Wine Production in Québec: an investigation into the price-quality relationship

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Abstract

Wine production in Québec over this period has also grown rapidly with an increased interest for diversified products in terms of quality and price. The growth of supply is related not only to the number of producers but also to the increased varieties of wines proposed. An index of relative firm position in the market based on relative prices has been calculated and we demonstrate that a high price strategy is inversely related to the number of wines produced and the age of the firm. The analysis also demonstrates a positive and significant relation between price and the variable related to the perceived quality of wines (the jury grades or medals).

JEL classification: L11, L15, L66, D21.
Keywords: Wine production, Price index, Price-quality relation.

1   Introduction

What determines the price of a bottle of wine? The question is obviously not new but the most recent papers dealing with this subject tend to go beyond a simple competitive market where the prices are the result of supply and demand (Chiffoleau and Laporte 2004). The price-quality debate has long been controversial (Lecocq and Visser, 2006) and many papers look at the determinants of prices and are reporting estimation results of hedonic price functions were wine's price is determined by grape varietals, climate influences and by the reputation or perceived quality. The empirical studies analyzing the price-quality relationship give rise to various and sometimes contradictory results (see for example, Jones and Storchmann 2001, Oczkowski 2001, Horowitz and Lockshin 2002, Schamel and Anderson 2003, Roberts and Reagans 2007).

Many factors impact the price of a wine including production costs but ultimately, the pricing strategy used for marketing wines should be a function of the demand for wine because consumers are not directly concerned with the cost structure inherent in producing a wine. Reputation, based on past performance, provides an important signal about the quality of the actual products and explains why reputation contributes to higher wine prices (Benjamin and Podolny, 1999). A new wine producer will take into account the consumer perception about the price-quality relationship and will position his wine in a strongly competitive market where the price remains an obvious commercial argument to signal the quality of a wine (Chironi and Ingrassia 2009).

This analysis is of particular relevance for small or new wine producing regions which lack a reputation background. Because wine quality and taste differ by geographic origin and variety, new wine producing regions may have opportunities to define a wine's image (or a winery image) and the producer must carry out arbitration and inform the market on quality of the wine by reflecting it on the final selling price[2]. In the absence of credible reputation, such information may increase the consumer's willingness to pay.

However, wine price exhibits a great variability among producers even for very similar products and the lack of information and the difficulty of developing a credible reputation may lead to price practices that do not correspond to the real quality value. A high price positioning can also be related a strategy based on a high value wine market or niche market. On the other hand, a low price positioning can be referred to firms aiming at an average standard quality and applying a low price strategy. Again, these issues are of particular importance when looking at

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[2]The price is one variable but producers generally use several criteria to signal the quality of their wine: the style of the bottle, the drawing of the label, the marketing approach.

characteristics that may explain the pricing strategy of wine producers in a new and small wine region.

The objective of this paper is to investigate the case of wine producers in the Québec Province of Canada. The analysis is relevant since the number of producers increased from five in 1985 to ten times more in 2009. The wine consumption in Québec over this period has also grown rapidly with an increased interest for wines. Wine production in Québec can be part of this quest for diversified products in terms of quality and price.

The paper is structured as follow. The following sections describe the sector in terms of geographical conditions, types of vines produced and growth of the sector over the past 15 years. In the next sections we propose a measure of price positioning of the wine producers. The analysis of the price-quality relationship is developed and the last section discusses the limits and possible extensions of the analysis.

2   General description of the sector

In 1864 the Quebec government began encouraging the wine grape culture with grants for experimentation on local grapes varietals and more rustic hybrids from the United States. By 1919 all provinces went dry under Prohibition except Quebec which banned the sale of all alcohol but beer and wine. Quebec remained the sole region of North America to escape total prohibition. However, it is interesting to note that Canadian law made it illegal to sell but not to manufacture liquor while during the same period in Québec a combination of pressure from anti-viticulture political-religious groups and decreased support from the state would lead to almost the abandon of wine production. The surprising result was the proliferation of small distilleries in Ontario and other provinces but Québec[3].

