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Abstract

The wine industry in New Zealand has been maturing over the past few decades, with consumers becoming more sophisticated and wineries responding by increasing their production of premium varieties. In addition, there have been several legal changes and subsequent changes to the distribution and marketing of wine in New Zealand that have made wine more widely available. It is therefore an interesting and dynamic time to gain a more comprehensive understanding of the relative effects of regional reputation and producer-specific quality on the willingness to pay for domestically produced premium table wine in New Zealand. Previous empirical work suggests that New Zealand consumers rely on both expert opinion and regional reputation when determining their willingness to pay for wine produced domestically. The current paper extends this work by considering the development of a winery's reputation in more detail. Hedonic price analysis is used to determine the price premia associated with a range of indicators of both individual and collective reputation. Preliminary statistical results are presented and interpreted within the context of a growing body of international literature on wine economics.

Keywords: Hedonic pricing, New Zealand wine, willingness to pay, quality, reputation

Introduction

This is a fascinating and dynamic time for the New Zealand wine industry. There is a growing body of evidence in the marketing and economics literature that New Zealanders are becoming increasingly sophisticated wine drinkers, trending towards higher valued, more 'complex' wines. There have also been changes to the political climate over the past 30 years which have made both domestic and imported wine more widely available to the average consumer. New Zealand wine producers have responded with tremendous enthusiasm, and the increase in both the area planted in vines and the number of wineries has been exponential. Unfortunately for domestic producers while per-capita consumption of wine in New Zealand has doubled since the early 1980's, the growth can largely be attributed to an increase in the consumption of imported wine, principally from Australia.

Market research conducted in Christchurch indicates that New Zealand consumers are becoming increasingly 'proactive' in their wine purchases (Lamb, Forbes and Cohen). Given the competitive nature of the industry, and the current decline in profitability brought about by a relative over supply of wine, it is becoming increasingly important to improve our understanding of precisely which indicators of value have the strongest influence on consumers' willingness to pay for premium table wine. Some potential indicators of a wine's quality such as vintage, regional origin and grape variety are

easily obtained from the wine's label prior to purchase.[1] Other, more subjective, indicators of quality come in the form of quality rankings or recommendations from wine experts, and the receipt of various wine awards.

In this paper we estimate a hedonic pricing model in an attempt to determine which attributes are valued the most highly by consumers of domestically produced Chardonnay in New Zealand. For this analysis we have combined data from annual publications of Michael Cooper's "*Buyer's Guide to New Zealand Wines*" and the results of three leading New Zealand wine competitions published on-line at www.wineshow.co.nz. Attributes under consideration are quality, as reflected in Michael Cooper's five-star rating, cellaring potential, regional reputation and success at any one of three of New Zealand's leading wine competitions.

Statistical results suggest that the most statistically significant price premium is associated with Cooper's quality rating. Results also indicate that regional reputation is significant for New Zealand Chardonnay. The size and direction of the regional coefficients are broadly consistent with our expectations, with the most notable regional influences coming from Auckland, Gisborne (New Zealand's Chardonnay capital) and Nelson. Somewhat surprisingly, the receipt of wine medals or trophies is not only statistically insignificant, but in two of the three cases negatively correlated with price once the effects of quality and regional reputation have been taken into account.

The remainder of the paper is as follows: Section 2 provides a brief description of the New Zealand wine industry, Section 3 describes the data and hedonic price model, Section 4 presents the empirical results and Section 5 concludes.

