). In mathematical terms,

$$(2) \quad L_i = G(\mathbf{X}_i\beta)^{D_{ij}} [1 - G(\mathbf{X}_i\beta)]^{1-D_{ij}}.$$

We apply quasi-maximum likelihood estimation (QMLE) to obtain robust estimators. One attractive property of QMLE is that the vector of parameter β is consistent as long as the conditional expectation in equation 1 is correctly specified. The empirical model consists of the following vector of explanatory variables with their corresponding coefficients.⁸

$$(3) \quad \mathbf{X}_i\beta = \beta_0 + \beta_1 Year_i + \beta_2 Cases_i + \beta_3 Marketing Challenge_i \\ + \beta_4 Promotion Intensity_i + \beta_5 Collaboration_i + \beta_6 Own Grape Share_i$$

We employ the estimated coefficients to calculate marginal effects of the independent variables on distribution channel choices. The marginal effects are calculated employing the sample mean of the independent variables. The increments for calculating the marginal effects are selected to facilitate economic interpretation. For example, to measure the marginal effects of winery size we employ production increments of 1,000 cases (as opposed to only one case).

⁸ In the fractional logit model, multicollinearity could potentially generate inefficient parameter estimates. However, we estimated the correlation matrix of variables in the model and verified that multicollinearity was not affecting the empirical results.

Results

We present the fractional logit parameter estimates in Table 4 and report the associated marginal effects calculated at the sample mean of the explanatory variables in Table 5. The pseudo R-squares suggest that our model explains 29 percent of the variance of the share of total sales in each distribution channel. This measure of fit varies across equations, ranging from 40 percent for winery tasting rooms to 16 percent for direct shipments. We employed Akaike and Bayesian information criteria to select the empirical model specified in equation 3.

Hypothesis 1: Winery Characteristics

The coefficient on the independent variable for the number of years the winery has been in operation (*Year*) is negative and statistically significant for tasting room sales and positive and statistically significant for the other three distribution channels (Table 4). The marginal effect of *Year* suggests that the percentage of sales from tasting rooms is 4 percent smaller for a winery that is ten years older

Table 4. Regression Results for Winery Distribution Choices

Variable	Distribution Choice			
	Winery Tasting Room	Distributor	Institution	Direct Shipment
<i>Year</i>	-0.021** (0.012)	0.086*** (0.019)	0.035** (0.017)	0.028** (0.016)
<i>Cases</i> (thousand)	-0.029*** (0.001)	0.011** (0.001)	-0.017 (0.011)	-0.031** (0.015)
<i>Marketing Challenge</i>	-0.214** (0.113)	0.373** (0.171)	0.191 (0.142)	0.157 (0.134)
<i>Promotion Intensity</i>	0.180* (0.115)	1.028*** (0.331)	-0.289** (0.144)	0.593*** (0.139)
<i>Collaboration</i>	-0.131* (0.082)	0.539*** (0.189)	0.150* (0.104)	0.018 (0.089)
<i>Own Grape Share</i>	0.593** (0.358)	3.042*** (1.006)	-0.592 (0.476)	-0.311 (0.402)
Constant	1.234* (0.800)	-17.121*** (3.096)	-1.989** (0.915)	-8.166*** (1.002)
No. of Observations	73	73	73	73
Log of pseudo-likelihood	-29.09	-7.94	-15.87	-4.73
Deviance	16.37	4.30	10.78	1.74
Pearson chi-square	16.89	7.84	12.27	1.62
Akaike Info. Criterion	0.99	0.41	0.63	0.32
Bayesian Info. Criterion	-266.80	-278.87	-272.39	-281.43

Note: *, **, and *** denote coefficient estimates statistically significant at a 0.15, 0.10, and 0.05 level, respectively. Standard errors are presented in parentheses. Each variable is defined in Table 2.

than the sample mean (10.7 years) (Table 5) compared to a winery of mean age. This is consistent with our first hypothesis, that newer wineries obtain a larger share of sales from tasting rooms. However, the marginal effect of years of operation for direct shipment (*Direct*) has the opposite sign and suggests that sales by direct shipment are 0.3 percent greater for a winery that is ten years older than the mean. This increment is more than twice the average percentage for sales through direct shipment (0.2 percent). This large difference may stem from the infrastructure investment that is required to develop a direct shipment channel. Older wineries likely sell more through direct shipment because they have developed a scale of operation large enough to overcome such a barrier. The influence of a winery's age on the percentage of sales through distributor and institution channels is as expected; sales through a distributor are 0.6 percent greater and sales through institutions are 2.4 percent greater for a winery that is ten years older than the mean.