Today there are about 250 wineries in Canada within six provinces: British Columbia, Alberta, Ontario, Quebec, Nova Scotia and Prince Edward Island. Canada's cool climatic conditions enable it to be the largest ice wine producer in the world[4]. Ontario's premier wine regions include Niagara Peninsula, Lake Erie North Shore and Pelee Island. British Columbia hosts the second largest grape growing regions including the Okanagan Valley, Similkameen Valley, Fraser Valley and Vancouver Island.

Québec is in the third place with currently more than fifty-five registered winer-

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[3]See Dubois and Deshaies (1997) for a history of wine production in Québec.
[4]Canada produces over 2 million 375ml bottles of ice wine annually. Although Germany and Austria are large ice wine producers, the climate is not as consistently cold as is Canada's to guarantee ice wine production every year.

ies, divided into the areas along and south of the St. Lawrence River. It is only in 1985 that the first wine growers obtained the right to sell their production. In 1987, the first few Québec wine growers formed the *Association des Vignerons du Québec.* Early successes at developing quality products prompted many others to follow and the 1990s saw the establishment of several vineyards all over southern Québec. Never heard of these wineries? Don't feel bad. Neither have most Québécois.

Québec is the least likely of all Canadian wine regions. The south of the province is a fertile region where fruits grow naturally and abundantly. However, the four-month long winter freezes the land deep enough that most varietals of European vines do not survive. Temperatures in Quebec are still cold in April compared to France but nevertheless the number of hours of sunshine is comparable to the situation in Alsace[5]. The centre of the province's wine growing zone is the old town of Dunham. Average sunshine hours during the growing season in Dunham are 1,150 (in Burgundy there are 1,315; Niagara has 1,426 and the Okanagan Valley 1,423), but topographical features create highly localized warm spots that allow the hardiest vines to survive although during the winter months the vines have to be covered to protect them from the fierce cold.

In the 1980s, Quebec wine growers started planting varietals known for their resistance to below-zero temperatures. During the early years, from 1982 to 1992, vineyards mainly emerged in the southern part of Québec province in two regions called Montérégie and Cantons de l'Est (Eastern Townships) but from 1992 onwards, new vineyards started commercial operations in the northern side of the Saint-Laurent River and in Québec city region. Today, vines are cultivated and production is significant in seven regions. There are a total of 55 registered producers at the end of 2009 mainly located in Montérégie and Eastern Townships and a total area of production equal to 272.0 ha, which means an average size per vineyard of 5.1 ha[6].

The grape varietals cultivated in Québec, both white and red, all have common qualities needed for resistance to below-zero winter temperature resistance and short life cycle (fruit maturation before October). The vine varietals that best meet these requirements are those of the Northern France, Germany, and hybrids from France, Québec, and North-Eastern United States.

In 1996, Québec's wineries produced mainly dry white wines (52%) and dry

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[5]Note that the Eastern Townships' wine region is on the same latitude (45°) as Lyon in France and Québec city is on the same latitude as Beaune (Burgundy). See Shaw (1999) and Lasserre (2001).

[6]In this paper we account only for producers registered with the A*ssociation des Vignerons du Québec* and all the statistical information is available on the website of the association at www.vignerons-du-quebec.com.

wines (85% including reds and rosés). From 1996 to 2008, the number of different wines increased from 73 to 255. Dry wines (red, white or rosé) accounted still for more than 64% of the number of wines produced, followed by fortified wines (red or white) for 14.5% and Ice wines for more than 6%. Other types of wines produced are late harvest, sweet wines, appetizers and sparkling wines. Today, more reds than white wines are produced. In reds, Sainte-Croix, Maréchal Foch, Frontenac, Sabrevois and De Chaunac are popular grapes in all regions, while in whites Vandal-Cliché is mostly grown in northern regions and Vidal, Seyval Blanc and Geisenheim are more popular in the Eastern Townships and Montérégie.

