EXAMINATION OF OBJECTIVE WINE ATTRIBUTE INFLUENCE ON PRICES OF ARGENTINEAN AND CHILEAN WINE

by

VERONICA TERESA YOO

(Under the Direction of Wojciech J. Florkowski)

ABSTRACT

This study examines values consumers place on wines from Argentina and Chile using the objective attribute measures provided on wine labels in the British Columbia (BC) market. Two separate models are estimated using the Ordinary Least Squares (OLS). The estimated results indicate that grape variety, producer name, alcohol content, corporate brand name, special descriptors, quantity sold, and seasonal changes are all important factors influencing prices. Results show that BC consumers are willing to pay a premium for blended red wines, Argentina's Malbec, Chile's Cabernet Sauvignon, and Carmenere. In Argentina, wines produced by foreign firms are significantly discounted with respect to those produced by domestic firms, while in Chile such disparity is not confirmed due to an industrial structure that is more homogenous than in Argentina. While prices of Argentinean wines are not influenced by corporate brand names, the latter add a premium to Chilean wine prices sold in BC.

INDEX WORDS: Wine, Objective Characteristics, Hedonic Pricing, Brand Effects, New World Wine Suppliers

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VERONICA TERESA YOO

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VERONICA TERESA YOO

Major Professor:	Wojciech J. Florkowski
Committee:	James E. Epperson Lewell F. Gunter

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
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DEDICATION

Dedicated to my inspiring parents and to all those who believe in the richness of learning.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

For centuries, wine production and consumption have been centered in Europe. Wine is such an integral component of the culture of many European countries that, it is argued, a meal is incomplete without a glass of wine (Brunner and Siegrist, 2011). France, Italy and Spain have been the leading wine-producing countries in the world, and are often referred as the "Old World" in the wine lexicon. However, in the late 1980s, the global wine market experienced fundamental changes. Bernetti *et al.* (2006) examine the wine industry in the context of globalization and identify three major structural trends. First, a changing pattern of consumption characterized by an increasing demand for red wines compared to that for white wines. Second, the emergence of wine-producing countries in the New World such as Argentina, Australia, Chile, New Zealand, South Africa, and the United States which has caused a gradual decline in the Old World's global market share. Third, a higher consumer appreciation for quality wine has led to a growing demand for premium wine.

Changes in the world's market share for wine show how Old and New World countries have shifted their competitive positions. According to statistics from the International Organization of Wine (OIV), between 1996 and 2006 total vineyard acreage fell 5.5 percent in the Old World, while it rose 16 percent in the New World. A similar pattern has been observed in wine production, for which the Old World reported a four percent decline and the New World a significant 30 percent increase. In addition, the world wine industry has experienced a dramatic

export-led growth. Export volumes from the Old World increased by 22 percent from 1996 to 2006, accounting for more than one half of total world exports. However, the region's market share decreased by 11 percent at the expense of gains of producers in the New World. The latter experienced an 80 percent increase in market share and, in 2006, accounted for almost 27 percent of total world exports compared to 15 percent in 1996 (OIV, 2007).

As exports from both Old and New World wine producers continue to expand, global demand remains static posing increasing pressure on market prices. These challenges underscore the importance of a solid understanding of the role of both intrinsic and extrinsic factors that drive consumer choice (Cox, 2009). A thorough knowledge of the relationship between wine attributes and consumer choice allows winemakers to produce appealing wine for purchase and efficiently differentiate their product. Researchers have been measuring the impact of extrinsic attributes on wine prices employing a hedonic price technique. The fact that wine is such a highly differentiated product makes it a suitable candidate for this type of empirical analysis (Boatto *et al*., 2011). While the literature on hedonic price models applied to the Old World producing countries is well established (Shapiro, 1983; Tirole, 1996; Landon and Smith, 1998; Angulo 2000; Combris *et al*., 2000; Steiner, 2004; and Ashenfelter, 2008), New World countries' prices, with the exception of Australia, have been examined less frequently.

This study expands the knowledge of price behavior, employing a hedonic pricing model to prices of wines from Argentina and Chile, two competitors from the New World that have experienced a remarkable increase in exports as well as significant improvements in quality and competitiveness in the last fifteen years (Cetrangolo and Briz, 2008). While export growth in Argentina and Chile has caught the attention of wine enthusiasts and the wine-related mass media, little academic research has been carried out on consumer valuation of Argentinean and

Chilean wine attributes. Previous studies include those from San Martin *et al*. (2008), who examine Argentinean wine prices in the U.S. market, and Troncoso and Aguirre (2006) and Ortuzar-Gana and Alfranca-Burriel (2010), who address Chilean wine prices in the U.S. and the Chilean market, respectively.

According to Robinson (2010), consumers around the world perceive Argentinean and Chilean wines differently. The latter is well positioned in the British market and has introduced a plethora of competent varietals comparable to those that grow in the Old World. To the U.S. consumers, on the other hand, Chilean wines are primarily associated with bargain wine. Argentinean wines share the same fragmented perception. While Argentina's emblematic varietal, Malbec, has risen in popularity to the point of being considered one of the fastest-growing red varietals in the U.S. (Koppel, 2009), Argentinean wine sales in the U.K. barely capture one percent of its market (Cetrangolo and Briz, 2008). Different consumer preferences and perceptions across markets raise the question of how these emerging South American wines are assessed in other markets, especially those where consumption levels and wine imports are growing. Canada, one of the top destinations for Argentinean and Chilean export wines, continues to experience an increase in wine consumption as well as import activity (Datamonitor, 2010). Consequently, the Canadian market deems suitable for the intended hedonic analysis.

A study by Yoo *et al.* (2011) examines Argentinean and Chilean wines in the Canadian market, more specifically in the province of British Columbia (BC), and compares these wines to those from the Balkan countries. The analysis extends the previous study in a number of ways. First, the current study estimates two separate equations for Chilean and Argentinean red wines. The exclusion of white wine is based on the fact that consumption of red wine in BC has been increasing more rapidly than that of white and rosé wine (Florkowski *et al*., 2004). In addition,

production and exports of red wine in Argentina and Chile have increased significantly in the past 20 years, far outpacing the growth of other types of wines (USDA, 2010). Second, the model accounts for additional explanatory variables to further explain what other factor influence wine prices. The product characteristics considered in the current study include grape variety, alcohol content, producer name, corporate brand name, and special quality descriptors. Two market characteristics, seasonality of sales and quantity sold, are considered as well. Finally, based on the hypothesis that the New World producing countries promote their wines under certain brand names in order to signal quality products (Steiner, 2004), the current study discusses the effect of the producer name and corporate brand name on wine prices more thoroughly. Taking into account the prevalence of foreign ownership in the Argentinean and Chilean wine industries, the current study generates insights into how price premia or discounts are distributed across domestic and foreign firms.

In an era of fierce competition and economic uncertainty, the wine industry is concerned with the reasons underlying consumer purchasing behavior and what differentiates one bottle of wine from another. Implicit prices derived from the proposed hedonic models contribute to the understanding of the role of product attributes on wine prices. Such information is critical for wineries and marketers and leads to improved decisions regarding marketing strategies, product differentiation, and resource allocation.

1.2 Objectives

Using a large dataset that very well represents the production and exports of red wines from Chile and Argentina in the BC market, this study examines the impact of wine attributes on prices. The primary objectives of this study are to:

a. Estimate a hedonic pricing model for Argentinean and Chilean red wines on the BC market employing a wide range of objective characteristics;

b. Examine the contribution that the underlying objective characteristics have on wine prices from Argentina and Chile, and more specifically, examine the extent to which premiums and discounts are associated with such characteristics;

c. Investigate the extent to which the producer name and the corporate brand name explain wine prices, and more specifically, address the question of whether there is a difference in price premium or discount for wines made by foreign-owned firms and domestic (i.e., Argentinean and Chilean) firms;

d. Discuss how prices of red wine from Argentina and Chile compare with respect to the same set of wine attributes.

1.3 Organization

The present study is divided into six chapters. Chapter 2 describes the international market for Argentinean and Chilean wines with a focus on their export performance as well as an overview of the BC wine market. Chapter 3 reviews and summarizes the existing literature related to hedonic pricing techniques. Chapter 4 introduces the theoretical framework and specified model. Chapter 5 discusses the empirical analysis, including the data, descriptive statistics, and the variable selection criteria. Chapter 6 presents the estimated results of the hedonic models. The final chapter provides the conclusions and summary of the study, including a section on the implications of the study and suggestions for future research.

CHAPTER 2

OVERVIEW OF THE WINE INDUSTRY

2.1 The Argentinean Market

Argentina's wine production dates back to colonial times. Characterized by a wine tradition similar to that of Western European countries, Argentina has historically been one of the world's top wine producing and consuming countries. Figure 2.1 presents the historical trend of Argentina's production and consumption. In 2007, Argentina produced 15 million hectoliters (hl) of wine, placing it fifth in wine production in the world. The country placed after Italy (45.9 million hl), France (45.6 million hl), Spain (34.7 million hl), and the United States (19.8 million hl). Several New World wine countries such as South Africa, Australia, and Chile have

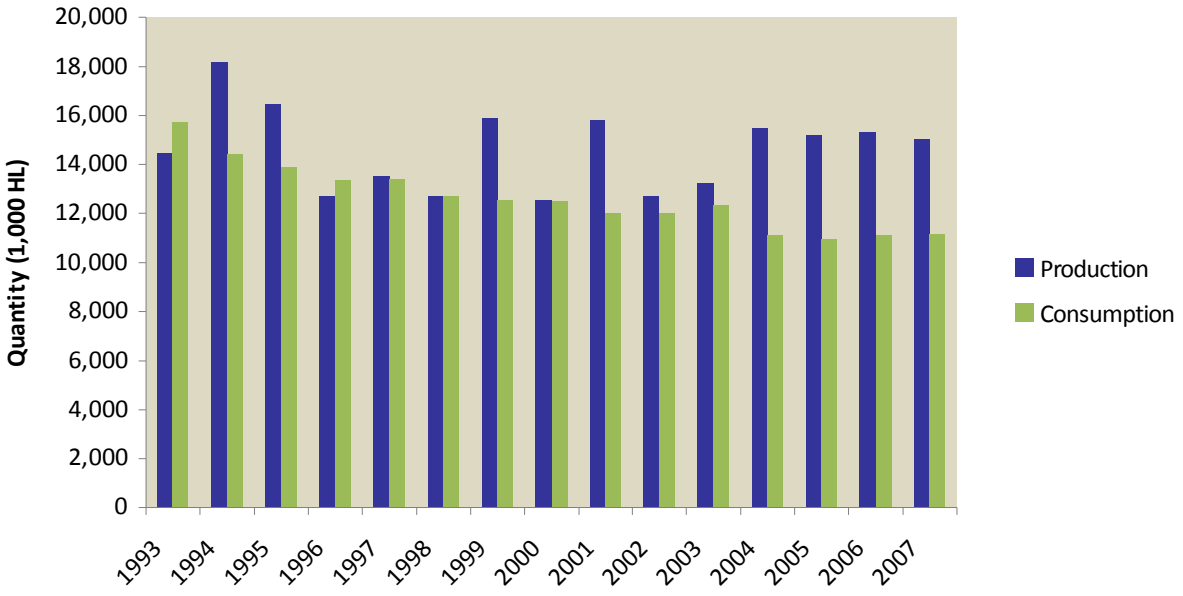

Figure 2.1 Argentina Wine Production and Consumption, 1993-2007
Source: International Organizations of Wine and Vine (OIV), 2008

production levels below those of Argentina with 9.7, 9.6, and 8.2 million hl, respectively (International Organization of Wine and Vine, 2007).

Argentina is also a major wine-consuming nation. With 11 million hl consumed in 2007, it is the seventh largest wine market in the world. The country ranked immediately after the major Old World wine-producing countries and first among the New World countries. Figure 2.1 shows that local production has been absorbed by the domestic market, especially during the late 1990s. There are currently over 26 thousand local vineyards in the country and more than 72 percent of their production is intended to meet the thirst of local consumers (Prosperar, 2009). Despite the high share of domestic wine consumption, the consumption has been trending downward. It started at 15.7 million hl in 1993 and decreased to 11.1 million hl in 2007. The decline is even more dramatic when considering that per capita wine consumption fell by 41 percent during the same time period (OIV, 2007).