The coefficient of *Cases*, our measure of production volume, is positive and statistically significant for the distributor channel and negative and statistically significant for the tasting room and direct shipment channels (Table 4). In terms of marginal effects (Table 5), the share of sales through distributors is 0.01 percent greater for a winery that produces 1,000 cases more than the sample mean of 5,824 cases per year. Likewise, the same winery's share of sales through a tasting room is 0.55 percent less and of sales by direct shipment is 0.40 percent less compared to an average size winery. This result also supports our first hypothesis, that smaller wineries sell more of their wines through direct channels.

Table 5. Marginal Effects for Explanatory Variables

Variable	Distribution Choice			
	Winery Tasting Room	Distributor	Institution	Direct Shipment
<i>Year</i>	-0.004** (-)	0.001* (+)	0.002** (+)	0.000** (-)
<i>Cases</i> (thousand)	-0.005*** (-)	0.000 (+)	-0.001 (+)	-0.004** (-)
<i>Marketing Challenge</i>	-0.040** (-)	0.003* (+)	0.013 (+)	0.002 (-)
<i>Promotion Intensity</i>	0.034* (+)	0.008*** (+)	-0.020*** (?)	0.007*** (+)
<i>Collaboration</i>	-0.025** (-)	0.004** (+)	0.010* (+)	0.000 (-)
<i>Own Grape Share</i>	0.111** (-)	0.022*** (+)	-0.041 (-)	-0.004 (-)

Notes: Marginal effects were calculated at the sample means for continuous variables. Signs in parentheses represent the hypothesized direction of the marginal effect based on hypotheses H1–H4. Proposed direction of partial effects is presented in parentheses for crosscheck purposes. *, **, and *** denote coefficient estimates statistically significant at a 0.15, 0.10, and 0.05 level, respectively. Marginal effects are calculated as dy/dx ; number of observations is 73.

Hypothesis 2: Marketing Efforts

The coefficient of *Marketing Challenge* is negative and statistically significant for the tasting room channel and positive and statistically significant for the distributor channel (Table 4). Recall that *Marketing Challenge* is a discrete variable with a value between 0 (marketing is not one of the three top challenges faced) and 3 (marketing is the number one challenge faced). Therefore, the marginal effects suggest that the share of sales through the tasting room is 4.0 percent smaller for a winery that scores one point higher in terms of marketing challenge than for a winery with the mean score (1.3). Conversely, the share of sales through distributors is 0.3 percent higher for a winery that scores one point higher in terms of marketing challenge than for a winery with the mean marketing challenge score. The marketing challenge variable is not significant for the institution and direct shipment channels.

We find positive and statistically significant coefficients for promotion intensity for the tasting room, distributor, and direct shipment channels. In contrast, we find a negative and statistically significant coefficient for this variable for the institution channel (Table 4). The marginal effects shown in Table 5 indicate that the shares of sales for a winery that employs one promotion tool more than the mean number are 3.4 percent greater for the tasting room channel, 0.8 percent greater for the distributor channel, and 0.7 percent greater for the direct shipment channel compared to a winery that employs the average number of promotions (5.8). In contrast, the share of sales through the institutional channel is 2.0 percent less for a winery that employs one additional promotion tool than for a winery using the average number of promotions.

These results support our second hypothesis that more intensive promotion is associated with marketing through the noninstitutional channels. The negative effect of promotion intensity on the institutional channel may be a result of the dominant role played by restaurant server recommendations.

Hypothesis 3: Horizontal Integration

The coefficient estimate for horizontal integration, *Collaboration*, is negative and statistically significant for the tasting room channel and positive and statistically significant for the distributor and institutional channels (Table 4). The marginal effect of collaboration for tasting rooms suggests that the share of sales through a tasting room is 2.5 percent smaller for a winery with a collaboration score one point greater than the mean relative to a winery with the mean score of 6.1. The influence of *Collaboration* on the share of wine sold through distributors and institutions is the opposite (Table 5). The marginal effects show that the share of sales through distributors is 0.4 percent greater and the share of sales through institutions is 1.0 percent greater for the winery with a collaboration score one point greater than the mean. These results support our third hypothesis that wineries with a greater degree of horizontal integration sell more of their wines through multi-layer distribution channels.

Hypothesis 4: Vertical Integration

The coefficient estimate for the degree of vertical integration, *Own Grape Share*, is positive and statistically significant for the tasting room and distributor

channels. In terms of marginal effects, the share of sales through a tasting room is 1.1 percent greater and the share of sales through distributors is 0.2 percent greater for a winery that uses 10 percent more than the mean percentage of their own grapes (48 percent). These results fit the prediction of our fourth hypothesis that a winery with a greater degree of vertical integration sells more of its wines through distributors because it has greater control over the production process and thus can provide a consistent volume and better quality. Vertical integration may positively influence sales through tasting rooms because larger vineyards make a winery more of a destination, thereby increasing visitor traffic.