The New Zealand Wine Industry

Geographically New Zealand lies between 34°S and 47°S latitude and therefore has a predominantly cool viticultural climate. There are, however, distinct climatic growing zones spanning from Northland to Hawke's Bay (warm and sunny), Wairarapa to Waipara (cool but very sunny) and Canterbury to Central Otago (cold with significant risks of frost) and these climatic differences have resulted in emergence of clearly identified regional strengths. The industry has recently experienced tremendous growth, with the total vine area more than doubling since 2000. Wine grapes are now the largest single horticultural crop in New Zealand in terms of bearing area, at more than 25 000 hectares (SONZAF (2008), see Figure 1). The bearing area is forecast to continue to increase, as existing planted areas come into production and new areas are planted. Growth has been particularly concentrated in the South Island, and in the premium varieties such as Sauvignon Blanc, Chardonnay, Pinot Noir, Pinot Gris and Merlot. Plantings of Muller Thurgau and Muscat, by contrast, have declined considerably in the recent past.

Adding to the dynamic landscape of the New Zealand wine industry have been several legal changes that directly affect the wine market. The Australia-New Zealand Closer Economic Relations Trade Agreement (ANZCERTA), which came into effect near the end of 1983, led to a dramatic reduction of import restrictions and

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[1] By law, labels on New Zealand wines must provide information on the brand, region of origin, principle grape variety, vintage, winery, alcohol content by volume and presence of any preservatives or additives.

has ultimately facilitated an increase in the volume of Australian wines imported into New Zealand. The Sale of Liquor Act (1989) passed later that decade permitted the sale of wines in supermarkets, making wine far more widely available and easy to purchase with the weekly groceries. And finally, a more recent reduction in the legal drinking age has brought more potential wine consumers into the market from a relatively early age.

**Figure 1:   Vineyard area, by variety, as at 30 June 2000-2007**
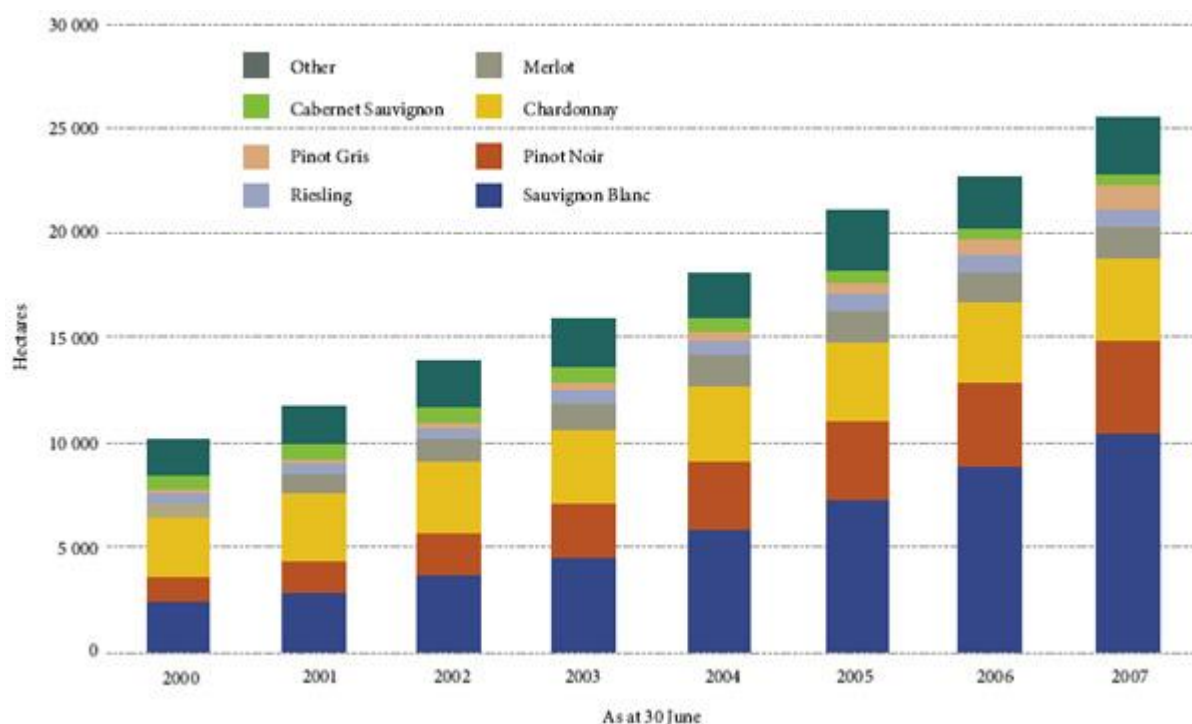
Source: Situation and Outlook for New Zealand Agriculture and Forestry (2008), and New Zealand Wine