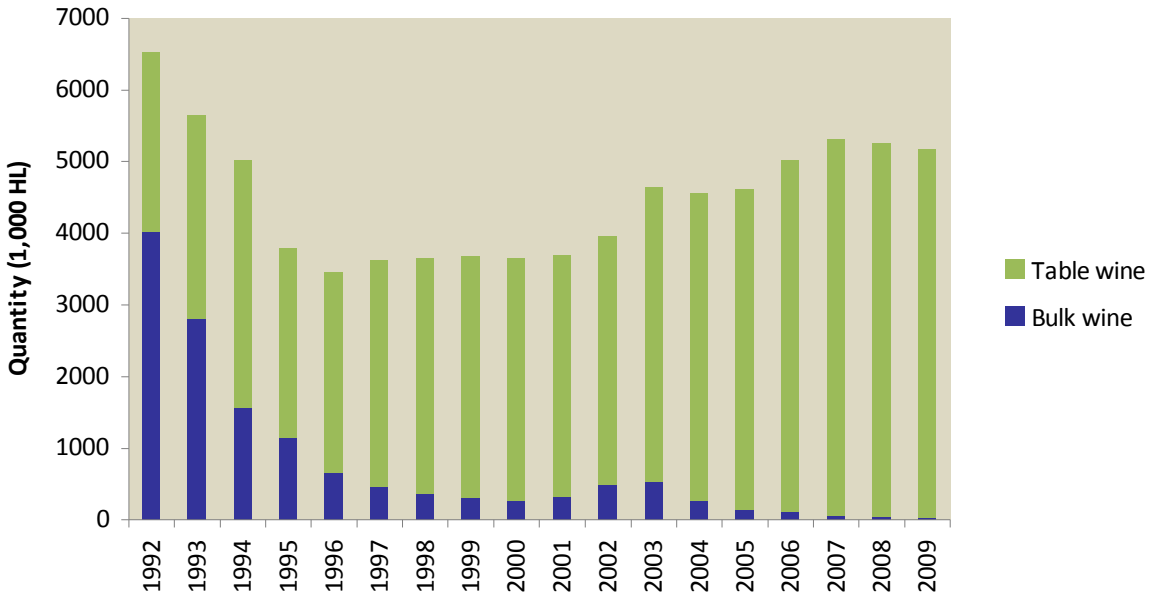

Figure 2.2 Argentina Production of Table Wine and Bulk Wine, 1992-2009
Source: Instituto Nacional de la Vitivinicultura, 2010

Evidence from the Argentinean *Instituto Nacional de la Vitivinicultura* shows that the local market has become more sophisticated over the past two decades. The shift in preferences is reflected in the growing domestic demand for premium wine. Figure 2.2 illustrates the gradual increase of the latter along with a decrease of bulk or "jug" wine. The substitution of basic wines for higher quality wines is not only taking place in Argentina, but also in the rest of the world (Campbell and Gilbert, 2006). Another shift in the consumer market has been associated with an increasing consumption and export demand of red wines. Between 2000 and 2007, the area planted to vineyards of red grapes rose by 43 percent and increased from 70 thousand planted acres to over 100 thousand acres. On the other hand, the planted area for white grapes decreased from 49 thousand acres to 48 thousand acres during the same time period (USDA, 2010). Red grape varieties also account for the largest percentage (68 percent) of high-quality grape varieties, showing that consumers might associate high-quality wines with red varieties rather than white varieties. Argentina's most planted grape varieties are Malbec, Bonarda, and Cabernet Sauvignon, which together account for more than 60 percent of the red grape varietals planted in 2008.

Despite Argentina's well-integrated wine industry, export transactions have been less successful compared to those in other New World countries such as Australia or Chile. Argentina did not start developing export markets until the mid-1990s; prior to the mid-1990s only two percent of produced wine was shipped abroad. The basic explanation is that production was sufficient to meet the demand of local consumers and hence, little excess supply was available for exports (Artopoulos *et al*., 2011).

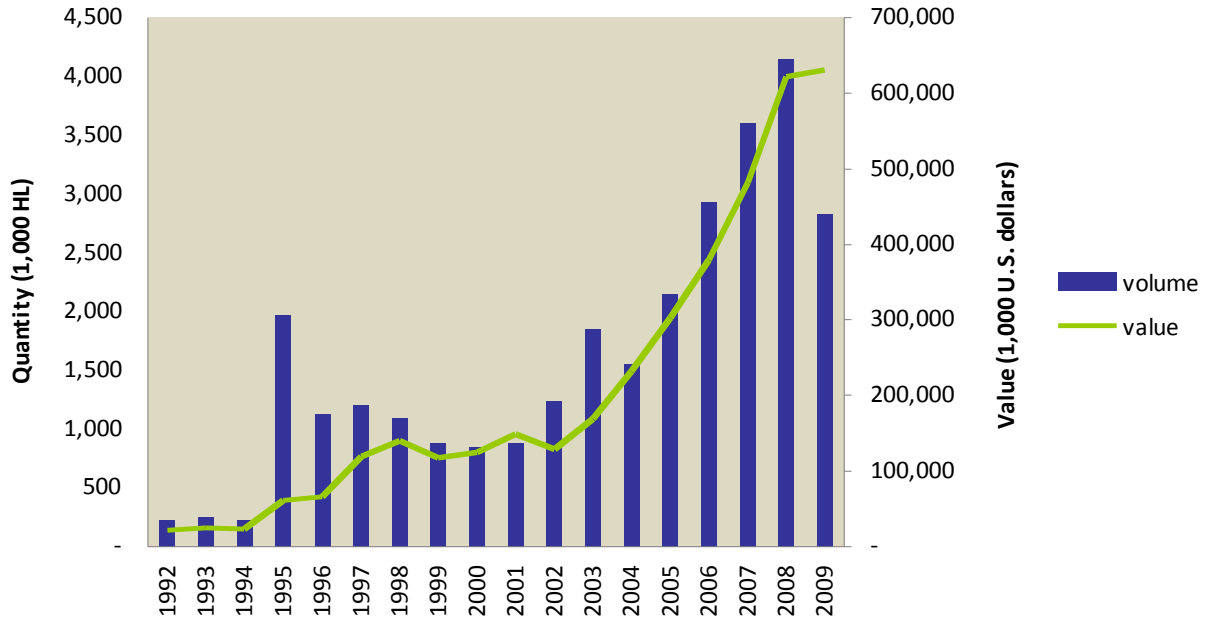

Figure 2.3 Volume and F.O.B. Value of Argentina Wine Exports, 1992-2009
Source: Instituto Nacional de la Vitivinicultura, 2010

Over the past 15 years, Argentinean wine exports have increased tremendously. Between 2002 and 2008, Argentina was the fastest growing wine exporter in the world with export volumes increasing at an annual compounded rate of 22.3 percent (OIV, 2008). By 2009 Argentina was the 7th largest wine exporter (Wines of Argentina, 2011). Figure 2.3 illustrates the rapid increase of wine exports in terms of volume and value. A sharp rise in volume exported is noticeable in 1995 followed by a significant fall several years later and a gradual recovery after 2001. It appears that the increase in the volume exported followed the domestic economic crisis of the late 2001 and the early 2002. On the other hand, export values indicate a more steady increase and move consistently with export volumes after 2004. The sharp decrease of export volume in 2009 is the result of the global economic crisis, which affected other traditional wine-producing countries as well. As the impact of the downturn has begun to mitigate, the forecast

for export volumes indicates the return to 2007 levels in 2011 (USDA, 2010). In 2009, the U.S. and Canada were the two primary destinations of Argentinean wine exports in terms of both volume and value. Figure 2.4 the main import markets.

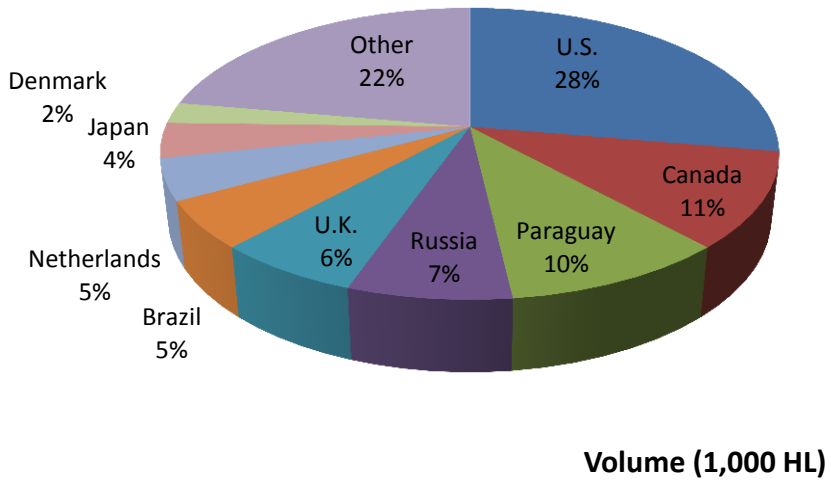

Figure 2.4 Main Export Destinations of Argentinean Wine in 2009
Source: "Argentina Wine Annual 2010" Foreign Agricultural Service, USDA (April 2010)

Argentina's renowned focus on export markets and higher quality wines was predominately in response to a combination of factors that started developing in the 1990s. The increasing world demand for wine, deregulation of the Argentinean wine industry, introduction of better oenological techniques, and influx of foreign direct investment (Secretaria de Ambiente y Desarrollo Sustentable, 2006) are all believed to have contributed to the country's export-led orientation. In addition, the financial crisis of 2001 attracted even more foreign investors as a devalued local currency and low land values were all in their favor (USDA, 2005).

2.2 The Chilean Market

Like its neighboring country, Chile has a long history in winemaking, originating during Spanish colonization. However, the commercial production did not start until the second half of

the 19th century when European oenological techniques coupled with new vineyards came into play (Del Pozo, 1995). Still, due to subsequent economic crises and political turmoil the wine industry managed very modest numbers in terms of volume and value. Beginning in the 1980s, market liberalization attracted foreign direct investment, mainly from Spain, France, and the U.S. Besides purchasing land, foreign investors also brought their know-how and formed partnerships with domestic firms (Kunc and Bas, 2009). Since then, Chile's wine industry has been export-driven and has turned into a major player among the New World countries and became the biggest South American name in international markets.

Unlike Argentina, Chile has never had a strong wine-consuming population and production has historically been one half of Argentina's production. Figure 2.5, shows that, in

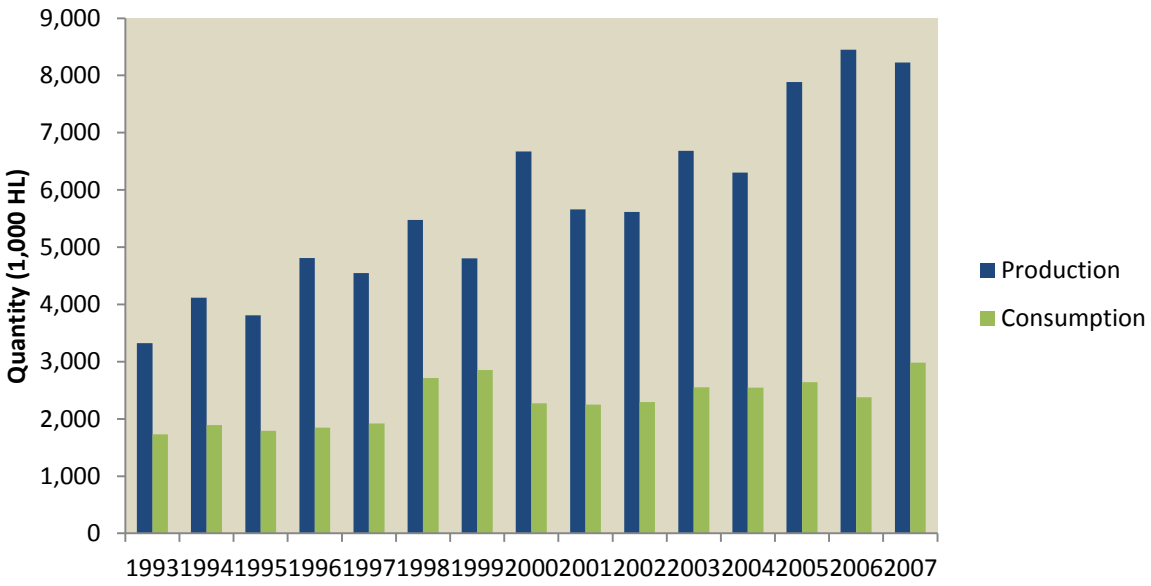

Figure 2.5 Chile Wine Production and Consumption, 1993-2007
Source: International Organizations of Wine and Vine (OIV), 2008

general, Chile's wine production has followed an upward trend. In 2007, Chile produced 8.2 million hl placing it behind Argentina as the tenth largest wine producer in the world. In

addition, the total planted area of vines for wine increased from 63 thousand hectares in 1997 to almost 120 thousand hectares in 2007 (Wines of Chile, 2010). On the other hand, consumption has been growing at a much slower pace, ranking Chile in the 21st place in global wine consumption (OIV, 2008). Chile has the lowest per capita wine-consumption among all major wine producing and exporting countries. Given the modest domestic demand for wine, it is clear why producers would target export markets to increase profits. In fact, Chilean wine has found its way to consumers around the world as over 60 percent of total yearly production is being exported (USDA, 2010).

