

**Pricing Attributes of Wines from Emerging Suppliers on the British Columbia
Market**

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Abstract

We examine British Columbia (BC) wine consumers' valuation of wine imported from emerging suppliers (Argentina, Bulgaria, Chile, Croatia and Hungary) through the estimation of a hedonic price function. Retail sales data employed in this study comes from the BC Liquor Distribution Branch and covers weekly sales of table wine that was imported from all five countries into the province of British Columbia. The results indicate that the grape variety is an important factor influencing consumers' willingness to pay. In particular, white and red wines from Chile are associated with larger price premia while wines from Argentina command a premium only among red wines. Wines from Bulgaria, Croatia and Hungary, although sold in large quantities in the BC market, are associated with significant price discounts compared to wines from New World suppliers.

Keywords: hedonic pricing, New World countries, wine, objective characteristics

Introduction and objectives

The second largest grape growing province in Canada, behind Ontario, British Columbia (BC) is also a major producer and a major consumer of wine. Per capita wine sales in BC have shown a significant growth of 20 percent between 2003 and 2007, and volume growth of wine sales at 27 percent outpaced that of spirits and beer combined (Statistics Canada 2007). Even though BC has been growing superior grapes that have resulted in higher quality wines, imports from the so-called Old World and New World producing countries still appear to be necessary to satisfy the taste and preferences of BC consumers. In fact, sales of imported wine by volume increased by 23 percent between 2000 and 2005 while those of domestic wine increased by a much slower 13 percent (Hope-Ross 2006).

The BC wine market is changing rapidly, and so are its players. While Old World wine producers such as France and Italy are still the main sources of imported wine in BC, new producers from South America, and Central and Eastern Europe are gaining market share. Our study focuses on imports from Argentina, Bulgaria, Chile, Croatia and Hungary. Argentina and Chile are considered New World countries according to the wine lexicon (Foster and Spencer 2002), and their wines have gained significant international reputation in the last ten to fifteen years. On the other hand, Bulgaria, Croatia and Hungary do not fall into any wine-related category per se, but they are often referred as “transition economies.” Ever since the end of the Soviet Union and the subsequent entry to the European Union of Bulgaria (in 2007) and Hungary (in 2004), their wine industries have re-emerged and slowly gained international competitiveness (Noev and Swinnen 2001). We consider all five countries to have the status of “an emerging supplier” in the

BC wine market, and thus, refer to them as emerging wine countries throughout this paper.

This paper aims to extend the existing literature on wine studies by estimating a hedonic price function for wine from emerging suppliers. To the knowledge of the authors, this is the first attempt to estimate such model, especially for Central and Eastern European suppliers. The first and general objective of this paper is to estimate a hedonic pricing model for wine imported from the five emerging countries in the BC wine market. Second, we examine the relationship between the price of wine and its various attributes and see which of these attributes are statistically significant in determining prices. Results originated from this paper reflect consumers' valuation of wine attributes and thus, provide useful market information for producers' decision making and retailers' purchasing strategies.

The remainder of this paper is structured as follows. Section II presents an overview of the wine industry in British Columbia. In Section III we provide a brief review of the literature on hedonic pricing models and their application to wine. Section IV describes the methodology and data used for our estimation. Section V discusses the empirical results for the estimated models, and the final section summarizes the main findings of this study and describes some marketing and policy implications.

Overview of the British Columbia Wine Market

Although Canada is not a major player in the global wine making market compared to other developed countries, its wine industry has undergone major positive changes. Growing consumer and production demand, the advent of the North American Free Trade Area, new investments along with government support (Agriculture and Agri-Food

Canada 2009) have all contributed to the gradual growth of the industry.

British Columbia, one of Canada's leading wine regions, planted its first grapevines in the 1860s although commercial wine making did not start until 1930s. In the premature stages of production, producers were focused on making dessert and fortified wines (Williams and Dossa 2003). Over the years, production has not only expanded to more than sixty group varietals including Merlot, Pinot Noir and Chardonnay, but it has also improved in terms of quality. Part of this improvement can be attributed to the creation of the Vintners Quality Alliance (VQA), a national premium wine standard that regulates domestic production practices, quality and labeling. Between 2000 and 2005, the number of existing wineries almost doubled going from 60 to 119 wineries. During the same period, sales of wine made in BC experienced a similar increase going from 48.7 million CND\$ to almost 115 million CND\$ (BC Wine Institute 2011). Moreover, the introduction of regional appellations and even sub-appellations in British Columbia, which is comparable to the concept of European "terroir," gives evidence of the province's evolving sophistication in the winemaking field. Despite the unquestionable success and steady expansion of the domestic wine industry in British Columbia, local consumers still seem to purchase imported wine in significant and increasing quantities. Between 2002 and 2006, the consumption of domestic wine rose by 17 percent while that of imported wine rose by 28 percent (British Columbia Liquor Distribution Branch 2007).