On the demand side, market research conducted over the past 10 years has shown that the wine preferences of New Zealand consumers have matured in the recent past (Lamb, Forbes and Cohen). Evidence of this maturation are a decrease in the sales of cask wines, and a general trend towards the higher-valued, dryer varieties. Consumers have also reported a lower level of brand loyalty, relying instead on various sources of information when evaluating a wider range of potential labels to purchase. The majority of consumers surveyed were particularly interested in having both variety and vintage displayed on the label, and an increasing proportion of the consumers (albeit still a minority) would like to see information on awards and medals shown on the bottle.

In the midst of all these changes, the per-capita consumption of wine in New Zealand has increased steadily. Much to the frustration of local producers, however, the growth can be almost entirely attributed to an increase in imports, with the per-capita consumption of domestically produced wine remaining relatively static (Figure 2).

These trends can be explained at least in part by the availability of relatively inexpensive imported wine, principally from Australia.

Figure 2:   Per-capita Consumption of Wine in New Zealand
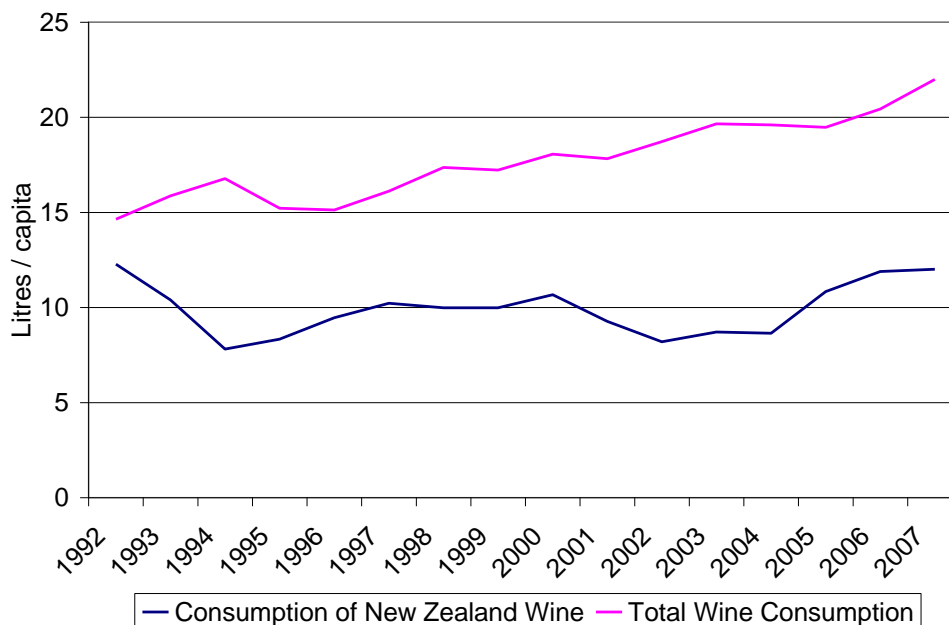
Source: New Zealand Wine

The combined forces of a rapid increase in the area planted in vines in New Zealand, continued pressure from overseas imports and a relatively stable per capita consumption of domestic wine have lead to concerns over future profitability for industry representatives in New Zealand. It is therefore an interesting and dynamic time to gain a more comprehensive understanding of the relative effects of regional reputation and producer-specific quality on the willingness to pay for domestically produced premium table wine in New Zealand.