The culture of several types of vines is the norm; up to a dozen for some vineyards with an average is five varieties. Diversity proceeds partly from the experimentation and research of vines offering best quality taking into account the constraints of the climate. Another reason for this current practice is the necessity to propose to potential clients a diversified range of quality wines and original tastes to compensate for the weaknesses of harvests of some vines in bad climatic years.

3   The growth of the sector from 1996 to 2009

The sector was limited to a less than a dozen of producers until the beginning of the 90s but recorded an accelerated increase in the number of new vineyards over the past 15 years from 19 in 1996 to a total of 55 at the end of 2009 (Figure 1). At the beginning of the year 2000, exploited total surface area was 164.5 ha, an average 4.98 ha by exploitation. Today, the area of production equals to 272.0 ha, an average size per vineyard of 5.1 ha, but the average size of the most recent vineyards (since 2006) remains below the average with 3.7 ha.

The first two vineyards are recognized to be *Les Côtes d'Ardoise* and *L'Orpailleur* in the Dunham County and are still among the most important vineyards. There is a lack of information on the number of failures during these years but at least eight vineyards among the twenty that were set up during the early years and still in operation in 1996 are closed today[7].

The Québec wine industry is centered on "small vineyards". Size of the vineyards ranges from 18 ha for largest to 1.3 ha for smallest and only the 10 largest are over 10 ha (Appendix 1). The average size is around 6.0 ha. The aggregate output grows from 303,300 bottles in 1995 to 528,700 in 1999 and increased to

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[7]Among these are two renowned vineyards: one of the oldest domains, *Les Arpents de Neige* closed in 2002 and *Dietrich-Joss* closed in 2003 after the sudden death of the owner. This vineyard was one of the first experimenting ice-wine production with success in Québec. In 2003 the vineyard was sold and the vines replaced by corn. It is probably the saddest story of wine production in Québec since its early years.

Figure 1: The growth in the number of producers, 1982-2009
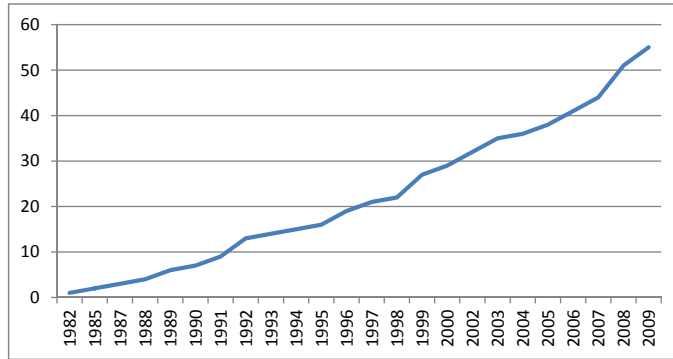
Source: www.vignerons-du-quebec.com/

about 2 million bottles in 2008. Only a few of the oldest wineries produce more than 100,000 bottles annually, with the average being 10,000 to 20,000 bottles.

The development of tourism activities are important and make it possible to partly understand the growth in the number of producers in some regions of Québec province[8]. However, production in volume is low compared to consumption: the Québec consumption of alcohol (wine and other spirits) is growing at approximately 5% annually. In 2007, the annual consumption in million liters was 156.4 (Statistics Canada) while wine production in Québec is more than marginal with only about 1% of this amount. Wine represents 82% of the consumption of alcohol excluding beer. Annual consumption of wine alone per individual over 15 years old was 18.7 liters compared to 12.4 l in 1996. The rest of the consumption comes from other Canadian provinces (5.5%) and foreign countries, notably France (33%), Italy (23%), Argentina (8.4%), Spain (8.3%), United States (6.3%), Australia (6.2%) and other wine producing countries (SAQ Annual Report 2008).

4 A price index of firm position

Since all firms are producing several types of wines, the first step in the analysis is to examine the relative price of each product of a firm compared to the average

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[8]The Eastern Townships and Montérégie areas are only about 45 minutes drive from Montréal and also located near the American border. This is important since wine tourism is a growing business and Québec can establish itself on the wine tourism map due to this proximity.

price in the market. Prices of the different products ranges from $17/liter for dry wines (on average $13 per bottle) to more than $44/liter for late harvest and $132/liter for ice wines (Red Ice wines are rare products only produced in two vineyards) (see table 1).