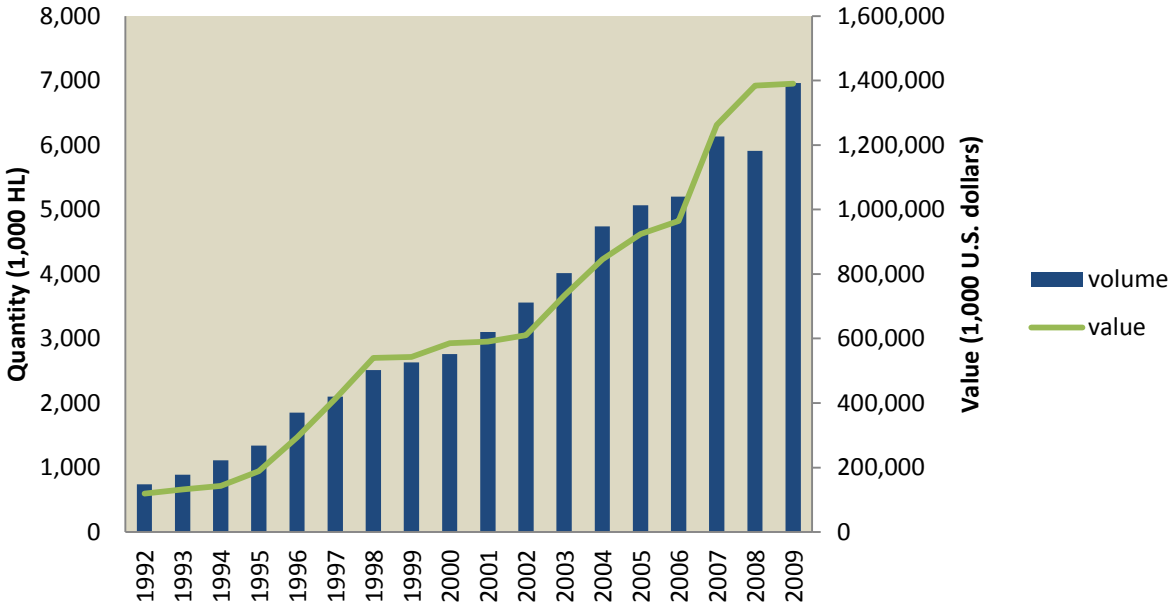

Figure 2.6 Volume and F.O.B. Value of Chile Wine Exports, 1992-2009
Source: National Agricultural Society, 2010

Figure 2.6 well illustrates Chile's export success story in the wine trade. The export growth of Chilean wines has been driven not only by a remarkable increase in volume, but also by a strong increase in the unit value. In fact, between 2002 and 2008, wine export sales

increased at an annual compound rate of 8.7 percent in terms of volume, placing Chile as one of the fastest growing exporters after Argentina. While in 1986, Chile had an export market share less than one percent and was ranked 13th in terms of export shipments, in 2005 the country advanced to the fifth position with a market share of five percent (OIV, 2007). In 2009, Chile remained the fifth largest wine exporting country in the world and its market share reached 8.7 percent. Despite the global economic downturn, Chile's export shipments reached a record volume of 6.9 million hectoliters and $1,390 million USD, a 17.8 percent growth. This is remarkable considering that export sales in some countries, including Argentina, declined substantially.

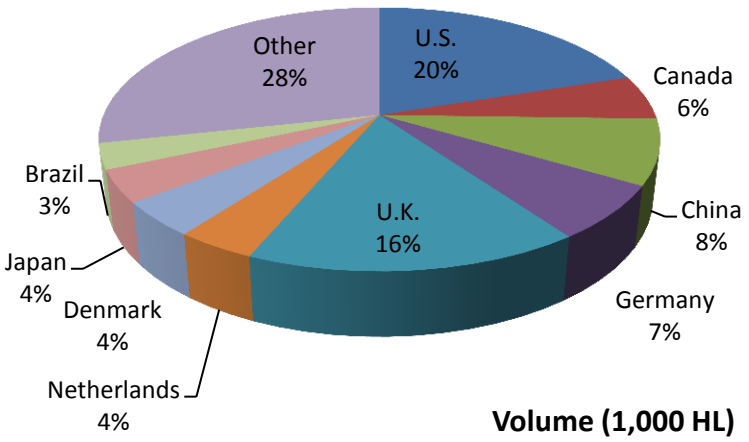

Figure 2.7 Main Export Destinations of Chilean Wine in 2009
Source: "Chile Wine Annual 2010" Foreign Agricultural Service, USDA (April 2010)

Like its neighboring country, Chile is also known for its red varieties (Tienhoven, 2008). In 2009 as much as 76 percent of the total planted area of vines for wine was devoted to the production of red varieties. Currently, the predominant types are Cabernet Sauvignon, Merlot, Carmenere, Syrah, and Pinot Noir. Cabernet Sauvignon, Chile's most popular and traded grape variety, accounts for 46 percent of the total production of red varieties while other varieties

account for 15, 8, 4, and 1.6, respectively (Wines of Chile, 2011). Destinations for Chilean wine exports have been expanding steadily over the past decade. The U.S. continues to be Chile's main importing partner followed by the U.K., China, Germany, and Canada (Figure 2.7).

2.3 A Note on Foreign Ownership

Argentina and Chile's comparative advantage in producing wine is attributed to their natural endowments. Both countries are gifted with suitable climate, soil, and altitude for grape growing (Macchiavello, 2010; Nalley, 2008). However, a country may need to look beyond its natural endowments in order to remain competitive in today's global environment. Porter (1990) suggests that competitiveness can be achieved through constant innovation. In addition, Castaldi *et al*. (2006) indicate that a country's overall competitive advantage in the wine industry is defined by a strong existing domestic market, growth market potential, economies of scale, adaptability to industry change and ability to attract foreign investors.

One particular factor that contributed to the substantial growth of the wine sectors in both countries is the market liberalization. It took place in Argentina during the 1990s and in the 1980s in Chile during the 1980s. The more capitalistic and competitive environment facilitated the influx of foreign investors. Foreign direct investment arrived in the form of new oenological techniques, advanced equipment, refined grape varieties, efficient managerial practices, and better access to export markets (Kunc and Bas, 2008). A number of foreign firms formed partnerships with local producers or even purchased large shares of domestic firms. The entry of foreign firms gave birth to a series of joint-ventures, which contributed to structural changes in the Argentinean and Chilean wine industries.

2.4 The British Columbia Market: An Examination of Consumption Patterns

Even though beer remains the preferred alcoholic beverage among Canadian consumers, the wine industry has been experiencing a remarkable growth over the past decade. For example, between 1997 and 2009, the market share for wine increased by eight percent, while that for beer decreased by six percent. In 2009, wine sales reached a record 441.4 million liters and $5.7 billion CDN, a 159 percent growth of volume and a 74 percent increase in value with respect to 1997. On the other hand, in terms of value and volume, beer sales increased at a much slower pace of 54 percent and 15 percent, respectively (Statistics Canada, 2010). The exceptional expansion of the wine industry is attributed to a number of factors such as a growing demand for wine, government subsidies, sector investments in new vineyards, and the introduction of the North American Free Trade Agreement (Agri-Food Canada, 2009).

The current study focuses on the province of BC, one of the leading wine-producing and consuming regions in Canada. Corresponding to the rest of the country, wine sales in BC have increased significantly. According to the latest available data, between 2003 and 2007 wine sales grew by 27 percent and 48 percent in terms of volume and value, respectively. In addition, British Columbians represent some of the largest wine consumers in Canada. While the average adult Canadian purchased 15 liters of wine in 2007, British Columbians purchased an average of 17.3 liters of wine during the same period (Statistics Canada, 2007). According to recent data from the BC Wine Institute (2011), as of 2009 the region was home for nearly 710 vineyards, 193 wineries, and more than 60 different types of grape varieties. Despite the availability and emerging popularity of domestic wines, BC consumers' taste for imported wine remains strong. As Table 2.1 shows, total sales of imported wine by volume increased from 49.28 million hl to 62.80 million hl in a short period of five years. Even though domestic wine accounts for the

majority of the wine consumed in the province, the latter increased by 15.9 percent, a much slower rate than the 27.4 percent increase for imported wines during the same period. The growing trend continued throughout 2008 when imported wines reached an all-time record of 31 million hl (Statistics Canada, 2011).

Table 2.1 Sales of Table Wine in British Columbia by Type and Volume, 2003-2007, in Million Hectoliters

Wine Category	2003	2004	2005	2006	2007
Canadian red	8.77	9.20	10.27	11.41	12.00
Imported red	10.84	11.72	13.18	14.40	15.92
Total red	19.61	20.92	23.45	25.81	27.92
Canadian white	11.50	12.07	12.63	13.27	13.67
Imported white	6.06	6.42	6.90	7.23	8.10
Total white	17.56	18.49	19.53	20.5	21.77
Total Canadian	30.72	31.70	33.23	35.03	35.59
Total Imports	18.56	19.83	21.80	23.50	26.20
Total Wines	49.28	51.53	55.03	58.51	62.80

Source: Statistics Canada, 2007

It appears that consumption of white and red wines in BC mirrors the shift in consumption for the latter that is taking place in international markets. In 2007, British Columbians consumed almost 28 million hl of red wine, representing a 30 percent increase in relation to 2003. Although white wine consumption increased at a rate of 24 percent in the same period, the gap between white and red wine sales keeps widening. In fact, red wine volumes were pointing at this direction even at a time when white wines accounted for most of the wine consumed in British Columbia. Statistics reported by Florkowski *et al*. (2004) show that in the period between 199

and 2000, red wine consumption increased by 88.5 percent while that of white wines decreased by 28.5 percent. Some observers have suggested that the observed shift in consumption may be attributed to a combination of health and demographics factors. In 1991, a segment titled "The French Paradox" from the *60 Minutes* CBS Programme highlighted the health benefits of moderate red wine consumption. What followed was a series of research studies acknowledging the positive association of red wine with healthy living (Boucheron, 1995). As health concerns tend to increase with age, it appears that the aging BC population prefers red wines over white wines (Wine Australia, 2007).

In BC, consumption of red versus white wine seems to be dictated by the location where the wine was made. While BC consumers prefer their domestic wines to be white, red wines are preferred to be imported (Table 2.1). This set of preferences may be explained by the fact that BC's cool climate is more suitable for the production of white wines rather than reds (Hope-Ross, 2006). It is evident that the wine industry in BC has been making fine progress. However, the province (and Canada as a whole) does not possess the level of comparative advantage to produce wine that other traditional producing countries do. As a result, wine imports have been necessary to meet Canada's growing demand for wine.

The top ten suppliers of imported wine by volume in BC are shown in Table 2.2. Australia and the U.S. continue to be the main sources, and together account for 50 percent of all wine imports. With the exception of Argentina, import volumes across countries were largely affected by the global economic downturn of 2009. Even Australia, BC's top supplier, saw its exports reduced by 36 percent. In 2009, Argentina exported as much wine as Chile, a remarkable achievement considering that Argentinean imports represented 40 percent of Chilean imports the year before.

Table 2.2 Sales of Imported Table Wine in British Columbia by Country of Origin and Volume, 2004-2009, in Million Hectoliters

Country	2004	2005	2006	2007	2008	2009
Australia	6.6	7.6	9.0	10.3	10.0	6.4
United States	3.4	3.3	3.7	4.3	5.0	4.8
Italy	2.9	2.9	3.1	3.3	3.5	3.4
France	2.1	2.0	2.3	2.4	2.6	2.1
Chile	2.3	1.9	2.6	3.5	3.8	3.1
Argentina	0.7	0.8	0.9	1.5	2.0	3.1
New Zealand	0.3	0.4	0.5	0.7	0.8	0.8
Spain	0.6	0.5	0.8	0.9	1.0	0.9
Portugal	0.4	0.3	0.3	0.3	0.4	0.4
South Africa	1.2	0.9	1.2	1.2	1.3	1.0
World Total	19.8	21.8	23.5	26.2	31.2	26.9

Source: Industry Canada

In terms of value, BC imported wines from Chile at $18 million CDN while those from Argentina were imported at 12.1million CDN (Canada Statistics, 2011). Since both countries exported the same volume to BC, we could argue that the difference in value is due to Chilean wines being priced higher than Argentinean wines. Figure 2.8 illustrates how import values from these two countries have evolved over time. While there was not much change during the period from 1997 to 2004, a significant increase has been taking place since 2005. It is evident that Chile captures a much larger share of the BC market although Argentina appears to be rapidly increasing its presence.