Even though Old World countries are still the top suppliers of imported wine in British Columbia, they have been losing market share at the expense of wine supplied from other parts of the world. Within our group of emerging suppliers, Chile and

Argentina are the ones that have promoted their products more aggressively and thus, captured larger portions of the market. Croatia, Bulgaria and Hungary, on the other hand, have undergone different paths primarily due to their socialist heritage. Their communist regimes protected the wine sector quite heavily, and state intervention was still latent throughout the 1990s (Sidlovits and Kator 2007). During the period of transition, these countries experienced a series of changes such as the vineyard restructuring, land privatization and new know-how. In addition, Bulgaria and Hungary started to receive additional funds after their accession to the EU. Evidently, these countries are trying to re-emerge in the global market embracing a competitive market strategy.

Hedonic Pricing Technique and Its Application in Wine Studies

There is an extensive stream of studies that have analyzed the relationship between prices and product attributes through hedonic price models. The earliest recognized application in agricultural economics comes from Waugh (1928), who measured the effect of quality factors on prices of asparagus, tomatoes and cucumbers. The results provided practical value, especially to vegetable producers, who intended to discover consumers' valuation for particular product characteristics. Followed Waugh's work, several more studies followed, including a classic paper by Rosen (1974) who is believed to have established the theoretical foundation of hedonic price analysis. Rosen suggests that consumers pay an implicit price for each quality attribute of a given good, and the sum of these implicit prices translates into observed market prices.

Applications of the hedonic pricing technique to the wine industry started developing in the 1990s. The fact that wine is a highly differentiated product makes it an

appropriate candidate for hedonic techniques. According to the existing literature, there are three different sets of variables that affect prices of wine. The most widely studied category consists of the so-called objective attributes such as grape variety, appellation of origin, harvest year (vintage), name of brand, and alcoholic content to name a few. Since wine producers include most of this information on their labels consumers are aware of these quality attributes at the point of purchase. Golan and Shalit (1993) intended to evaluate and identify quality characteristics of Israeli wines through a hedonic pricing system. Focusing mainly on the effect of grape variety on wine prices, they developed a producer pricing schedule. Oczkowski (1994) on the other hand, incorporated more variables in his hedonic model such as grape style, grape region, grape vintage and producer size, and found all of them to be statistically significant in explaining price differentials of Australian wines.

The other two sets of categories that relate to wine quality are based on sensory evaluations and reputation of wines. Probably the most cited study within the first category is by Combris et al. (1997; 2000), who employed a hedonic model for Bordeaux and Burgundy wines using data from an independent panel of tasters. Based on both label and sensorial characteristics, the Bordeaux study concluded that objective attributes appeared to be better indicators of price variations compared to sensorial attributes while the Burgundy study found the latter attributes somewhat significant. As a result, evidence of the effects of sensory wine characteristics is ambiguous. The authors ascribe this inconclusiveness to the existence of imperfect information and the high transaction costs associated with the acquisition of data on sensorial variables. The third category focuses on the importance of reputation of wines as well as of wine producers. Landon and Smith

(1997) pioneered this category. They expanded on previous studies by adding single and collective wine reputation as an explanatory variable for price variation. They concluded that the long-term reputation is a superior determinant of consumers' valuation of wine to short-term quality factors. A more recent study by Benfratello et al. (2009) on vintage Italian wines also found evidence for significant effects of reputation on consumers' willingness to pay.

Few hedonic price studies have explored the Canadian wine market. Florkowski et al. (2008) examined the effects of reputation and vintage on Italian wines sold in British Columbia. Using brand names as proxies for the individual firm reputation, the authors concluded that this particular variable was an important factor. Expanding on the studies of BC consumers' valuation of European wines, Carew and Florkowski (2010) examined the role of geographic wine appellations of Burgundy wines as well.