Table 1: Average prices per liter in 2008

Prices per liter (CAD$), 2008

| Type of wine	Price/liter
White (dry)	$17.7
Red (dry)	$19.3
Rosé (dry)	$17.2
Quality white	$32.0
Quality red	$26.7
Semi-dry wine	$18.0
Sweet wine	$20.0
Sparkling wine	$40.0
Late Harvest	$44.6
Ice wine (white)	$131.7
Ice wine (red)	$205.0
Fortified wine	$34.4

An index of relative firm positioning in the market has been calculated as the average of ratios between firm price for each wine and the sample average price for the same wine category (Coppola et al. 2001)[9]. According to this index, a firm with an index value greater (lower) than 1.0 is positioning itself above (below) average prices.

Because of the geographical diversity of regions in Québec province, some regions may have opportunities to define a wine's image. It could be expected that the historical regions (Montérégie and Eastern Township) could have a comparative advantage over new producing regions. The relationship between the index and the region of origin of the firm shows that in each region some firms are positioning themselves above the average which indicates that firm positioning is not related to the location (see figure 2).

A wine producer's identity is affected partly by the strategy of its products diversification. If a firm's line of products is not coherent in quality, its organizational identity will become incoherent and its products may be devalued (Roberts and Reagans, 2007). Following this logic, we hypothesize that low product diversity in a winery constructs a coherent identity, hence increases wine price. The

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[9]A weighted index was not calculated due to lack of information on the share of each wine on total firm production.

Figure 2: Index of firm position by region of production
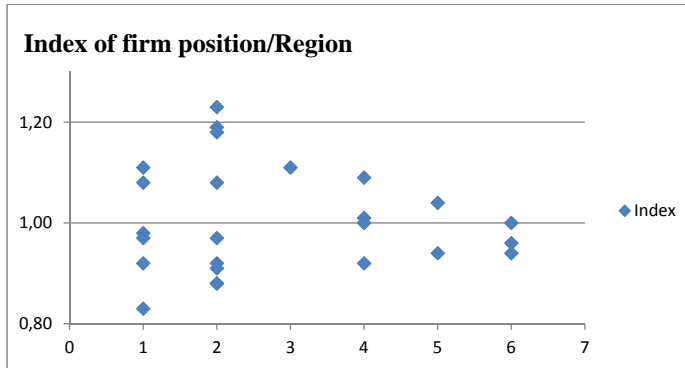
Note : (1) = Montérégie, (2) = Eastern Townships, (3) = Center of Québec, (4) = Québec,
(5) = Basse-Laurentides and (6) = Lanaudière. There is no firm in the last region.

relationship between the index and the number of wine produced shows that firms producing few wines (six or less) have generally average or above the average prices, while a large share of firms applying a more horizontal differentiation are positioned under the average price (see figure 3).

A high price positioning can also be related to either 1) a small firm carrying out a quality strategy based on a niche market, or 2) a large firm selecting high value wine market. On the other hand, a low price positioning can be referred to large firms aiming at an average standard quality and applying a low price strategy or, on the contrary, to more small, marginal and traditional firms (see figure 4). The relationship between the index and the size of the vineyard (measured in ha) shows no significant trend.

Finally, a high price positioning can also be related to the age of the vineyards, assuming that new small firms would prefer to enter the market in a niche market of quality wines (see figure 5).