Conclusions

This study examined factors that influence the choice of distribution channels by operators of wineries located in emerging cool climate regions using data collected from 73 wineries in Missouri, Michigan, and New York. Understanding the determinants of distribution channel choice is important because a growing number of small- and medium-sized wineries have been established in nontraditional regions in recent years. We developed a conceptual framework to test the influence of microeconomic, institutional, and functional factors on the selection of distribution channels.

Overall, we find that the winemakers in our sample depend heavily on sales from tasting rooms. As they gain experience and increase their production capacities, however, they begin to use distributors, restaurants and other institutions, and direct shipments to consumers. The implication is that tasting rooms are an attractive, high-margin, low-volume distribution channel for small and relatively new wineries and play an important role in the initial stages of growing a winery business. It is not surprising, therefore, that marketing represents less of a challenge for these winery owners than for their larger, more experienced counterparts. In addition, our results suggest that wineries that emphasize the tasting room channel should conduct a large number of promotional activities given the positive association between those sales and promotion intensity. Thus, new and small wineries are likely to benefit from marketing education programs by industry associations and the cooperative extension system at land grant universities. A more complete understanding of marketing strategies will benefit winery managers as they develop tasting rooms.

Our results suggest that the other distribution channels (distributors, institutions, and direct shipments) become more important as the winery operator gains experience. Moreover, for managers who want to expand their production and market penetration, the distributor channel is particularly important. According to our study, increased horizontal integration through inter-winery collaboration improves the ability of these wineries to access distributor and institutional channels. At the same time, however, wine producers who use those channels report that marketing is a significant challenge for them. As a result, programs aimed at facilitating and sustaining inter-winery collaboration will be critical as wineries in nontraditional regions expand production and consider additional distribution channels.

Our study sheds light on how wineries select distribution channels using a sample of wineries in Michigan, Missouri, and New York. We believe that these findings are valuable to wine producers in other nontraditional regions such as Texas, Virginia, and Washington given the similarities among these states

in development of their wine industries. Our results may not apply to well-established wine regions such as those in California and some parts of Oregon where the industry structure and the institutions are different (e.g., their wines are nationally distributed and have already built a strong reputation among distributors and consumers).

This study provides valuable insight into factors that influence the distribution channels chosen by wine producers, and future research could address its limitations. Our regression model, like many models used in empirical studies, may suffer from missing variables. For example, a winery's proximity to a metropolitan area may play an important role in the selection of distribution channels. In addition, our sample of wineries is small and covers only a portion of the emerging cool climate wine regions in the United States. Future studies could expand the geographic scope and refine techniques to achieve a higher survey response rate.

References

- Anderson, E., and B.A. Weitz. 1986. "Make-or-Buy Decisions: Vertical Integration and Marketing Productivity." *Sloan Management Review* 27(3): 3–17.
- Carlsen, J. 2004. "A Review of Global Wine Tourism Research." *Journal of Wine Research* 15(1): 5–13.
- Coughlan, A., E. Anderson, L.W. Stern, and A. El-Ansary. 2006. *Marketing Channels* (7th edition). Upper Saddle River, NJ: Prentice Hall.
- Dodd, T.H. 1995. "Opportunities and Pitfalls of Tourism in a Developing Wine Industry." *International Journal of Wine Marketing* 7(1): 5.
- . 1999. "Attracting Repeat Customers to Wineries." *International Journal of Wine Marketing* 11(2): 18–28.
- Economides, N. 1999. "Quality Choice and Vertical Integration." *International Journal of Industrial Organization* 17(6): 903–914.
- Folwell, R.J., and M.A. Grassel. 1995. "How Tasting Rooms Can Help Sell Wine." *Direct Farm Marketing and Tourism Handbook*. Tuscon, AZ: University of Arizona College of Agriculture. Available at www.ag.arizona.edu/arec/pubs/dmkt/HowTastingRooms.pdf.
- Gattorna, J. 1978. "Channels of Distribution Conceptualization: A State-of-the-Art Review." *European Journal of Marketing* 12(7): 469–512.
- Gómez, M.I., and L. Sun. 2011. *Entrepreneurship in Growing Wine Regions*. Presentation at Extension Meeting with Emerging Region Winery Owners, Plattsburgh, New York, November 3.
- Gurau, C., and F. Duquesnois. 2008. "Direct Marketing Channels in the French Wine Industry." *International Journal of Wine Business Research* 20(1): 38–52.
- Hall, C.M., L. Sharples, B. Cambourne, and N. Macionis. 2000. *Wine Tourism around the World: Development, Management, and Markets*. Oxford, UK: Butterworth-Heinemann.
- Hollebeek, L.D., and R.J. Brodie. 2009. "Wine Service Marketing, Value Co-creation, and Involvement: Research Issues." *International Journal of Wine Business Research* 21(4): 339–353.
- King, R.P., M.I. Gómez, and G. DiGiacomo. 2010. "Can Local Food Go Mainstream?" *Choices* 25(1): 4.
- Kolyesnikova, N. 2007. "Marketing Strategies for Small Wineries." Presentation to the annual conference of the Texas Wine and Grape Growers Association, Houston, TX.
- Lesser, W.H., and V. Roller. 1982. "Identifying Factors Affecting Productivity in Grocery Distribution Centers." *Journal of Food Distribution Research* 13(2): 35–46.
- Marsh, I., and B. Shaw. 2000. *Australia's Wine Industry: Collaboration and Learning as Causes of Competitive Success*. Sydney, NSW: Australian Business Foundation.
- Martinez, S.W., M.S. Hand, M. Da Pra, S.L. Pollack, K.L. Ralston, T.A. Smith, S.J. Vogel, S. Clark, L. Lohr, S.A. Low, and C. Newman. 2010. "Local Food Systems: Concepts, Impacts, and Issues." Economic Research Report 96635, Economic Research Service, U.S. Department of Agriculture.