Data

Our study employs wine sales data sourced from the British Columbia Liquor Distribution Branch. The data covers weekly retail sales of imported table wine in 0.750 liter bottles from Argentina, Bulgaria, Chile, Croatia and Hungary for 108 weeks over the period from April 20, 2002 to May 8, 2004. Thus, the total number of observations is 1,020. In addition to prices, quality attributes such as grape variety, color, quantity sold, and alcoholic content are also obtained from the dataset. Table 1 provides a summary of the descriptive statistics. Given the categorical nature of the grape variety variable, a set of zero-one dummy variables was constructed to represent each of the ten grape varieties in the red wine group and the four grape varieties in the white wine group. There is a

clear prevalence of red wine in the data given that 74 percent of wine imported from all five regions is red. It can also be noted that while Argentina and Chile supply better-known varieties such as Cabernet Sauvignon and Chardonnay, the rest of the countries supply native varieties (Bulgaria's Hemus) or blends (Hungary's Egri Bikaver and Croatia's Kastelet).

Additional dummy variables were used to account for factors that could affect the number of wine bottles sold each week. Therefore, a set of dummy variables was added to capture the effect of seasons (summer, fall, winter and spring) and festive holidays (Christmas and New Year) on wine sales.

The Specification of the Empirical Model

Following the conventional hedonic price analysis, we assume that consumer preferences are based on the attributes of the goods rather than on the actual market goods. Under this assumption, two units of identical goods should carry the same price. However, let us consider a different scenario in which one of these goods has a particular attribute that is valued by consumers. Then, the difference in price between these two goods, *ceteris paribus*, should represent consumers' willingness to pay for that particular attribute (Rosen 1974). We propose that a bottle of wine embraces a bundle of objective attributes, which are represented by a vector z . Then, the price of this good becomes an implicit price function defined as follows:

$$P(z) = f(z_1, z_2, z_m)$$

We assume markets are perfectly competitive and that given a certain budget constraint,

consumers have made their utility-maximizing choices. The derivative of the hedonic price function with respect to each attribute equals the marginal willingness-to-pay for a change in that attribute, thus taking the form:

$$\frac{\partial P}{\partial z_i} = P_i = [(\partial U / \partial z_i) / (\partial U / \partial x)] \forall i$$

The next step is to identify the appropriate functional form. Even though there is little theoretical guidance regarding which functional form is suitable for hedonic pricing models, previous work has led researchers such as Oczkowski (1994), Nerlove (1995), Schamel and Anderson (2003), Troncoso and Aguirre (2006) and Carew and Florkowski (2010) to prefer the log-linear form. In light of the above discussion, we estimate separate models for red and white wines expecting to see possible differential impacts due to the different wine type reflected in the color of wine. Thus, our empirical model specification takes the following functional form:

$$\ln(P_{it}) = \alpha + \beta_1(\text{variety}_{it}) + \beta_2(\text{alcohol}_{it}) + \beta_3(\text{quantity}_{it}) + \beta_4(\text{season}_{it}) + \beta_5(\text{holiday}_{it}) + u_{it}$$

where the betas are the unknown parameters to be estimated and u_{it} is the random error term. Our dependent variable, $\ln(P_{it})$, represents the natural logarithm of the observed price in CND\$. The group of explanatory variables is comprised of a combination of continuous and discrete variables. The inclusion of grape variety as a determinant of price deems appropriate as the variety of grape is considered to have an important effect on the style and taste of the wine (Landon and Smith 1998). The variables, alcohol_{it} and quantity_{it} , represent the alcoholic content and number of bottles sold respectively. Following Costanigro et al. (2007) and Carew and Florkowski (2010), the quantity variable acts as a proxy for the supply of wine available at the time of purchase.

In order to avoid the so-called “dummy variable trap” that can result in collinearity between dummy variables, a base variable was omitted in two groups. Merlot from Chile was chosen as the base variety in the red wine sample and Chardonnay from Chile in the white wine sample. Summer was the chosen season of the year to act as the reference variable in the corresponding dummy group.

Next we tested for the existence of severe multicollinearity by calculating the correlation matrix. Correlation coefficients do not appear to be problematic discarding the possibility of unreliable standard errors. Our specified equation was estimated using ordinary least squares.