Literature Review
The number of published studies applying hedonic pricing theory to the wine market in various countries is reasonably extensive. Some of the first studies attempted to determine whether wine prices were more heavily influenced by objective characteristics such as variety, region of origin, and vintage, or sensory characteristics such as olfactory or gustatory traits. Combris, LeCocq and Visser (1997) specified a hedonic equation for Bordeaux wine that included both objective or label characteristics, and sensory characteristics. The results of a semi-log specification indicate that the price of Bordeaux wine is most significantly influenced by objective characteristics that are easily determined by the purchaser before the bottle is opened. In a subsequent paper the same authors extended their analysis of Bordeaux wines to cover Burgundy wines (Combris, LeCocq and Visser, 2000). Explanatory variables for the hedonic price equation again included both sensory and objective characteristics. Consistent with the Bordeaux study, the coefficients of the objective characteristics were the largest in magnitude and the most statistically significant determinants of price in the hedonic equation for Burgundy wine.

Quite a lot of attention has also been focused on identifying the best indicators of wine quality, focusing in particular on proxies such as region of origin, critics' quality ratings and success at various wine competitions – all factors that are reasonably easy for consumers to access. Landon and Smith (1997), for example, specify five different hedonic pricing models to explore the relative impact of current quality versus longer-term reputation on the price of Bordeaux wine. In their specifications, current quality is represented by a '100-point' quality index published in various issues of the Wine Spectator. Short-run firm-level reputation is captured by lagged values of the quality ranking relative to an overall average, and longer-term firm-level reputation is captured by dummy variables corresponding to a classification of Bordeaux wine producers designed by Robert Parker to reflect quality performance between 1961 and 1990. Two sets of dummy variables, one regional and one industry-defined quality classification, are used to capture the impact of collective reputation. Overall, the authors conclude that reputation has a large impact on consumer's willingness to pay for wine, and that long-term and collective reputation are considerably more important than short term changes in product quality

In a subsequent paper, Landon and Smith (1998) further explore the influence of reputation and quality on the price of Bordeaux wine with the development of a two-equation system. In this specification price is determined by current and expected quality, and expected quality is a function of individual firm and collective reputation. Although the coefficient on the current quality rating was statistically significant, their results were consistent with earlier work, which suggested that longer-term reputation has a more profound impact on price. As a consequence, the authors conclude that consumers rely heavily on both individual firm reputation and collective reputation indicators, and that long-term reputation is a better signal of current quality than more recent movements in the scores published by wine critics. In addition, collective reputation indicators play a significant role in price determination principally through their impact on expected quality.

In a more recent effort to determine the relative importance of sensorial characteristics versus reputation in the determination of wine prices, Benfratello, Piacenza and Sacchetto (2004) compare two different hedonic pricing specifications for Italian premium wines. Following Combris *et al.* (1997, 2000) their first specification includes both objective attributes and sensorial characteristics. Their second model, influenced by the work of Landon and Smith (1997, 1998), incorporates various proxies for wine and producer reputation as well as objective characteristics of the wine itself. Their results suggest that the reputation model developed by Landon and Smith (1997, 1998) was a more appropriate specification for their Italian data. Among the reputation variables, single wine reputation factors were seen to exert a modest influence in price, whereas improvements in producer reputation had the greatest impact on willingness to pay.

Schamel (2000) uses a hedonic framework to analyze the impact and significance of wine quality, individual and collective reputation indicators, and other attributes on the willingness to pay for premium wine. His main objective was to compare an expanded reputation model with a nested full information alternative where consumers are hypothesized to consider only expert quality ratings and variety when making their purchase decisions. Explanatory variables for the full information

model are limited to a 100-point quality score and a dummy variable for the two varieties under consideration. In the expanded reputation model the author proxies individual reputation with a continuous variable reflecting relative scarcity (number of cases produced) and three dummy variables indicating the *Wine Spectator's* recommendation on cellaring potential, a 'noteworthy' wine, and value for money. Collective reputation is incorporated via a series of dummy variables corresponding to region of origin. Standard t-ratios and goodness of fit statistics associated with both models support the claim that wine consumers rely on more than just a quality score when making purchase decisions. Implicit prices for collective reputation from the expanded model indicate that consumers are willing to pay a premium for California wine in general and Napa Valley wine in particular. A premium is also associated with highly recommended wines, and those with cellaring potential. The coefficients on the quantity variable indicate a small 'snob' or scarcity effect that is larger for Cabernet Sauvignon then Chardonnay.