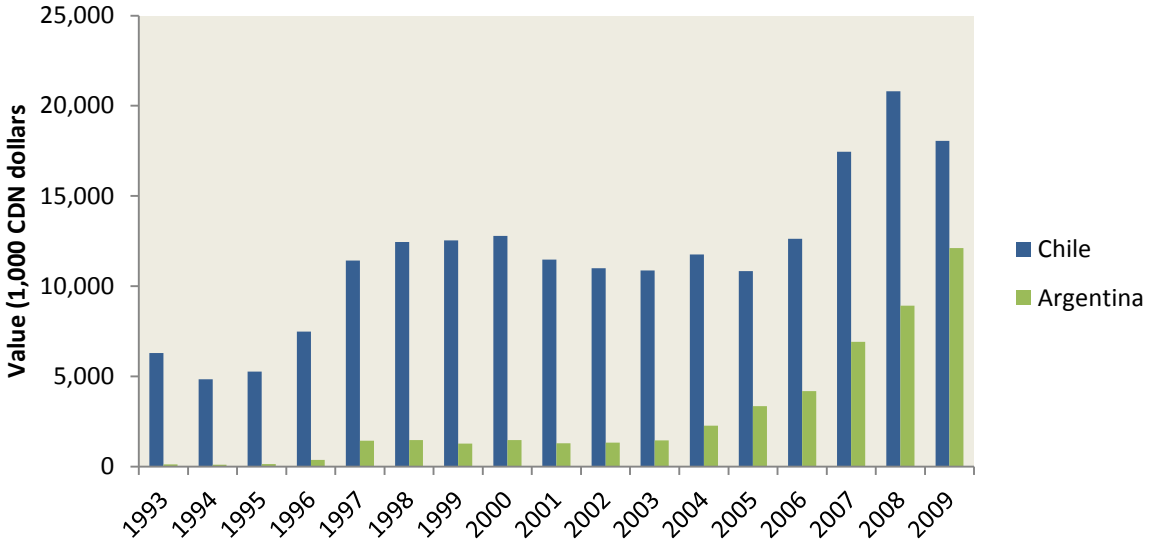

Figure 2.8 Sales of Table Wine Imported from Argentina and Chile to British Columbia, 1993-2009, in CDN$ thousand dollars

CHAPTER 3

LITERATURE REVIEW

Hedonic pricing theory posits that every good embodies a set of attributes that differentiates it from other related goods. The price of a good is a sum of the good's characteristics establishing a critical relationship between price and quality. Thus, hedonic pricing studies can reveal valuable information about prices as well as consumers' valuation. This chapter draws on the accumulated findings of previous studies to refine the formulation of hedonic price equations for wines imported from Argentina and Chile into the BC market.

The literature on hedonic pricing analysis is quite vast and has been applied to both durable (e.g., housing and cars) and non-durable goods (e.g., food products). The earliest recognized application in agricultural economics is the seminal paper by 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 increase revenue by discovering consumers' valuation on certain vegetable attributes. Although Waugh pioneered the use of the conceptual approach, he did not coin the term. Rosen (1974) is argued to have established the theoretical foundation of hedonic models. Rosen suggests that consumers evaluate product characteristics when they make a purchase. As a result, the sum of implicit prices paid for each quality attribute equals the observed market price.

Applications of hedonic price analysis to the wine industry have become more frequent in the 1990s. The fact that wine is a highly differentiated product makes it an appropriate candidate for the hedonic technique (Oczkowski, 2001). Recent studies on wine have identified several

types of quality attributes that have been found to have an impact on wine prices. In general, the studies have identified three groups of variables that affect observed prices of wine. The most widely studied category consists of the so-called objective characteristics. Consumers easily identify such attributes because they are displayed on the labels on wine bottles. In addition, because wine is an experience good, its quality cannot be fully assessed until the bottle is uncorked. The irreversible process of experiencing wine forces consumers to rely on objective characteristics to aid in their wine selection process (Speed, 1998). Grape variety, appellation of origin, harvest year (vintage), color, packaging, country of origin, and corporate brand name represent some of the objective variables used in the empirical investigations of wine hedonic prices.

Golan and Shalit (1993) examined quality characteristics of Israeli grapes. The hedonic qualities of these grapes are then estimated and the contribution of each grape attribute to wine quality is measured. The result is a quality-based pricing schedule, which shows that high quality wine commands significant price premia. Oczkowski (1994), on the other hand, incorporated additional variables in his hedonic model such as the grape variety, production region, vintage, and producer size, and found all of them to be statistically significant in explaining differences in prices for Australian table wine. Oczkowski was the first to incorporate a dummy variable accounting for producer size in hedonic wine price regression. Results show that consumers appear to be willing to pay a premium for wines made by small producers. Blair and Burley (1998) were the first to include the variable "continentality" in hedonic modeling. The term, which refers to the historical climatic variation found in grape-growing regions, results in a significant and negative impact on price.

As studies in hedonic theory evolved, researchers began to incorporate non-objective explanatory variables into their models. The non-objective group of wine attributes includes two categories that influence wine quality and are based on sensory evaluations and reputation of wines. Perhaps the most cited study in the category of sensory attributes is by Combris *et al*. (1997), who employ a hedonic model for Bordeaux and Burgundy wines using data from an independent panel of tasters. Based on both label and sensory characteristics, the study of Bordeaux wines concludes that objective attributes have greater explanatory power than sensory characteristics, while in case of Burgundy wines the study found that the sensory characteristics are significant. The evidence from both studies is that the effects of sensory wine characteristics can be ambiguous. The authors ascribe the inconclusiveness to the existence of imperfect information and the high transaction costs associated with the acquisition of data on sensory attributes. The majority of the existing literature indicates that objective characteristics are more frequently statistically significant in determining prices than sensory characteristics (Nerlove, 1995; Landon and Smith, 1997 and 1998; Oczkowski, 2001; Cardebat and Figurt, 2004; Benfratello *et al*., 2009).

The third category of wine attributes used to variable specification focuses on the importance of reputation as a quality indicator of wine. Shapiro (1983) pioneered the application of attributes falling into the category by developing an equilibrium price-quality schedule to evaluate the impact of producer reputation on wine prices. The estimation results show a positive and significant effect indicating that producers can command price premia by building a reputation. Other studies that obtained similar results include Combris *et al*. (1997), Schamel (2000), and Schamel and Anderson (2003). In addition to reputation indicators, the latter incorporates experts' quality ratings and argues that consumers' own reputation assessment for

certain grape varieties and regions also plays a role during the wine choice process. Landon and Smith (1997) expand on previous studies by adding single and collective wine reputations as explanatory variables for price variation of Bordeaux wines. They conclude that long-term reputation is a superior determinant of consumers' valuation of wine than short-term quality factors.

While most hedonic studies on the New World wine producing countries have centered on the Australian wine prices (Oczkowski, 1994 and 2001; Blair and Burley, 1998; Wade, 1999; Schamel and Anderson, 2003; Fogarty, 2006; Carew and Florkowski, 2009; Cox, 2009), few studies have examined prices of other countries in the group. San Martin *et al.* (2008) investigate the impact of several variables (vintage, region of origin, producer name, special descriptors, sensory quality rating, number of cases made, and grape variety) on prices of Argentinean wine imported into the U.S. The results from the hedonic model indicate that objective characteristics such as grape variety command higher premia than subjective characteristics. A study by Ortuzar-Gana and Alfranca-Burriel (2010) employs the hedonic approach to examine the influence of product attributes on regular prices of Chilean wines within the Chilean market. Regular prices reflect changes in demand and supply. The authors incorporate mostly objective attributes such as color, grape variety, packaging, brand name, quantity, and ways of distribution in their equations. The variable brand name appears to have larger price impacts compared to those from color and even grape variety. Troncoso and Aguirre (2006) employ a hedonic function to evaluate prices of Chilean wines in the U.S. market. Estimated results indicate that grape variety and valley of origin report higher price premia than quality ratings and aging. Luppe *et al*. (2009) analyze prices of Argentinean, Brazilian, and Chilean wines to construct a hedonic pricing model of wines from these three countries in the Brazilian market. The study

concludes that information such as the country of origin and variety of grape are the most important characteristics influencing prices. However, the study fails to compare impacts of attributes across countries, which could reveal the relative consumers evaluation of wine attributes from each country.

Few hedonic price studies have explored the Canadian wine market. Florkowski *et al*. (2008) examine 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 conclude that this particular variable is an important explanatory factor of prices. Expanding on the studies of BC consumers' valuation of the Old World wines, Carew and Florkowski (2010) examine the role of geographic wine appellations of Burgundy wines as well. The results show that collective reputation effects are significant for certain regions in France. Research by Yoo *et al*. (2011) explores wine attributes of emerging wine suppliers on the BC market. Here, wine prices from Argentina and Chile are compared to those from Bulgaria, Croatia, and Hungary. Results reveal that the latter group receives price discounts compared to the South American suppliers.

CHAPTER 4

THEORETICAL UNDERPINNINGS AND THE EMIPRICAL MODEL SPECIFICATION

4.1 The Hedonic Price Model

The primary objective of this study is to estimate a hedonic price model of Argentinean and Chilean wine prices to determine how they differ in terms of product characteristics on the BC market. The study applies the hedonic pricing approach developed by Rosen (1974) to accomplish this task. The hedonic model is an alternative theory of consumer demand that relates the price of a good to its underlying characteristics. In the case of wine, the underlying characteristics may be the grape variety, brand name, color, or valley of origin (among others). Consumers purchase goods because of the utility derived from the particular characteristics rather than the marketed goods per se. An important assumption under the hedonic approach is that markets are competitive and that given certain budget constraints, consumers have made their utility-maximizing purchasing choices. In addition, all firms have made their profit-maximizing decisions based on their production costs. In equilibrium, the observed purchase price of a good is a reflection of how its underlying characteristics are recognized and valued by the market (consumers and producers). As a result, implicit prices for the attributes can be estimated.

Hedonic models applied to wine studies suggest that a bottle of wine is composed of *m* observable characteristics represented by a vector z (z_1, $z_2 \ldots z_m$). Then, the price of a bottle of wine becomes an implicit price function defined as follows:

$$P\,(\mathrm{z}) = f\,(z_1, z_2 \ldots z_m), \tag{1}$$

considering that consumers derive certain level of utility from the underlying characteristics, the utility maximization problem for a representative consumer of wine is assumed strictly concave and is expressed as follows:

$$Max\ U = U\,(\mathrm{x}, \mathrm{z}), \tag{2}$$

where z is a vector of wine attributes and x is a vector associated with a composite commodity (i.e., other commodities). The consumer chooses an optimal bundle of wine attributes and all other commodities by maximizing equation (1) subject to the budget constraint, Y:

$$Y \geq P\,(\mathrm{z}) + \mathrm{x}. \tag{3}$$

The corresponding first-order conditions are thus,

$$\partial P/\,\partial \mathrm{z}_i = p_i = \partial U/\partial z_i\,/\,\partial U/\partial \mathrm{x},\ \forall\ \mathrm{i}. \tag{4}$$

The partial derivative of the hedonic price function (equation 1) with respect to the wine attribute z_i yields the marginal willingness to pay for a change in that attribute also known as the implicit price for that attribute. The right-hand side of equation 4 states the marginal rate of substitution between attribute z_i and commodity x. The implicit value of the wine attribute z_i represents consumers' willingness to pay for that particular attribute and producers' willingness to supply such attribute (Rosen, 1974).

4.2 The Specification of the Functional Form

Economic theory might predict the sign of the partial derivatives of price with respect to each wine attribute. However, there is little theoretical guidance regarding the appropriate

functional form that should be used in hedonic pricing models. As Triplett (2004) argues, model specification of hedonic price functions can be only explained by the data and thus, remains an empirical process. The importance of this practice relies on the fact that an incorrect specification can result in inconsistent parameter estimates and hence, erroneous inferences (Gujarati, 2004). Previous studies in the literature of hedonic pricing models have explored a variety of different functional forms. For example, Landon and Smith (1997) and Costanigro (2007) find that the reciprocal square root is the best performing transformation among different functional forms. Diewert (2003) argues that using an untransformed dependent variable violates the homogeneity condition, which is an important property in regression analysis. Hence, he excludes the use of linear specifications in hedonic models and preferred a log-linear form. The latter is also the preferred functional form in a wide number of published studies including those by Oczkowski (1994, 2001), Nerlove (1995), Schamel and Anderson (2003), Steiner (2004), Troncoso and Aguirre (2006), Fogarty (2006) Carew and Florkowski (2010), and Ortuzar-Gana and Alfranca-Burriel (2010).

In this study, the log-linear form is preferred in order to estimate a hedonic pricing model for Argentinean and Chilean red wines in the BC market. The choice was based on the functional transformation that had the best performance given the Box-Cox test results. In addition, using a logarithmic transformation on the dependent variable has the advantage of reaching normal distribution and conforms to the implied homogeneity condition of errors (Fogarty, 2006).

4.3 The Empirical Model Specification

Two separate equations are used to estimate prices of Argentinean and Chilean red wines, respectively, as a function of a set of wine attributes. The expanded model includes the same set of explanatory variables or variable categories for each country and takes the form:

$$\text{Ln}\,(P_{it}) = \alpha + \sum \beta_1(VARIETY_{it}) + \sum \beta_2(PRODUCER_{it}) + \beta_3 \text{Ln}\,(QUANTITY_{it}) + \beta_4(ALCOHOL_{it}) + \beta_5(SPECIAL_{it}) + \beta_6(BRAND_{it}) + \sum \beta_7(SEASON_{it}) + \beta_8(HOLIDAY_{it}) + u_{it} \quad (5)$$

where the price of wine is a log-linear function of product characteristics. In essence, the hedonic price model of equation (5) can be interpreted as a reduced equation reflecting both supply and demand effects (Huang and Lin, 2007).