5   The price-quality relationship in the Québec wine industry

The purpose of the empirical analysis is to examine the relationship between firm's strategies (positioning) and factors explaining this position in the market. In particular we considered some aspects related to the characteristics of the firms and the perceived quality of wine produced. The model is expressed by the following

Figure 3: Index of firm position by number of wines produced by each vineyard
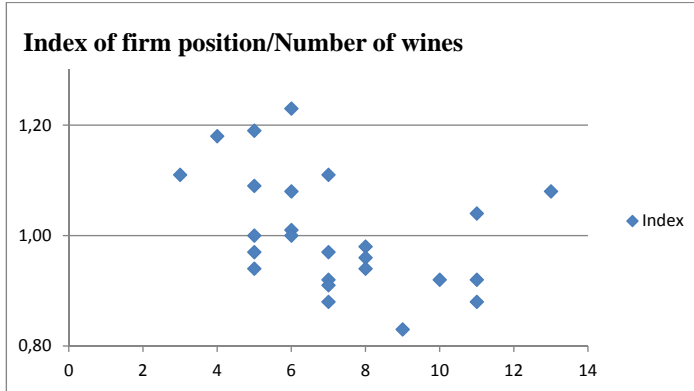
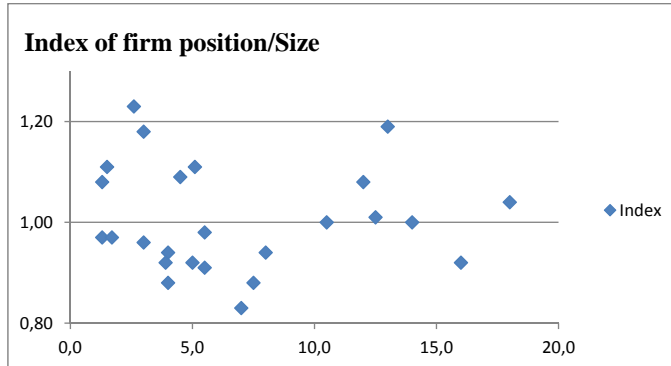equation:

$$PPI_i = f(S_i, Q_i) \tag{1}$$

where:

- PPI_i represents the price-position index of the firm;

- S_i is the set of attributes defining the firm or the characteristics of supply (age, size, number of wines produced, and region of production);

- Q_i is the perceived quality factor measured by the number of medals (gold and silver medals only) gained by the firm in public contests over the period under study A similar measure was proposed by Lima (2006) in the study of prices of Californian wines.

Expert quality evaluations (jury grades or medals) are an important vehicle enabling consumers to learn about the quality and reputation building of producers[10]. However, quality measures and their reliability have been criticized by many authors (Oczkowski, 2001; Hodgson, 2008 and 2009). Lecocq and Visser (2006) suggested two types of explanations for the small correlation between price and average tasting grade. In the first explanation it is argued that the jury members essentially agree on the quality of the wine but make evaluation errors in determining the precise quality level. In the second explanation it is argued that jury

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[10]See Schamel (2009) for a review.

Figure 4: Index of firm position by size of the firm (ha)

members do not make evaluation errors but disagree on the quality of the wine because of taste heterogeneity.

It could also be that jury grades are systematically related over time to the set of attributes (S_i) defining the firm or the characteristics of supply (age, size, number of wines produced, and region of production). The first test is to verify the relationship $Q_i = f(S_i)$.

The relationship has been tested on a data set of firms for which information was available from the Association des Vignerons du Quebec (number of medals awarded and price information to calculate the price-position index) Data were collected in two different periods, i.e. 2008 (27 firms) and 2010 (33 firms). As an example, detailed statistics on the variables for 2008 are presented in appendix 2[11].

Results of OLS estimation for the relationship between quality and characteristics of supply are presented in Table 2 The variance inflation factors in our regressions were all lower than 2.0, indicating that multicollinearity is not a problem. To take into account the possibility of heteroscedasticity in cross-section models, and considering that the number of regressors is small enough, the estimation was performed with consistent standard errors estimates (White 1980). Except for the size variable in 2008, which could be considered marginally significant, none of the variables are significantly correlated with the measure of quality.

Following this validation, results of the estimation procedures for the price-quality relationship are presented in table 3. Again, the variance inflation factors

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[11]Data for 2008 and 2010 are available from the author.