Schamel and Anderson (2003) specified and estimated a hedonic pricing model to explore how expert ratings, grape variety and regional reputation affect the price of wine in Australia and New Zealand. Their results indicate that, particularly in Australia, there is a statistically significant price premium for wines achieving a higher quality rating, but that this premium has been softening over time. By contrast, the regional and variety premia have been strengthening. Taken together, these results indicate that Australian wine consumers are becoming more confident in their own ability to distinguish higher quality wines. Results from the New Zealand data sets are broadly consistent with those from Australia, but not so pronounced in magnitude or significance.

More recently, Lima (2006) estimated a hedonic price function for premium California wine. Quality in Lima's analysis was represented by a series of dummy variables corresponding to the receipt of a medal at one (or more) of 9 different tasting competitions. Additional regressors (all binary) were included for vintage and variety. Using a linear functional form and stepwise regression, Lima confirmed that older wines attract a higher premium, and the highest premium is associated with winning a medal at the San Francisco tasting.

In an earlier paper on the New Zealand wine industry Bicknell and MacDonald (2008) use hedonic pricing to explore the relative importance of wine quality and regional reputation for domestically produced Chardonnay, Sauvignon Blanc and Pinot Noir. In all years and for all varieties, Cooper's quality rating was found to be highly statistically significant. For both Chardonnay and Pinot Noir, which are destined primarily for the domestic market, the quality premium has also been growing steadily through time. Overall, regional reputation appears to be most significant within the Chardonnays – a result that is consistent with this variety's diverse regional styles. For Sauvignon Blanc, the regional coefficients were far less significant and the coefficient on Michael Cooper's quality rating did not exhibit the upward trend through time that was associated with both Chardonnay and Pinot Noir. Taken together, these results are consistent with the hypothesis that both regional reputation and local expertise may be less influential for a variety that is much more heavily influenced by the world market.

The Data and Hedonic Price Model

The purpose of this study is to extend the hedonic price analysis presented in Bicknell and MacDonald (2008) by expanding the list of explanatory variables. At least one previous study has indicated that success at various wine competitions may have an important influence on price via the development of a favourable reputation among wine enthusiasts. Entering wine competitions is, however, a costly exercise for the winery and it is important in this competitive industry to begin to establish whether such exposure is associated with a price premium.

The Data

We are beginning this analysis with a focus on Chardonnay. The majority of the Chardonnay grown in New Zealand is processed and marketed domestically, and faces significant competition from Australian imports. In the early 1990's Chardonnay was the most widely planted grape in New Zealand. More recently, however, plantings of Sauvignon Blanc have grown exponentially and now dominate the viticultural landscape. Climate has an important influence on the flavour profile of Chardonnay, and New Zealand's varied regional conditions create a range of distinct regional styles (Wine New Zealand).

Data for this analysis was constructed from two sources. The first is Michael Cooper's annual *Buyer's Guide to New Zealand Wines* (2007). The index of quality is based on Cooper's five-star rating system, which he uses to judge the overall quality of a wine relative to other New Zealand wines of the same variety. Each additional half-star represents an increase in quality ranging from 'to be avoided' (zero stars) to 'outstanding' (five stars). Regional reputation is represented by a series of dummy variables associated with one of eight different growing regions. The price variable is the recommended retail price (current NZ$, including taxes) per 750 ml bottle.

The second source of data is Wine Show, who publish the results of New Zealand's major wine competitions on-line (www.wineshow.co.nz). For this analysis we have included the 2005 Air New Zealand Wine Awards, the 2005 New Zealand International Wine Show, and the 2005 International Chardonnay Challenge. A series of dummy variables were created to indicate the receipt of a trophy, or a gold, silver or bronze medal – with multiple awards possible for wines entered in more than one competition.