The betas represent the unknown parameters associated with each product characteristic and u_{it} is the random error term. The dependent variable, Ln (P_{it}), is the log of the observed price in Canadian dollars. The group of explanatory variables that is expected to influence price is comprised of a combination of continuous and discrete variables. The variable *VARIETY* is a set of dummy variables indicating the variety of grapes that are used to produce wine. The variable *PRODUCER* represents another set of dummy variables indicating the name of the producer/winery that makes the wine. The two continuous variables in the model are *QUANTITY*, representing the log of the number of bottles sold each week, and *ALCOHOL*, which refers to the percentage of alcohol in the bottle of wine. The variable *SPECIAL* represents special label descriptors such as "reserva" (reserve) and "gran reserva" (grand reserve) that are used to signal higher quality wine. *BRAND* is a dummy variable indicating whether or not the producer is selling the wine under a corporate brand name. The variable *SEASON* is a set of dummy variables capturing the seasonality effect on wine sales, while *HOLIDAY* is a single dummy variable accounting for changes in wine purchase during festive holidays such as Christmas and New Year's Eve.

In order to avoid the so-called "dummy variable trap" that can result in collinearity among explanatory variables, a base variable was omitted in each group of dummy variables (Belsley, 1986). The omitted dummy variables are: Malbec for grape variety and "Esmeralda" for producer name in the sample of Argentinean wines. In the sample of Chilean wines, the omitted variables are Cabernet Sauvignon and "Concha y Toro," respectively. The benchmark variables were chosen based on the number of observations, which are the largest within their respective categories. In the case of season-indicating dummy variables, summer was selected as the reference variable. As a result, the estimated parameters within each set of dummy variables (*variety*, *producer*, and *season*) should be seen as departures from the price of the selected omitted variables in both equations.

In log-linear functions, the weights of the regression coefficients are interpreted in different ways depending on whether the variable being analyzed is continuous or not. According to Halvorsen and Palmquist (1980), the coefficient of a continuous explanatory variable is a derivative that, when multiplied by 100, is interpreted as the percentage change in the dependent variable due to a one percent change in the continuous variable. Hence, the percentage impact of the continuous explanatory variables *QUANTITY* and *ALCOHOL* were calculated with the formula $100*\beta_j$. However, this procedure is not appropriate in the case of dummy variables because the latter preclude the interpretation of the regression coefficients as derivatives. Recent hedonic studies (Steiner 2004; Troncoso and Aguirre 2006; San Martin *et al*., 2008) follow Kennedy (1981) and use the following formula:

$$100 * [\exp (\beta_j - 0.5 \text{ var } (\beta_j)) - 1]$$

Thus, the percentage impact of the dummy variables *VARIETY*, *PRODUCER*, *SPECIAL*, *BRAND*, *SEASON* and *HOLIDAY* were estimated using the above method.

CHAPTER 5

THE EMPIRICAL ANALYSIS

5.1 The Data

The current study employs weekly retail sales data on wine imported into the BC market. The data set comes from the British Columbia Liquor Distribution Branch (BCLDB) and covers a time period that runs between April 20, 2002 and May 8, 2004. The data represents a total of 108 weeks of observations. The BCLDB records all wine sales in the province of BC. Hence, the employed data set includes prices of every bottle of wine sold in the province. The sub-set of data used for analysis covers imported table wine sold in 0.75 liter bottles from Argentina and Chile. In total, the sample is comprised of 18,164 observations, of which 12,841 refer to Chilean wines and 5,323 to Argentinean wines, respectively. The key advantage of the data set is that it records actual transaction prices rather than the list or suggested retail prices. The latter are usually reported in catalogues and wine guides such as the Spanish *Guia de Vinos Gourmets*, the *Wine Spectator,* and the Australian *James Halliday*. Nominal prices are adjusted to 2002 Canadian dollars using the consumer price index (CPI) for wine purchased in stores (Statistics Canada, 2005). In addition to prices, wine attributes such as grape variety, producer name, alcohol content, quantity sold, corporate brand name, and special descriptors are obtained from the data set.

5.2 The Descriptive Statistics of Variables

Table 5.1 and 5.2 provide a summary of the descriptive statistics for the Argentinean and Chilean samples, respectively. The average price of an Argentinean wine sold in the BC market

Table 5.1 Descriptive and Simple Statistics of Red Wines from Argentina

Variable/category	N	Units	Mean	Minimum	Maximum
Price	5,323	CDN$	15.43	5.95	125.95
Alcohol content	5,323	Percent	13.02	11.00	14.50
Quantity sold (per week)	5,323	Bottles	149.00	0.00	3,579.00
Variety or blend					
Bonarda	108	CDN$/bottle	10.28	10.28	10.28
Cabernet Merlot	40	"	7.45	7.45	7.45
Cabernet Sauvignon	1,130	"	16.10	6.95	65.96
Malbec	1,770	"	17.27	12.63	125.95
Malbec Blend	108	"	19.99	19.99	19.99
Malbec Cab. Sauvignon	120	"	13.30	12.95	13.49
Merlot	695	"	13.86	8.79	19.56
Merlot Malbec	108	"	7.99	7.99	7.99
Pinot Noir	108	"	11.33	11.33	11.33
Red Bordeaux Blend	108	"	29.99	29.99	29.99
Sangiovese	108	"	12.99	12.99	12.99
Sangiovese Bonarda	99	"	7.17	7.17	7.17
Syrah	720	"	12.31	8.24	16.51
Other variety	101	"	22.69	6.95	69.00
Producer Name					
Dona Paula	262	CDN$/bottle	16.05	5.95	25.62
Esmeralda	369	"	29.89	19.56	125.95
Penaflor	324	"	10.27	7.99	11.49
Finca Flichman	688	"	15.08	6.95	69.00
Lurton	229	"	10.75	6.95	12.32
Luigi Bosca	207	"	22.90	21.95	23.95
Marcus James	324	"	10.27	7.99	11.49
Martin Santos	216	"	9.59	9.59	9.59
Nieto Setenier	244	"	14.12	12.95	45.63
Norton	323	"	14.32	12.99	14.99
Trapiche	255	"	14.37	11.49	50.61
Trivento	410	"	10.76	5.95	25.62
Valentin Bianchi	197	"	11.94	9.95	14.95
Weinert	405	"	24.60	17.95	119.90
Other producer	870	"	14.51	6.95	34.57
Season of the Year[1]					
Fall	1,283	N/A	0.24	N/A	N/A
Winter	1,158	"	0.22	"	"
Spring	1,494	"	0.28	"	"

[1] Seasons of the year are expressed as the share of the total number of Argentinean red wine sold in a given season.

Table 5.1 Continued

Variable/category	N	Units	Mean	Minimum	Maximum
Summer	1,241	N/A	0.23	N/A	N/A
Holiday	147	"	0.03	"	"
Corporate Brand	1,496	CDN$/bottle	17.92	6.95	125.95
Special Descriptor	575	CDN$/bottle	11.16	11.45	75.95

is $15.43 (range $5.95 – $125.95). Price distribution indicates that 80 percent of wines are in the $10 to $20 range. Wines priced at or above $25 account for 13 percent of the sample. For the Chilean sample, the average price is slightly higher at $17.63 (range $5.65 - $99.99). Price distribution is also concentrated in the medium price range with 74 percent of the wines priced between $9 and $18, and 24 percent at $21 or above. Alcohol content across samples appears to be very similar with a mean of 13.02 percent of alcohol content for Argentinean red wines and 12.99 percent for Chilean wines. In terms of the quantity sold, BC consumers purchase an average quantity of 190 bottles of Chilean wine per week and 149 bottles of Argentinean wine.

In order to assess the value of the most representative grape varieties in both samples, wines made of rarely used varieties have been grouped; specifically wines with 40 or fewer observations are included under the category "other variety". We identify 12 main grape varieties in the Argentinean sample covering Argentinean wines. Malbec, Argentina's signature varietal, accounts for 33 percent of observations and is followed by Cabernet Sauvignon, Syrah and Merlot. A notable 69 percent of the wines are comprised of bivarietal wines, which contain a blend of wine made from more than one varietal. There are two different types of blended wine but the Red Bordeaux Blend is distinguished for having the highest mean price in the sample. The least expensive wine imported from Argentina is made of Cabernet Merlot priced at $7.45.

The sample of Chilean wine prices contains wines made from 14 main grape varieties. Cabernet Sauvignon, Chile's top exported and planted variety, represents 41 percent of the

sample observations and is by far the most imported Chilean red variety in the BC market. Merlot wines rank second and comprise 23 percent of the sample. Overall, there is great variance in prices, especially wines made from Cabernet Sauvignon (prices range from $6.75 to$75.99), Merlot (prices range from $7.95 to$84.95) and Syrah (prices range from $9.99 to$88.43). The highest average price is for a blended wine, the Red Blend selling for $42.93 per bottle, while Cabernet Merlot has the lowest average price at $5.65 per bottle, respectively.

Data for the two countries include a total of 14 main producers. However, some producers have a very small share in the total number of observations and are not major suppliers to the BC market. Producers with 100 or fewer observations are grouped in the category "other producer". In the Argentinean dataset, the highest average price is associated with the producer Esmeralda, which is considered the oldest winemaker in the prime wine region of Mendoza. In addition, Esmeralda wines have the highest average price and the widest price range among wines from all producers, from $29.89 to $125.95, respectively. In the case of Chile, the most distinguishable producer is Concha Y Toro. The share of Concha Y Toro in the sample is 12 percent of observations and is the largest number of observations among all producers. Concha Y Toro is Chile's top wine exporter in terms of value and volume (Van Tienhoven, 2008).

Figures in Table 5.1 and 5.2 show that 28 percent of Argentinean wines are marketed under a corporate brand name and 10 percent under the special descriptor "reserve". In the Chilean data set sample, the descriptor is present in 20 percent of the wine labels, while 35 percent of all Chilean wines are marketed under a corporate brand name.

5.3 Variable Selection

Researchers using the hedonic price technique have examined different types of wine attributes to explain price variation in wine. In fact, any factor influencing the purchasing or

Table 5.2 Descriptive and Simple Statistics of Red Wines from Chile

Variable/category	N	Units	Mean	Minimum	Maximum
Price	12,841	CDN$	17.62	5.65	99.99
Alcohol content	12,841	Percent	12.99	11.00	14.70
Quantity sold (per week)	12,841	Bottles	190.00	0.00	4,745.00
Variety or blend					
Cabernet Carmenere	304	CDN$/bottle	33.73	20.58	99.99
Cabernet Franc	71	"	22.78	17.95	23.49
Cabernet Malbec	82	"	16.40	16.40	15.47
Cabernet Merlot	508	"	14.39	5.65	30.62
Cabernet Sauvignon	5,316	"	17.08	6.75	75.99
Cabernet Syrah	221	"	20.35	13.99	48.63
Carmenere	333	"	13.90	9.95	34.80
Malbec	330	"	19.01	11.99	28.99
Merlot	2,993	"	15.68	7.95	84.95
Merlot Mourvedre	108	"	13.99	13.99	13.99
Pinot Noir	460	"	18.79	7.95	54.95
Red Blend	161	"	42.93	30.90	73.99
Red Bordeaux Blend	108	"	24.95	24.95	24.95
Syrah	673	"	18.20	9.99	88.43
Other variety	68	"	29.94	11.33	56.99
Producer Name					
Caliterra	474	CDN$/bottle	16.06	11.37	73.99
Carmen	901	"	23.14	12.50	50.95
Concha y Toro	1,545	"	16.76	7.95	54.95
Cousino Macul	291	"	17.32	13.99	39.95
Errazuriz	365	"	18.67	13.43	56.99
Lapostolle	457	"	29.94	18.49	84.95
Miguel Torres	195	"	21.85	17.90	46.90
Montes	428	"	24.51	14.95	88.43
San Pedro	578	"	11.95	7.95	17.55
Santa Rita	588	"	18.07	11.95	75.99
Tarapaca	474	"	13.56	11.99	19.65
Undurraga	522	"	14.31	9.95	35.99
Valdivieso	1,278	"	20.21	11.33	54.95
Veramonte	366	"	19.30	14.95	27.99
Other producer	4,365	"	15.07	5.65	99.99
Season of the Year[2]					
Fall	3,055	N/A	0.24	N/A	N/A
Winter	2,813	"	0.22	"	"
Spring	3,667	"	0.29	"	"

[2] Seasons of the year are expressed as the share of the total number of Argentinean red wine sold in a given season.