Figure 5: Index of firm position by age of the firm (years of production)
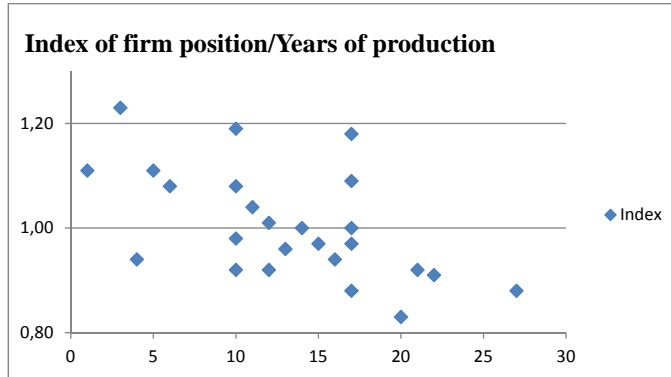
were all lower than 2.0, with the exception of the size variable for the year 2008 (less than 5.0). These factors are well below the usual 10.0 benchmark for multi-collinearity. Similarly to the previous analysis, all regressions were estimated with consistent standard errors estimates.

The region of origin has been omitted since this variable was never significant in the regressions. The measure of quality is in logarithm as suggested by Lecocq and Visser (2006)[12]. Estimation is provided for each year 2008 and 2010 (first two columns of table 3) and for an unbalanced panel of combined data with fixed cross-section effects (last two columns of table 3).

As expected, firms producing a fewer number of products are significantly positioning themselves in the high price segment of the market. The same is true for the age of the firm (or the number of years of production). The size has the expected positive sign but is less significantly related to the index in the OLS estimates (first two columns). As explained in the previous section, a high price positioning can also be related to either a small firm carrying out a quality strategy based on a niche market, or a large firm selecting high value wine market Also, in the presence of economies of scale, size might be a proxy for the production costs. Larger wineries may have a cost advantage and may be able to produce higher quality wines at the same marginal cost as small wineries. If this is true, then the variable (size/nb of wines) would be negatively correlated with production costs and enter positively in the regression. This is verified in the last column of Table

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[12]Note that when a winery gets zero medals, by assumption Log (0) = Log (1) = 0.

Table 2: Regression results, quality measure

Dependent variable: Quality		2008	2010
		OLS	OLS
		27 obs	33 obs
variable		coefficient	coefficient
Constant		-4.276	-7.804
		(-1.407)	(-1.327)
Years (age)		0.225	0.412
		(1.288)	(1.184)
Size		0.484	0.535
		(1.598)	(0.875)
Nb of wines		0.468	0.964
		(1.018)	(1.429)
region		-0.160	0.191
		(-0.285)	(0.179)
R-squared		0.32	0.21
F-statistic		2.67	1.94
Note: t-statistic in ( )			

3.

A more interesting result is the positive and significant relation with the variable related to the perceived quality of wines produced by the firm (the jury grades or medals) for the year 2010 but also when the panel estimation analysis is performed. A similar result was found by Lecocq and Visser (2006) when investigating data sets of French wines.

6   Discussion and conclusion

The objective of the paper is to analyze some of the factors related to the characteristics of a firm and quality that may explain the price strategy of wine producers in a new and small wine region, i.e. Québec province in Canada. Wine production in Québec over the last 15 years has grown rapidly but it remains a marginal phenomenon and practically does not generate any income outside the province. Furthermore, contrary to the existing literature on the determinants of prices, wines lack reputation assessment and the only measure of quality is determined