The Model

Hedonic price analysis involves the specification of an implicit or hedonic price function that relates the price of a good to all of the attributes that theoretically affect its value. Rosen (1974) provides the theoretical foundation for this approach in a paper which suggested that individuals value goods on the basis of their utility-generating attributes. Within the current context, one could hypothesize that the price of a bottle of wine depends upon varietal characteristics of the wine, the region where the wine was produced, and the specific winery that produced the wine. Previous authors have suggested that a consumer's willingness to pay for a bottle of wine might also depend upon expert ratings of current wine quality that are available in published guidebooks and magazines, and the receipt of various wine awards. Such guidelines may be particularly valuable to individuals who are relatively infrequent purchasers of wine, or those who are looking for a bottle of wine to suit a special occasion.

In this paper, we follow previous studies of the New Zealand and Australian wine markets by assuming that a consumer's willingness to pay for a particular wine is a function of that wine's quality rating and regional reputation. In addition, we extend this analysis by including the results of three of New Zealand's top wine competitions, as market analysis suggests that medals and awards are becoming increasingly important to consumers' buying decisions in New Zealand. In a well-functioning market, utility maximizing consumers will purchase wine so that their willingness-to-pay for a marginal increase in a particular attribute equals its hedonic price. Consequently, in equilibrium, the hedonic price for an attribute can be interpreted at the willingness-to-pay for a marginal increase in that attribute.

Previous authors have employed a range of functional forms when estimating hedonic price functions for various wine markets. The log-linear form has perhaps been the most widely employed, featuring in Oczkowski (1994, 2001), Combris at al. (1997) and Schamel and Anderson (2003). Oczkowski adds further flexibility to his price equation by specifying the ordinal quality ranking variable as a series of dummies.

Following previous authors, we estimate the hedonic price function using a log-linear functional form:

$$\ln(P) = \beta_o + \beta_1 QR + \beta_2 CP + \sum_i \beta_i R_i + \sum_i \beta_i A_i + \varepsilon$$

Where QR = average quality rating for that label, CP = a dummy variable indicating cellaring potential, R = a series of dummies indicating regional affiliation, and A = a series of dummies indicating success at one or more of the three wine competitions,.

Using the semi-log specification, with the dependent variable specified as the natural log of the recommended retail price, the coefficient on the continuous quality rating can be interpreted as the percentage increase in price for each half-star increase in the rating scale. The coefficients on each regional dummy represent the regional price premium (or discount) relative to the comparator region for each variety, and the coefficients on the wine award dummies represent the price premium relative to not receiving any awards.

Regional and wine competition dummy coefficients can not be interpreted directly as derivatives due to the dichotomous nature of the variables, so their marginal percentage impact was approximated following Kennedy (1981):

$$p_j = 100 \left[\exp\left(\alpha_j - 0.5\sigma_{\alpha_n}^2 \right) - 1 \right],$$

where:
- p_j is the percentage impact of the jth region or competition on price,
- α_j is the estimated coefficient of the jth region or competition, and
- $\sigma_{\alpha_n}^2$ is the variance of the estimated coefficient of the jth region or competition.

The marginal price of each variable is the product of the marginal percentage impact and the average price of the wine, in dollars per bottle.

Results

Table 1 presents the preliminary estimation results, and Table 2 presents the marginal impacts in percentage and absolute dollar terms. Hawkes Bay has been chosen as the comparator region, and the wine competition dummies (ICC, ANZWA and NZIWS) represent the receipt of at least one award from the competition in question. Multiple awards are possible for wines that were entered in more than one competition. Cellaring potential is captured by the dummy variable CELLAR_3, indicating that the wine was produced with cellaring in mind.