Table 5.2 Continued

Variable/category	N	Units	Mean	Minimum	Maximum
Summer	2,939	N/A	0.23	N/A	N/A
Holiday	367	"	0.02	"	"
Corporate Brand	4,448	CDN$/bottle	17.16	7.95	59.95
Special Descriptor	2,626	CDN$/bottle	19.75	11.33	55.58

winemaking process could be regarded as a potential explanatory variable in the hedonic model (Bombrum and Sumner, 2003). According to the work by Rosen (1974), market prices derived from consumers' valuation are only possible if consumers are aware of the observed product characteristics. It could be argued then that subjective characteristics such as sensory attributes or expert ratings should not enter the hedonic price function. Among several experts, Oczkowski (1994) and Nerlove (1995), were first to demonstrate that objective characteristics had stronger explanatory power than non-objective characteristics. While previous studies have considered the latter, the current study is solely concerned with objective characteristics.

The inclusion of grape variety as a determinant of price deems appropriate because the type of grape is considered to have an important effect on the style and taste of the wine (Landon and Smith 1998). Industry reports (Malizia, 2008) support the descriptive statistics from Table 5.2, in which wine made from Cabernet Sauvignon appears to be the most widely purchased red grape variety in the BC market. It is reasonable to expect other grape varieties to command a price discount. There is no *a priori* evidence how native varietals such as the Argentinean Bonarda or the Chilean Carmenere are viewed by BC consumers because few may have any knowledge of them. A price discount could mean that consumers lack information about these uncommon varieties and hence, hesitate to purchase wines made from them, while a price premium could mean that consumers see the rarity of these wines as a sign of exclusiveness.

According to previous studies (Yue *et al*., 2006; San Martin *et al.*, 2008; Ortuzar-Gana and Alfranca-Burriel, 2010), the New World producing countries have relied mainly on grape varieties and company brand names to signal quality products. Brands can take the form of the producer name (e.g., Chile's Santa Rita), the winery name (e.g., Argentina's Trapiche), or a corporate brand name (e.g., Chile's Casillero Del Diablo). All wines in our sample are marketed under at least one of these three brand indicators. Steiner (2003) notes that the producer name may be the most visible source of information on the label, which captures attention of consumers in the case of New World wines. In a subsequent study, Steiner (2009) attributes Australia's export success to its focus on branding, a strategy that other New World producers appear to be following.

Previous authors have considered either the producer name (Steiner, 2004; San Martin *et al*., 2006) or the corporate brand name (Ortuzar-Gana and Alfranca-Burriel, 2010), but not both to account for a possible branding effect on prices. Although the data set employed in the current study includes information on both variables, it transforms the corporate brand name into a dummy variable. The estimation results indicate whether the inclusion of a specific corporate brand name has any additional effect on prices when the wine is already marketed under a producer name. Thus, a positive significant effect would denote that consumers are willing to pay a premium for a wine carrying a corporate brand name. From the producers' perspective, such an effect would indicate investment returns for exporting wines under specific names.

Wine producers have used special descriptors on labels to signal quality and differentiate their wines from the competition. There are currently no formal restrictions regarding the use of quality descriptors, but the most widely used are "reserve," "gran reserve," "estate bottled," "selected," and "cru." Previous studies by Bombrum and Sumner (2002), Costanigro *et al*.

(2006), and San Martin *et al*. (2008) have included at least one of these special descriptors in their hedonic models and reported significant and positive effects on price, especially for the terms "reserve" and "gran reserve." In the current study, wines associated with the term "reserva" (reserve) are expected to command a price premium compared to those with no association to the term.

Several studies justify the inclusion of a variable associated with the number of bottles sold or the number of bottles produced. The quantity can act as a proxy to measure the supply of wine available at the time of purchase. Thus, the hedonic price equation becomes a combined supply and demand reduced-form equation (Huang and Lin, 2007). As economic theory dictates, the coefficient attached to the variable quantity is expected to be negative. In fact, Costanigro *et al*. (2007), Carew and Florkowski (2010), and Kwon *et al*. (2010) found that quantity has a significant and negative effect on prices of wine. The interpretation of the relationship is that wines that are in short supply are considered scarce and hence, may denote higher prices because of "exclusiveness." Studies by Benfratello *et al*. (2007) and Schamel (2000) obtained similar results. The latter measured quantity as the number of cases produced and found a significant negative relationship between quantity and prices of red wine.

The current study accounts for additional market factors that may affect the number of bottles sold every week. Therefore, a set of dummy variables was added to capture the effect of the four seasons of the year and festive holidays such as Christmas and New Year's Eve on wine sales. Estimations from Ortuzar-Gana and Alfranca-Burriel (2010) include the latter based on the idea that Chilean consumers increase wine consumption during special occasions. The estimated results from the study present a significant and negative impact on prices of wine indicating that prices tend to decrease as consumer demand rises. Consequently, it is plausible to expect similar

effects in the current investigation. Rabkin and Beatty (2007) explore the effects of seasonality on prices of Canadian wine on the BC market and find inconclusive results. When the models are estimated by Ordinary Least Squares, it appears that prices of red wine are not affected by season, while those of white wine are influenced during the fall only. By contrast, when the models are estimated by quantile regressions, the season in which the wine is sold appears to have a significant effect on prices for both red and white wines. The current study expects a significant price impact during the winter because the red wine consumption tends to increase during that particular season.

The alcohol content of wine has proven to be significant in previous studies. The variable is expected to have a positive effect on prices, and especially red wines as consumers tend to prefer red wines with higher alcohol content and red wines tend to have slightly higher alcohol content on average. Rabkin and Beatty (2007) report significant and positive effects of alcohol content on prices of Canadian red wines. Another study by Carew (2008) results in similar findings to those reported by Rabkin and Beatty and concludes that the alcohol content has a positive effect on red Australian wine prices sold in the BC market. Based on the previous findings, the current study expects to find similar significant and positive results.

Due to the following reasons, the current study does not consider certain wine attributes that have been reported to influence prices of wine. For example, characteristics related to the size of the packaging are excluded because all bottles in the data set were imported and sold to BC consumers in the standard size of 0.750 liters. The intrinsic attributes such as sugar level considered by Nerlove (1995) are excluded because of the lack of variation in the data. The sugar level in the majority of sampled wines ranged from 0 to 4.9 g/l. The effects of the acidity level on wine prices is examined by Golan and Shalit (1993), but had to be excluded from the model

in the current study due to lack of information. Finally, the region/valley of origin is also excluded due to the lack of variation in the Argentinean sample. The analysis of the data shows that more than 95 percent of the sampled Argentinean wines were produced in the region of Mendoza.

CHAPTER 6

ESTIMATION RESULTS

6.1 Tests for Multicollinearity and Heteroscedasticity

In order to assure unbiased and efficient parameter estimates, a series of statistical tests for each model, deemed necessary. The presence of multicollinearity is tested by employing the variance inflation factors (VIF) technique and the Pearson correlation matrix. The VIF test requires that all values are below the critical threshold value of 10 (Gujarati, 2009). The results of the VIF test indicate the absence of serious multicollinearity problems (see appendix A and B). The correlation coefficients do not appear to be problematic either. The range of the calculated correlation coefficients is from 0.0008 to 0.5337 for the Argentinean red wine model and from 0.0005 to 0.4970 for the Chilean red wine model. Overall, the results derived from both testing methods suggest that the current models do not reveal serious signs of multicollinearity.

Next, we test for the presence of heteroscedasticity. The White test, executed with the "spec" command in SAS, tests the null hypothesis of no heteroscedasticity. Results show that the null hypothesis is rejected at the 0.01 significance level, suggesting that the data suffers from heteroscedasticity. If variance is non-constant, standard error estimates derived from results obtained using the Ordinary Least Squares (OLS) may be biased and hence, yield inefficient parameter estimates. Therefore, we correct the aforementioned problem by reporting White's heteroskedasticity-consistent standard errors.

The current study employs the OLS using White's heteroscedasticity-consistent standard errors to estimate the models of Argentinean and Chilean red wines on the BC market. For all estimated parameters that are statistically significant at the 0.10 level or better, the percentage

impact is reported in the last column of Table 4 and 5. Estimation results for each model are discussed next.

6.2 Argentinean Red Wine Price Model

Table 6.1 reports the estimates of the hedonic price function for Argentinean wines. The adjusted R^2 for the equation is 0.73 indicating that the selected explanatory variables explain 73 percent of the price variation in Argentinean red wines sold in the BC market. The estimated model appears to be globally significant with an F value of 427.48 and the corresponding probability of less than one percent.

All grape varieties except for the category "other variety" have estimated parameters that are statistically significant at the 0.10 level or better indicating that the grape variety is important and influences the price. In fact, wines from Australia and the New World are primarily identified by the grape variety (Lin and Lockshin, 2003), while, San Martin *et al*. (2008) show a statistically significant relationship between varieties and retail prices of Argentinean wines sold in the U.S. market. The current results, which indicate that grape varieties receive a discount compared to Malbec, the benchmark grape variety, are not striking considering that the latter is a reputational cornerstone of Argentinean wines. In addition, the fact that Malbec grapes are primarily grown in Argentina, gives them a sense of "exclusiveness." According to industry reports, Malbec is the most popular Argentinean variety among BC consumers (Malizia, 2008) and its wide price range from $12.63 to $125.95 makes it attractive to consumers in all price segments.

When examining the price percentage changes associated with a particular attribute or measure, results show that Pinot Noir and Red Bordeaux Blend command the highest price

Table 6.1 Regression Results for the Argentinean Red Wine Price Model

Variable category/Name	Coefficient	Standard error	z-statistic	Percentage change
Intercept	1.082***	0.111	9.68	193.29
Grape variety or blend				
Bonarda	-0.015	0.020	-0.75	
Cabernet Sauvignon	0.079***	0.004	18.80	8.31
Cabernet Merlot	0.015	0.027	0.54	
Malbec Blend	0.066***	0.015	4.30	6.89
Merlot	0.019**	0.008	2.46	2.00
Merlot Malbec	-0.233***	0.007	-29.17	-20.79
Pinot Noir	0.434***	0.013	33.34	53.18
Red Blend	-0.123***	0.016	-7.57	-11.67
Red Bordeaux Blend	0.442***	0.015	27.85	55.59
Sangiovese Bonarda	0.057***	0.021	2.63	5.90
Syrah	0.000	0.005	0.13	
Other variety	0.297***	0.084	3.51	34.11
Producer name				
Dona Paula	-0.609***	0.013	-43.88	-45.63
Finca Flichman	-0.967***	0.018	-51.45	-62.00
Luigi Bosca	-0.237***	0.019	-12.17	-21.15
Lurton	-0.853***	0.028	-30.41	-57.44
Marcus James	-0.879***	0.031	-28.29	-58.52
Martin Santos	-1.089 ***	0.019	-56.17	-66.37
Nieto Setenier	-0.546***	0.019	-27.66	-42.09
Norton	-0.764***	0.018	-42.49	-53.47
Penaflor	-0.945***	0.019	-47.67	-61.17
Trapiche	-0.539***	0.027	-19.71	-41.71
Trivento	-1.127 ***	0.025	-44.42	-67.62
Valentin Bianchi	-0.562***	0.025	-22.45	-43.06
Weinert	-0.287***	0.019	-15.09	-25.01
Other producer	-0.767***	0.020	-37.11	-53.58
Season				
Fall	0.022***	0.001	6.47	2.32
Spring	-0.000	0.003	-0.11	
Winter	-0.003	0.003	-0.95	
Holidays	0.016**	0.006	2.43	1.70
Alcohol content	0.172***	0.007	22.41	0.17[3]
Quantity sold	-0.022***	0.001	-11.27	-0.02[3]
Corporate brand name	-0.185***	0.012	-14.78	-16.92
Special descriptor	0.346***	0.012	26.73	41.38
Adjusted-R square	0.95			
F-value	3085.1***			

Note: *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

[3] Indicates elasticity of a continuous variable

premia with respect to Malbec. A plausible explanation is production costs. For example, Pinot Noir is an extremely complex varietal to grow (Robinson, 1999) and the Red Bordeaux Blend is a wine comprised of five different types of single varieties. The result from the lengthy blending process is a wine with unique traits that only wine connoisseurs may be willing to purchase at a premium price (San Martin *et al*., 2008). It is noteworthy, however, that not all blended wines necessarily command higher prices. Blends are wines made from different types of grape that grow in a variety of climates and soil. Therefore, the quality and price of a blended wine can vary according to the particular combination of grape varieties (Jones and Heinz, 2000). This is a probable reason that the Red Blend and Malbec Blend bring a discount, instead of a premium, of 9.64 and 6.90 percent, respectively.

Other grape varieties resulting in price discounts include Merlot Malbec, Cabernet Merlot, Sangiovese Bonarda and pure Merlot. The latter is not only discounted as a single variety, but also when combined with other varieties. The result may be explained by a consumer home bias effect. Studies that obtained hedonic prices for Canadian wines sold in the BC market found that Merlot and Cabernet Sauvignon were the two grape varietals with the highest price premia (Kwon *et al*., 2010; Rabkin and Beatty, 2007). In addition, Merlot is the top red variety, by acreage planted, in the BC region (BC Wine Institute, 2011). Therefore, the results from the current study may suggest that Argentinean producers market their Merlot wines very aggressively in order to compete with those produced locally.