- Michigan Grape and Wine Industry Council. 2011. *Economic Impacts of Michigan Grapes and Wine 2005*. Available at www.michiganwines.com/docs/Industry/micheconimpact.pdf (accessed December 2012).
- National Agricultural Statistics Service, U.S. Department of Agriculture. 2011. *2011 Grape and Wine Industry Survey*. Available at www.nass.usda.gov/Statistics_by_State/Wisconsin/Publications/Crops/WIGrapeWine.pdf (accessed January–April 2013).
- New York Wine and Grape Foundation. 2011. “Facts and Figures” website. www.newyorkwines.org/Pages/FactsAndFigures (accessed November 2012).
- Papke, L.E., and J.M. Wooldridge. 1996. “Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates.” *Journal of Applied Econometrics* 11(6): 619–632.
- Pennerstorfer, D., and C. Weiss. 2012. “Product Quality in the Agri-Food Chain: Do Cooperatives Offer High-quality Wine?” *European Review of Agricultural Economics* 40(1): 143–162.
- Ropel, S.C., B.L. Smith, and M.N. Reuber. 2009. “New York Winery Survey 2008.” National Agricultural Statistics Service, USDA, Washington, DC. Available at www.newyorkwines.org/PDFs/NASSWinerySurveyPub2008.pdf (accessed October 2012).
- Schamel, G. 2009. “Dynamic Analysis of Brand and Regional Reputation: The Case of Wine.” *Journal of Wine Economics* 4(1): 62–80.
- Schamel, G., and F.J. Santos-Arteaga. 2013. “Strategic Choice of Organizational Form: A Theoretical Model and Empirical Evidence.” Paper presented at the 2013 American Agricultural Economics Association annual meeting in Washington D.C. Available at <http://purl.umn.edu/150311> (accessed February 2013).
- Stonebridge Research. 2010. “The Economic Impact of Wine and Grapes in Missouri 2010.” Stonebridge Research Group, St. Helena, CA. Available at www.iccve.missouri.edu/publications/mo-winery-impact.pdf (accessed January 2013).
- U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau. 2013. *2009 Wine Statistical Information*. U.S. Treasury Department, Washington, DC. Available at www.ttb.gov/wine/wine-stats.shtml (accessed multiple times in 2013).
- Wargenau, A., and D. Che. 2006. “Wine Tourism Development and Marketing Strategies in Southwest Michigan.” *International Journal of Wine Marketing* 18(1): 45–60.
- Wine Institute. 2013. “Number of California Wineries” web page. Wine Institute, San Francisco, CA. Available at www.wineinstitute.org/resources/statistics/article124 (accessed February 2013).
- Wyatt, R. 2011. “Undiscovered Wine Regions.” *Wine Enthusiast*. Available at www.winemag.com/Wine-Enthusiast-Magazine/February-2011/Undiscovered-expansion (accessed February 2013).
- Zuurbier, P.J.P. 1999. “Supply Chain Management in the Fresh Produce Industry: A Mile to Go?” *Journal of Food Distribution Research* 30(1): 20–30.