Consistent with previous work cited above, the coefficient on the quality rating variable is highly statistically significant. It is also large in magnitude compared to most of the other coefficients. With regards to regional reputation, the Auckland Region is associated with the largest, most statistically significant premium over wine originating in Hawke's Bay. This most likely reflects the pricey wines produced on Waiheke Island, many of which were not considered by Cooper to represent particularly good value for money. Significant price premia were also associated with wines produced in Gisborne, a region considered by many to be the Chardonnay capital of New Zealand (Wine New Zealand), and Nelson, a region more closely associated with the production of Sauvignon Blanc. Both the Wairarapa and Central Otago are associated with price premia that are reasonably large but only weakly significant. The Wairarapa premium reflects this region's sustained excellence in production over time, and the presence of many of the country's top wine producers. Although Central Otago is now producing some excellent Chardonnays, this region's price premium could also be attributed to the large volume of cellar-door sales near the popular tourist destination of Queenstown. The coefficients associated with Marlborough and Canterbury are small in both magnitude and level of significance.

Table 1.   Statistical Results

Variable	Coefficient	Std. Error	t-Statistic
C	1.93	0.07	26.82
AVE_QR	0.16	0.01	17.85
AUCKLAND	0.23	0.05	4.69
CANTERBURY	0.04	0.07	0.61
CENTRAL_OTAGO	0.08	0.05	1.60
GISBORNE	0.08	0.03	2.24
WAIRARAPA	0.13	0.06	1.95
MARLBOROUGH	0.01	0.03	0.35
NELSON	0.11	0.04	2.40
ICC	0.03	0.02	1.47
ANZWA	-0.03	0.02	-1.11
NZIWS	-0.05	0.02	-1.91
CELLAR_3	0.02	0.03	0.55
$R^2 = 0.65$			

Note: ICC = International Chardonnay Competition, ANZWA = Air New Zealand Wine Awards, and NZIWS = New Zealand International Wine Show

Table 2.   Marginal Impacts

Variable	Percentage Impact	Marginal Impact on Price
AVE_QR	16.0%	$4.04
AUCKLAND	25.7%	$6.44
CANTERBURY	3.8%	$0.96
CENTRAL_OTAGO	7.9%	$1.98
GISBORNE	7.8%	$1.95
WAIRARAPA	13.1%	$3.29
MARLBOROUGH	0.9%	$0.24
NELSON	11.3%	$2.82
ICC	3.4%	$0.86
ANZWA	-2.7%	-$0.67
NZIWS	-4.6%	-$1.15
CELLAR_3	1.5%	$0.37

Note: ICC = International Chardonnay Competition, ANZWA = Air New Zealand Wine Awards, and NZIWS = New Zealand International Wine Show

Discussion and Conclusions

The objective of this paper was to deepen our understanding about what influences consumer's willingness to pay for premium table wine in New Zealand. The preliminary statistical results presented above suggest that, for Chardonnay, quality as determined by New Zealand's leading wine critic and regional reputation are both important determinants of price. Of lesser importance is cellaring potential. Wines produced with cellaring in mind were associated with a premium over those produced for more immediate consumption, but the effect was small in both magnitude and significance.

Interestingly, the coefficients on the wine competition dummies were not only relatively small in magnitude and low in statistical significance; in two of the three cases they were actually negative. This lack of significance was consistent across a number of specifications for the wine competition dummy variables. Interpreted in an optimistic light, this preliminary analysis suggests that success at wine competitions is not a significant determinant of price for New Zealand Chardonnays. Through a harsher lens, one might conclude that the return to effort invested in entering competitions may very well be negative.

While initially surprising, these conclusions are consistent with survey work in the marketing literature, which suggests that only a minority of the wine consumers in New Zealand find information on medals useful when making purchasing decisions (Lamb, Forbes and Cohen). There are signs, however, that this may change. The importance of information about success at wine competitions has been growing in the recent past, and it is more important for women than men. Given the increasing share of supermarket sales, women are becoming the dominant buyers of wine in New Zealand.

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