Turning to the producer name dummy variables, coefficient estimates indicate that all producers in the sample, except for Luigi Bosca, report large price discounts with respect to the benchmark producer name, Viña Esmeralda. The results reinforce the hypothesis that the producer's name, acting as a brand, has an important effect on wine prices. Studies by Steiner

(2004), San Martin *et al*. (2006) and Yue *et al*. (2006) reported similar brand effects on price of New World wines. The percentage changes associated with the producer name are much larger than those obtained for the grape varieties. The producer Martin Santos earned the highest price discount of 59 percent, followed by Trivento, Lurton, Finca Flichman and Peñaflor at 58, 55, and 50 percent, respectively. The producers Trapiche, Weinert and Luigi Bosca obtained the smallest price discounts at 21, 19 and 10 percent, respectively.

The large two-digit price discounts present across most producer names should be considered from both consumer and producer's perspectives. For example, the deep discounts may be explained by the lack of brand/producer reputation among BC consumers. It is noteworthy that the data set employed in this study includes transactions from the period between 2002 and 2004. The presence of Argentinean wines in the BC market started expanding rapidly in 2001 suggesting that consumers may have not been exposed to Argentinean producer names/brands for a sufficiently long time period to develop any level of appreciation. Findings from Schamel (2006) indicate that local consumers exposed to marketing campaigns and hence, possess a deeper knowledge of local brands than external consumers. Such was the case for the majority of the Argentinean producers whose names were well-established in their domestic market, but lacked recognition in overseas markets at the time the current data was collected.

From a producer's perspective, the large price discounts may suggest an aggressive pricing strategy with respect to the benchmark producer name. The current study suggests a need for a closer examination of ownership structure in order to further understand the effect of producer names on wine price variation. In Argentina, half of the 30 main exporting producers are partially or wholly owned by foreign companies. In addition, the industry is centralized with the top five producers accounting for 40 percent of total sales (McDermott, 2007). In the current

model, the reference variable is Viña Esmeralda (currently known as "Catena"), which is the top exporter of Argentinean wines and one of the few that remains domestically and family-owned. The owners of Viña Esmeralda, the Catena family, are argued to have been the first ones to export Argentinean wines successfully (Matthews, 1995).

With the exception of Viña Esmeralda, the majority of the producers in the current study are either wholly or partially owned by foreign companies. Such is the case of Trivento and Doña Paula, owned by Chilean companies, and Finca Flichman, Lurton, Norton, Peñaflor owned by Portuguese, French, Austrian, and U.S. companies, respectively (Artopoulos *et al*., 2007). By 2006, Doña Paula and Trivento were the second and third largest exporters of Argentinean wine with the share of 12 and six percent of total exports, respectively. The latter set of producers commanded the largest price discounts with respect to Viña Esmeralda, possibly indicating their ability to mass produce wines at very low prices. Foreign producers in Argentina have had the distinct advantage of being able to export wine effectively compared to local producers. Besides having access to distribution channels in international markets, foreign firms also have large-scale facilities that allow them to produce wine in large volumes (McDermott, 2007).

Other brand elements commonly used in the wine industry are corporate brand names such as Viña Esmeralda's "Alamos Ridge". Producers may use corporate brand names to further differentiate their products (Ling and Lockshin, 2006). Australia has successfully used the branding and other New World producing countries like Argentina, Chile and New Zealand appear to be following the same approach. However, according to the results from the current estimated model, the coefficient corresponding to corporate brand name is not statistically significant, indicating that BC consumers may not value this information when purchasing a bottle of Argentine wine.

Turning to the special descriptor dummy variable, estimated results show that the term "reserva" (reserve) has a significant and positive effect on prices. Producers who market their wine under such quality descriptor can expect to earn a price premium of 41 percent. Similar findings emerged from studies by Bombrum and Sumner (2002) and Costanigro *et al*. (2007). San Martin *et al*. (2008) found no statistical significance with the term "reserve". However, the term "gran reserve" received a price premium of a similar magnitude as the one derived in the current study.

The regression results show that the effect of the alcohol content on price is small, but still statistically significant at the 0.01 level. The reported results show that a one-unit increase in alcohol content increases prices by less than one percent. Rabkin and Beatty (2007) obtained similar results indicating a slightly higher price premium of four percent for a one-unit percent change in alcohol content in Canadian red wines.

When examining the market characteristics, we find that only fall appears to have a significant effect on price. Demand for red wine peaks in the fall, when red wine sells at a premium compared to the prices in summer. Results from the current study indicate that Argentinean red wines fetch a premium of four percent during the fall. Red wine consumption tends to increase during the fall and winter due to changes in the weather, lifestyle and type of consumed food. Finally, we find that the quantity of bottles sold per week appears to have a negative and statistically significant impact on price. The result conforms to economy theory which dictates that price and quantity are inversely related.

6.3 Chilean Red Wine Price Model

Table 6.2 reports regression results for the Chilean red wine price equation. The adjusted R^2 is 0.60 and the F value of the model is statistically significant supporting the overall

explanatory power of the model. The model explains 60 percent of the price variance and the data fits the model reasonably well.

The regression results show that all of the grape varieties, with the exception of Pinot Noir have estimated coefficients that are statistically significant at the 0.10 level or better. The result is consistent with several previous studies (e.g., Troncoso and Aguirre, 2006; Luppe *et al*., 2009; Ortuzar-Gana and Alfranca-Burriel, 2010) and supports the importance of the grape variety with regard to price, whereby confirming *a priori* hypothesis of grape variety relevance. All estimated coefficients are interpreted as departures, in percentage terms, from Cabernet Sauvignon, which is the selected benchmark variety. The grape varieties or their blends that command price premia with respect to the latter are Cabernet Syrah, Merlot Mourvedre, Carmenere, Cabernet Carmenere, Red Bordeaux Blend and Red Blend.

The magnitude of price premia for the blended wines is much greater than that for non-blended wines. Blending is a costly process that combines the finest traits of different single varieties, resulting in unique wines (San Martin *et al*., 2008). It appears that BC consumers value this "uniqueness" and are willing to pay a premium of 87.48 percent for Red Bordeaux Wines and a remarkable 117.79 percent for Red Blends. The latter was also associated with the highest price impact in the study by Troncoso and Aguirre (2006) who examined prices of Chilean wines in the U.S. market using the hedonic technique. Carmenere represents the single grape variety that is associated with the highest price premium of 36.70 percent. A plausible explanation is the "exclusiveness" of Carmenere, which is primarily grown in Chile. Industry experts often refer to Carmenere as the future signature wine of Chile (Van Tienhoven, 2008). Carmenere appears to command a price premium even when it is combined with other single varieties. Such is the case of Cabernet Carmenere, which fetches a premium of 37.46 percent.

Table 6.2 Regression Results for the Chilean Red Wine Price Model

Variable category/Name	Coefficient	Standard error	z-statistic	Percentage change
Intercept	2.496***	0.035	70.22	
Grape variety or blend				
Cabernet Carmenere	0.142***	0.029	4.91	15.28
Cabernet Franc	0.027**	0.011	2.46	2.81
Cabernet Malbec	0.012	0.012	0.96	
Cabernet Merlot	-0.134***	0.008	-15.16	-12.56
Cabernet Syrah	0.075***	0.011	6.63	7.87
Carmenere	-0.220***	0.014	-14.91	-19.82
Carmenere Merlot	0.290***	0.013	22.26	33.75
Malbec	-0.065***	0.018	-3.55	-6.31
Merlot	-0.009 ***	0.003	-3.10	-0.99
Merlot Mourvedre	0.036***	0.012	2.87	3.67
Pinot Noir	0.093***	0.007	12.17	9.83
Red Blend	0.835***	0.014	56.97	130.618
Red Bordeaux Blend	0.634***	0.007	81.12	88.67
Syrah	-0.027***	0.007	-3.64	-2.70
Other variety	-0.431***	0.043	-9.90	-35.09
Producer name				
Caliterra	-0.015	0.010	-1.47	
Carmen	0.270***	0.010	26.16	31.06
Cousino Macul	0.186***	0.007	23.39	20.50
Errazuriz	0.188***	0.010	18.73	20.77
Lapostolle	0.515***	0.016	30.45	67.40
Miguel Torres	0.214***	0.015	13.75	23.84
Montes	0.435***	0.014	30.29	54.53
San Pedro	-0.139***	0.007	-17.73	-13.00
Santa Rita	0.072***	0.008	8.39	7.53
Tarapaca	-0.010***	0.011	-0.88	
Undurraga	0.045***	0.007	5.87	4.61
Valdivieso	0.135***	0.007	18.20	14.53
Veramonte	0.295***	0.011	25.14	34.35
Other producer	-0.113***	0.007	-15.30	-10.76
Season				
Fall	0.031***	0.003	9.14	3.20
Spring	0.002	0.003	0.77	
Winter	-0.005	0.003	-1.45	
Holidays	0.041***	0.007	5.37	4.18
Alcohol content	0.027***	0.002	10.18	0.02[4]
Quantity sold	-0.082***	0.001	-57.52	-0.08[4]
Corporate brand name	0.006*	0.010	0.59	9.57
Special descriptor	0.218***	0.008	26.98	33.51
Adjusted-R square	0.83			

[4] Indicates elasticity of a continuous variable

Table 6.2 Continued

Variable category/Name	Coefficient	Standard error	z-statistic	Percentage change
F-value	1,637.8***			

Note: *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

The grape varieties associated with price discounts include Malbec, Syrah, Cabernet Merlot, Merlot, Cabernet Franc and Cabernet Malbec and the corresponding discounts are 11.04, 10.70, 7.54, 6.94, 6.74 and 3.46 percent, respectively. The results show that wine made of Cabernet grapes may fetch a discount or a premium depending on what other grape variety is added to the blend. BC consumers appear to be willing to pay higher prices when Cabernet is blended with Syrah, Carmenere or Sauvignon. However, alternate combinations with Franc, Malbec and Merlot result in price discounts.

A number of similarities when compared with the Argentinean model are worth highlighting. For example, both Merlot and Syrah are associated with price discounts with respect to the benchmark grape variety, i.e., Malbec in the case of the Argentinean model and Cabernet Sauvignon in the case of the Chilean model. Merlot and Syrah may be discounted due to reputation effects. Chile's high reputation for Cabernet Sauvignon, the country's top cultivated, produced and exported variety (Wines of Chile, 2011), may overshadow wines made from other varieties such as Merlot and Syrah. Similar explanation applies to the Chilean Malbec, which sells at a price discount of 11.04 with respect to Cabernet Sauvignon. BC consumers may value the Chilean Malbecs less simply because Argentina is known for making superior Malbec. Syrah's associated price discount in both models is likely due to the fact that Australia, BC's top imports supplier, has a well-established reputation for making quality Syrah. A study by Carew (2009) reported large price discounts for most red Australian varieties with respect to Syrah.

Results (Table 6.2) also show how prices vary with regard to other objective attributes such as the producer name. With the exception of Carmen and Veramonte, all other producer names are associated with coefficient estimates that are highly significant at the 0.05 level or better. The benchmark producer name was Concha y Toro hence, all coefficients of binary variables representing producers should be interpreted with regard to that name. The results show that the majority of producers face price discounts ranging from four percent to 32.74 percent. The categories associated with two-digit discounts include the "other producer" group, San Pedro, Caliterra, Undurraga and Miguel Torres and the corresponding discounts 32.75, 31.07, 23.41 and 19.58 percent, respectively. The results suggest that BC consumers highly value wines made by Concha y Toro. The finding is consistent with a previous study by Buzeta (2005), in which the producer Concha y Toro received the highest price premium (62 percent) among large size Chilean producers.

Concha y Toro is not only the largest producer and exporter of Chilean wine, but it is also one of the oldest wineries in the country. Throughout the years, the firm managed to build its brand in international markets by establishing a reputation for wine characterized by good quality/price ratio (Visser, 2004). The descriptive statistics in Table 2 clearly show that Concha y Toro sells the Chilean wine with the lowest price in the BC market and several other producers sell wines at the average price much higher than that of Concha y Toro. Two producers, Montes and Lapostolle, command price premia of almost seven percent and 21.63 percent, respectively. The latter are relatively new and small wineries by the country's standards, but they share a quality and export-let orientation (Van Tienhoven, 2008).

In general, price effects estimated for the Chilean model are smaller compared to those in the Argentinean model. While the average price discount in the latter was 41 percent with respect

to the benchmark producer, it was 18 percent in the Chilean model. The observed differences in terms of mean price discounts across countries may be explained by the degree of industrial concentration in each country. The Chilean industry is less fragmented and more vertically-oriented than Argentina's industry (Del Pozo, 2004). Although there are currently over 70 wineries exporting in Chile, the top three producers dominate both domestic and export market shares. By 2006, the top three producers, Concha Y Toro, Santa Rita and San Pedro, accounted for 64 percent of the Chilean domestic market in terms of value and 73 percent in terms of volume. In the same year, the three listed producers accounted for 27 percent of the export market share (Van Tienhoven, 2008).