Results

Red Wines

Table 3 shows estimated results of the hedonic price equation for red wines. The adjusted R-square is high at 0.90 indicating that the specified model can explain 90 percent of variation in observed prices. The majority of grape varieties included in the study have estimated coefficients that are highly significant. The varieties of grape earning the highest premium in respect to the Chilean Merlot are Carmenere, Malbec and Cabernet Franc at 48, 79 and 75 percent, respectively. The parameters of Cabernet Sauvignon, Argentinean Merlot, Pino Noir and Shiraz indicate much lower premiums at 17, 5, 25 and 12 percent, respectively. On the other hand, the Hungarian Egri Bikaver and Bulgarian Gamza have large negative impacts on price in respect to the Chilean Merlot showing aggressive pricing of these varieties. Consistent with the prediction of economic theory, there is an inverse relationship between prices of red wine and volume suggesting that

scarcity results in price increases.

White Wines

Coefficient estimates for the group of white wines is presented in Table 4. The measure of goodness-of-fit was good at 0.84 indicating that 84 percent of variation in observed prices can be explained by the specified model. The high significance of the estimated coefficients for grape varieties indicates that the variety of the grape plays an important role in consumers' decision making when purchasing wine. All coefficients are relative to a Chardonnay from Chile and measure the percentage price premium or discount that the rest of the wines receive with respect to the reference variable. Considering that Chardonnays from Chile present the highest mean price of all white wines it is not surprising to see that most of the varieties earn a price discount of approximately 55 percent. The Bulgarian Hemus, the lowest priced wine in the data, also has the largest negative impact on price.

Changes in seasonal weather appear to have an effect on prices of white wine. The estimated coefficients for spring and fall are statistically significant at the 5 percent level and are relative to summer, which is the base variable. While the estimated coefficient for spring has a negative sign, the one for fall has a positive sign. The fact that white wine is more likely to be consumed chilled makes it more suitable for consumption during the summer. Thus, the increasing demand for white wine in the spring can translate into a price discount relative to the price in summer. Spring weather is still relatively cool in British Columbia. However, the demand for white wines seems to be peaking in the fall, when white wines bring a premium even as compared to the prices in

summer. Fall typically has a pleasant weather and its first part associated with the end of calendar summer and the beginning of fall encourages socializing, which likely contributes to the increased demand. Winter is less conducive to white wine consumption because of the changed seasonal weather, which affects the lifestyle including the forms of socializing (e.g., more indoor events) and the type of consumed food.

Implications and Conclusion

The methodological approach employed in this paper is the hedonic pricing technique widely used in applied studies. This study contributes to the existing literature by estimating a hedonic price function for emerging wine suppliers in the BC market. Results from the hedonic modeling reflect the implicit values that BC consumers place on a set of wine attributes. Thus, it can be assumed that a higher recognition of a certain wine characteristic leads to a higher price and vice versa. Results show that grape variety has an important effect on price and that BC consumers are willing to pay more for wines made from certain varieties than others. The result is consistent with the idea that consumers rely far more on objective characteristics that appear on labels than on subjective characteristics (Troncoso and Aguirre 2006). In general, Chilean producers seem to be better able to command higher prices for their red and white wines. Compared to its neighbor producer, Argentina reports much lower price premiums, with the exception of wines made from Malbec. According to Stein (2008), Malbec is Argentina's flagship variety and the main reason for the country's increasing popularity.

BC consumers appear to pay significant price discounts for wines originated from Central and Eastern Europe indicating the low value that is attached to these wines

compared to those from the New World. Even though the Bulgarian Hemus and Gamza along with the Hungarian Egri Bikaver are competitively priced, consumers might see low prices as a signal for inferior quality wines. Moreover, the fact that quality and image were neglected under the years of Communism has hindered the ability of these producers to build their reputation worldwide. A seminal paper by Akerlof (1970) argues that a firm cannot charge a premium for a high-quality product if consumers do not have full information on product quality. Even though this study was applied to the automobile market, it can easily extend to the wine market. It can be argued that BC consumers lack information about native varieties of grape that originate from countries like Bulgaria, Croatia or Hungary, and as a result, cannot value them as they value more common varieties. On the other hand, Chilean wines started attracting critical attention and market share before the rest of these emerging suppliers. Chilean wines have been able to build their reputation and therefore, command higher prices.

Because the world wine market witnesses the entry of new suppliers, product differentiation will play an increasingly important role. The results of our study suggest that the choice of the right variety can have considerable implications to the commercial success of a producer. Moreover, understanding how consumers assess wine's objective attributes helps both marketers and producers from emerging countries to differentiate their product more efficiently. It is thus fair to stress that this work should be complemented with further exploration of wine characteristics that may affect wine prices. As suitable data becomes available, suggested variables may include vintage year, role of experts' rating, brand affiliation and reputation and allow to derive additional practical recommendations for wine producers and distributors.