Table 3: Regression results, price index

Dependent variable : PPI (index)									
	2008		2010		Panel		Panel	
	OLS		OLS		Fixed effects		Fixed effects	
	27 obs		33 obs		Unbalanced		Unbalanced	
Variable	Coefficient		Coefficient		Coefficient		Coefficient	
Constant	1.189	***	1.131	***	1.153	***	1.049	***
	(20.28)		(25.31)		(25.88)		(36.42)	
Years (age)	-0.009	***	-0.008	***	-0.006	**	-0.008	***
	(-3.315)		(-3.075)		(-2.356)		(-3.612)	
Size	0.003		0.004	*	0.005	**	..	
	(1.281)		(1.723)		(2.591)			
Nb of wines	-0.016	**	-0.019	**	-0.019	**	..	
	(-2.013)		(-2.665)		(-2.684)			
Size/Nb wines							0.039	**
							(2.786)	
Quality (Log)	0.019		0.047	***	0.026	***	0.018	
	(1.435)		(4.347)		(3.199)		(2.372)	**
R-squared	0.44		0.47		0.38		0.30	
F-statistic	4.26		6.09		6.13		5.50	
Note: *** prob<0.01, ** prob<0.05, * prob<0.10								

by jury grades (medals) awarded to the wines over the recent past history.

The growth of supply is related not only to the number of producers but also to the increased varieties of wines proposed. An index of relative firm position in the market based on relative prices has been calculated and we demonstrate that a high price strategy is inversely related to the number of wines produced and the age of the firm. The analysis demonstrates a positive and significant relation with the variable related to the perceived quality of wines (the jury grades or medals) produced by the firm.

This analysis has important potential implications. Wine regions in Canada have recently defined quality standards and groups, such as the Vintners Quality Alliance (VQA) in British Columbia and Ontario. VQA membership is not prevalent in Quebec yet. The apparent reason is the lack of interest in defining standards that are appropriate for Quebec wines which have a style different enough to warrant its own sets of standards. The choice of grapes has not been imposed and most vineyards have planted vine species that are better adapted to cold climates. Because the grapes are different, the wines naturally are different

and quality standards need to be different. However, it is likely that as Quebec wines and markets develop, quality standards will have to be established.

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Appendix 1: The 10 largest vineyards and year of establishment

1   Vignoble de la Rivière du Chêne, Basses Laurentides / 18.0 ha (1998)
2   Vignoble le Cep d'Argent, Cantons de l'Est / 16.0 ha (1988)
3   Vignoble de l'Orpailleur, Cantons de l'Est / 15.0 ha (1985)
4   Vignoble Domaine Royarnois, Québec / 14.0 ha (1992)
5   Vignoble Domaine du Ridge, Cantons de l'Est / 13.0 ha (1999)
6   Vignoble Isle de Bacchus, Québec / 12.5 ha (1997)
7   Vignoble Domaine Les Brome, Cantons de l'Est / 12.0 ha (2003)
8   Vignoble Les Blancs Coteaux, Cantons de l'Est / 11.0 ha (1990)
9   Vignoble Carone, Lanaudière / 10.5 ha (1995)
10 Vignoble les Diurnes, Cantons de l'Est / 10.1 ha (2003)

Source: www.vignerons-du-quebec.com/

Appendix 2: Descriptive statistics

2008	INDEX	SIZE	YEARS	NBWINES	REGION	QUALITY
Mean	1.003	6.625	12.39	6.964	2.785	4.428
Median	0.980	5.050	12.00	6.500	2.000	1.500
Maximum	1.230	18.00	27.00	13.00	6.000	23.00
Minimum	0.830	1.300	1.000	3.000	1.000	0.000
Std. Dev.	0.099	4.801	6.361	2.456	1.685	6.356
Skewness	0.574	0.846	0.168	0.743	0.674	1.784
Kurtosis	2.680	2.581	2.495	2.871	2.160	5.189

Correlation matrix

	INDEX	SIZE	YEARS	NBWINES	REGION	QUALITY
INDEX	1.000	-0.031	-0.530	-0.364	-0.087	-0.151
SIZE	-0.031	1.000	0.174	0.442	0.247	0.461
YEARS	-0.530	0.174	1.000	0.278	-0.016	0.357
NBWINES	-0.364	0.442	0.278	1.000	-0.145	0.425
REGION	-0.087	0.247	-0.016	-0.145	1.000	0.026
QUALITY	-0.151	0.461	0.357	0.425	0.026	1.000