In terms of ownership structure, Chile has attracted a vast amount of foreign direct investment that has taken the form of joint-ventures and wholly-owned firms. With the exception of San Pedro and Undurraga, which fetch price discounts of 31.07 and 19.58, respectively, the majority of the producers in the current study are either wholly or partially owned by foreign wineries. Lapostolle and Miguel Torres, fully owned by European firms, command a premium of 21.63 and a discount of 19.00 percent, respectively. The rest of the producers are joint-ventures and include Concha y Toro, Santa Rita, Carmen, Caliterra and Errazuriz (Visser, 2004).

Despite the high level of concentration, the Chilean wine industry is overall well connected through a network of industry associations, public institutions and regional clusters that have helped to homogenize the market (Kunc and Bas, 2009). Thus, the modest differences in price premia/discounts across producers (both foreign and domestic) may be attributed to Chile's homogeneity in terms of quality and prices.

The current study also indicates that the presence of a corporate brand name has a small (0.6 percent), yet significant effect on prices of Chilean wines. Ortuzar-Gana and Alfranca-

Burriel (2010) examined Chilean corporate brand names in a categorical form and obtained significant price premia for the majority of the brands. The corporate brand name with the highest price premium was "Casillero Del Diablo", which is produced by Concha y Toro. Brand effects are argued to be more effective in a market where consumers have detailed information (Schamel, 2006). Therefore, results from the current study suggest that producers who already have a brand reputation established are more likely to succeed when selling wines under certain corporate brand names in the BC market.

The value of the special descriptors is in line with expectations. The results indicate that wines labeled under the term "reserva" have a significant effect on price and fetch a price premium of 24.45 percent. Another variable that also has a statistically significant and positive influence on price is the alcohol content. The result is similar to those obtained by Rabkin and Beatty (2007) and Yoo *et al*. (2011). BC consumers appear to be willing to pay more for red wines with higher alcohol content; a one percent increase in the latter increases the price of wine by 8 percent.

The seasonal effects influence wine prices. Prices of Chilean red wine are more sensitive to seasonal changes than those of Argentinean red wine. The results show that all dummy variables accounting for seasons or holidays are statistically significant at least at the 0.10 level or lower. The fall, spring and winter seasons command price premia of four, two and two percent, respectively, compared to the benchmark summer season. The results show that consumption of red wine peaks in the fall, when red wine sells at the highest premium compared to the prices in the summer. The premium effect appears to continue throughout the spring suggesting that certain Chilean red wines may be lighter and softer and hence, still likely to be consumed in warmer weather. The estimated results also indicate that red wine sold during

special celebrations commands a premium of almost three percent. Finally, the quantity of bottles sold per week, which acts as a proxy for availability, has a negative and highly significant effect on price. The estimated coefficient of the quantity supports the negative relationship between red wine prices and the quantity of red wines sold as expected.

CHAPTER 7

CONCLUSIONS

The current study investigated the implicit values of red wine characteristics from Chile and Argentina red wine sold in the BC wine market. The hedonic pricing approach was used to specify and estimate two separate equations for wine prices from each country. The same categories of objective wine characteristics available to a consumer and placed on the bottle label were used to form explanatory variables. Among the variable categories were grape variety, producer name, and corporate brand name. In addition alcohol content and special quality descriptors were added. Two market characteristics, seasonal change and holiday period were included to account for consumer wine purchases conditioned by cyclical factors, while quantity of bottle sold accounted for the supply conditions.

7.1 Summary of Results

Estimated results showed that, with few exceptions, all chosen wine attributes have a statistically significant effect on prices of Argentinean and Chilean red wines. The grape variety proved to be an important determinant of wine prices conforming to *a priori* expectations and previous studies. Results indicated that most wine prices are discounted with respect to Malbec if made from different grape varieties. The result was not unexpected because the latter had the highest average price among all varieties but, most importantly, Malbec is Argentina's premier grape variety.

Results for the Chilean red wine price model were noticeably different as compared to those reported for the Argentina's wine price model. One half of the grape varieties fetched price

premia, while the other half received price discounts with respect to the base, Cabernet Sauvignon. Unlike Malbec, which plantings are very much limited to Argentina, Cabernet Sauvignon is widely planted outside of Chile, and other New World countries such as the U.S. and Australia are also known for producing its fine versions. In addition, Chilean wines made from other grape varieties sold at an average price that was much higher than that of Cabernet Sauvignon. One clear example is Carmenere. Its particular traits and, possibly, its perception of being an "exclusive" native variety, are acknowledged by BC consumers and are reflected in the price premium.

The findings also show that BC consumers are willing to pay a premium for certain blended wines, especially for Red Bordeaux Blend. That blended wine fetched the highest premium whether it originated from Chile or Argentina. The size of the premium compared favorably even to wines made from Malbec and Cabernet Sauvignon. While BC consumers appear to value blended wines higher than those made with a single grape variety, wines made from two grape varieties report a discount or a premium depending on what grapes are combined. Another similarity in results for both countries is that both Merlot and Syrah are clearly discounted in comparison to both benchmark varieties, Malbec and Cabernet Sauvignon.

Results also reveal that the producer name leads to price discounts or premia for both Argentinean and Chilean red wine. However, the magnitude of the coefficients associated with Argentinean producers' names is much larger than that of Chilean producers. In Argentina, wines produced by foreign firms are substantially discounted with respect to those produced by domestic firms. Therefore, Argentina's large price discounts among producers may be due to the far greater disparity of quality and, consequently, prices within the industry. Such disparity is not

confirmed in the case of Chile due to an industrial structure that is more homogenous than in Argentina.

The coefficient corresponding to the corporate brand name mattered in the case of prices of Chilean red wines, but not for Argentinean red wines. The contrasting results are reasonable considering that BC consumers have been exposed to Chilean wines well before imports from Argentina started to arrive in the mid-to- late 1990s. Therefore, Chilean firms have had time to build their reputation before attempting to further differentiate their wines with corporate brand names.

The estimation results indicate that Argentinean and Chilean red wines labeled with special descriptors such as the term "reserva" fetch price premia. The finding is consistent with *a priori* expectations and previous studies. BC consumers appear to pay attention to that particular descriptor and can be expected to pay a premium, but to encourage the repeated purchase will take place if the wine quality meets expectations of taste. Another objective characteristic that has an influential and positive effect on wine prices is the alcohol content. The latter earns a higher premium in the case of Argentinean wines than Chilean wines.

Demand for red wine seems to be seasonally determined in the BC market. The results show that demand for red wine peaks in the fall, when red wine sells at a premium compared to the prices in the summer. The estimated results also indicate that Chilean red wine sold during special celebrations command a modest premium. On the other hand, special celebrations do not have any significant effect on prices of Argentinean red wine. Finally, the quantity of bottles sold per week, which acts as a proxy for availability, has a negative and significant effect on prices of wines from both countries.

7.2 Implications

In an era of fierce competition exacerbated by the entry of new suppliers, product differentiation plays an increasingly important role in the wine market. Understanding the reasons behind consumption and purchasing behavior can help both marketers and producers to efficiently differentiate their wines. The magnitude and the directional effects of the estimated coefficients of explanatory variables provide valuable insights. The results suggest that the choice of the grape variety has considerable implications to the potential reputation and commercial success of a producer. Such an interpretation is consistent with industry reports (Tourism British Columbia, 2009), which indicate that BC consumers focus on grape variety and origin when purchasing wine. In the current study, the high value attached to the blended wines suggests that BC consumers recognize and appreciate the complex wines and that their palates have become increasingly sophisticated. Another indication of BC consumers' refined taste is supported by the high value placed on the native grape varieties such as Carmenere and Malbec in wine making.

Another finding applicable in wine marketing and merchandising emerging from this study is the important BC consumers' attentiveness to the combination of (coupage) individual varieties in a single bottle. An example is the case of Merlot, which is price-discounted as a single variety. The coefficients showed that wines that combine either Argentinean or Chilean Merlot grapes with other types of grape might lose appeal to the BC consumers and, hence, suffer a price discount. Merlot has become a quite fashionable variety and it is one of the most popular red grape varieties in the BC market (Mitham, 2008). The results from this study show that the BC market might have become too saturated with mainstream varieties like Merlot, which are already supplied by domestic suppliers. The emerging trend posits an interesting

challenge to wine producers implying that the promotion of a "rare" or native variety bring greater returns than marketing wines made from well-known and widely available grape varieties.

The producer name and the corporate brand name have been associated with price discounts or premia and important implications for marketing. The corresponding coefficients enable producers to assess their relative position in the BC market and predict future changes. The majority of the Argentinean producer names induced large discounts with respect to the name of the country's leading producer. Such disparity can be attributed to the lack of reputation among BC consumers. A firm cannot expect a premium for a high-quality product if consumers do not have full information about the product quality (Akerlof, 1970). Assuring that buyers have easy access to information about wine attributes is the reason to invest in building the reputation and command higher prices than competitors in the long run (Rabobank, 2011). Australia was the first among the New World countries to implement an aggressive branding technique, which has eventually paid off. Chile, with the aid of industry organizations and government-funded export promotion agencies (USDA, 2011), is mirroring Australia's approach.

As competition in the global wine industry continues to grow, the need to reduce production costs through economies of scale will be ever present. Consequently, it is reasonable to expect future mergers, joint-ventures and acquisitions. A high level of consolidation in the industry can benefit wine makers and consumers because lower production costs may lead to lower selling prices. However, such trend raises the question of how much concentration is economically viable for the industry? Further consolidation in the industry may translate into more uniform wines and lower profits in the long run.

7.3 Further Research

The current study leaves plenty of opportunities to continue the investigation of consumer valuation of wine attributes. A verification of the results from this study using recent data will provide insights about the persistence of the BC consumers' valuation of Argentinean and Chilean red wines since 2004. Indeed, industry reports indicate that during the past few years, the demand for premium and super premium wines in Canada has increased due to an ageing and wealthier population (USDA, 2011). In addition, much of the growth in this higher-end category can be attributed to an increase in the demand for higher quality imported wine (Tourism British Columbia, 2011). Therefore, future research should explore the effects of specific wine characteristics on price across price segments. Such information would allow improving the efficiency of marketing strategies including the targeting of advertisement focused on various price segments.

There is an increased concern on how agricultural practices affect our global environment. Therefore, producers who practice a sound and sustainable viticulture may be able to market their wines using specially developed messages in their labels. Moreover, there has been a movement to expand the application of organic production methods and organically produced wine grapes have been used in making organic wines, but research on marketing and pricing such wines is needed.

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APPENDIX A:

RESULTS OF THE VARIANCE INFLATOR FACTOR TEST FOR ARGENTINEAN WINE PRICES

Name of the variable	VIF value	Name of the variable	VIF value
Quantity	2.4	Finca Flichman	5.7
Fall	1.5	Lurton	4.6
Spring	1.6	Nieto Setenier	2.1
Winter	1.6	Valentin Bianchi	2.1
Holiday	1.1	Weinert	5.5
Alcohol	4.4	Luigi Bosca	2.9
Syrah	1.6	Trapiche	5.2
Sangiovese Bonarda	1.9	Norton	3.5
Pinot Noir	2.7	Brand	6.2
Merlot Malbec	2.1	Trivento	5.7
Merlot	1.6	Other Producer	7.4
Red Bordeaux Blend	2.2	Dona Paula	1.8
Red Blend	1.1		
Malbec Blend	2.2		
Cabernet Merlot	1.5		
Cabernet Sauvignon	1.5		
Bonarda	2.2		
Other Variety	1.1		
Descriptor	1.8		
Martin Santos	3.0		
Marcus James	6.9		
Penaflor	5.9		

APPENDIX B:

RESULTS OF THE VARIANCE INFLATOR FACTOR TEST FOR CHILEAN WINE PRICES

Name of the variable	VIF value	Name of the variable	VIF value
Quantity	1.5	Undurraga	1.6
Fall	1.5	Valdivieso	3.0
Spring	1.6	Tarapaca	2.2
Winter	1.6	San Pedro	1.4
Holiday	1.1	Miguel Torres	1.4
Alcohol	2.2	Cousino Macul	1.4
Cabernet Franc	1.1	Other Producer	4.5
Cabernet Malbec	1.1	Descriptor	1.5
Cabernet Merlot	1.1	Brand	2.0
Cabernet Syrah	1.3	Montes	1.6
Red Blend	1.2	Santa Rita	1.9
Red Bordeaux Blend	1.0	Other Variety	1.0
Malbec	1.4	Errazuriz	1.5
Merlot	1.3	Lapostolle	1.8
Pinot Noir	1.2		
Syrah	1.3		
Merlot Mourvedre	1.4		
Carmenere Merlot	1.4		
Carmenere	1.1		
Cabernet Carmenere	1.2		
Caliterra	1.8		
Veramonte	1.9		
Carmen	2.4		