Table 1. Descriptive and Simple Statistics of Red Wines from Emerging Suppliers on the British Columbia Market, in CDN\$

Variable	Description	Origin	Mean	Minimum	Maximum
<i>All wines</i> (N = 741)					
P	Price		12.06	6.21	37.14
A	Alcohol content		12.69	11	14
Q	Quantity sold (per day)		286	-12	2170
Dcab (N = 85)	Cabernet Sauvignon	Chile	10.32	8.25	20.62
Dcarm (N = 23)	Carmenere	Chile	18.97	14.38	20.62
Degri (N = 108)	Egri Bikaver	Hungary	7.99	7.99	7.99
Dgam (N = 108)	Gamza	Bulgaria	6.85	6.85	6.85
Dkas (N = 108)	Kastelet	Croatia	8.11	8.11	8.11
Dmal (N = 53)	Malbec	Argentina	25.62	25.62	25.62
Dmer_ar (N = 40)	Merlot	Argentina	8.99	8.99	8.99
Dmer_ch (N = 91)	Merlot	Chile	14.51	8.25	37.14
Doth (N = 9)	Cabernet Franc	Chile	17.95	17.95	17.95
Dpino (N = 45)	Pino Noir	Chile	14.95	14.95	14.95
Dshi (N = 71)	Shiraz	Chile	17.93	17.53	19.90

Table 2. Descriptive and Simple Statistics of White Wines from Emerging Suppliers on the British Columbia Market, in CDN\$

Variable	Description	Origin	Mean	Minimum	Maximum
<i>All wines</i> (N = 279)					
P	Price		11.84	4.95	20.62
A	Alcohol content		12.35	11	13
Q	Quantity sold (per day)		75	-12	1839
Dchar_ar (N = 36)	Chardonnay	Argentina	8.99	8.99	8.99
Dchar_ch (N = 68)	Chardonnay	Chile	16.62	8.25	20.62
Dhem (N = 61)	Blend	Bulgaria	4.95	4.95	4.95
Dsau (N = 77)	Sauvignon Blanc	Argentina	11.20	8.99	12.95
Dsem (N = 37)	Semillon	Chile	18.52	18.52	18.52

Table 3. Regression Results of the Hedonic Price Function – Red Wines

Variable	Description	Estimate	Standard Error	t - value
Constant	Constant	-5.899***	0.423	-13.92
	Cabernet	0.175***	0.030	5.82
Dcab	Sauvignon			
Dmer_ar	Merlot (Arg)	0.057*	0.340	1.68
Dcarm	Carmenere	0.477***	0.032	14.52
Degri	Egri Bikaver	-1.237***	0.083	-14.76
Dgam	Gamza	-1.120***	0.083	-12.48
Dkas	Kastelet	-0.015	0.028	-0.54
Dmal	Malbec	0.789***	0.024	32.11
Doth	Cabernet Franc	0.749***	0.052	14.20
Dpino	Pino Grigio	0.251***	0.025	9.73
Dshi	Shiraz	0.123***	0.023	5.23
Dsp	Spring	-0.004	0.014	-0.33
Df	Fall	-0.009	0.015	-0.63
Dwi	Winter	-0.018	0.015	01.17
Dh	Holiday	0.003	0.027	0.12
Q	Quantity	-0.00015***	0.00002	-6.58
A	Alcohol	0.619***	0.030	20.07

Number of observations = 741

Adj. Rsquare = 0.90

Note: *, **, *** denote significant estimates at the 0.10, 0.05, and 0.01 levels, respectively

Table 4. Regression Results of the Hedonic Price Function – White Wines

Variable	Description	Estimate	Standard Error	t - value
Constant	Constant	12.862***	1.260	10.21
Dsau	Sauvignon Blanc	-0.549***	0.044	-12.41
Dchar	Chardonnay (Arg)	-0.555***	0.044	-12.68
Dsem	Semillon	-0.585***	0.105	-5.54
Dmes	Blend	-2.667***	0.196	-13.60
Dsp	Spring	-0.068**	0.033	-2.05
Df	Fall	0.076**	0.035	2.17
Dwi	Winter	0.036	0.038	0.35
Dh	Holiday	0.062	0.091	0.49
Q	Quantity	-0.00009	0.00009	-.102
A	Alcohol	-0.779***	0.096	-8.05

Number of observations = 279
Adj. Rsquare = 0.84

Note: *, **, *** denote significant estimates at the 0.10, 0.05, and 0.01 levels, respectively

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