Wine Quality and Regional Reputation:
Hedonic Prices for Australia and New Zealand

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January 2001

Abstract

We estimate hedonic price functions for premium wine from Australia and New Zealand, differentiating implicit prices for sensory quality ratings, wine varieties, and regional as well as brand reputations over the vintages 1992 to 1998. For Australia, the results suggest regional reputations in general are becoming increasingly significant through time, indicating an intensifying regional quality differentiation. As well, some specific cool-climate regions (e.g. Adelaide Hills, Tasmania) are becoming increasingly preferred over other regions. Price premiums based on brand reputation also are shown to be significant. For New Zealand, regional quality differentiation is considerably less significant than is the case in Australia, which raises the question as to why. (Is there scope for more regional promotion there?) In both countries, price premiums for James Halliday's sensory quality ratings are highly significant and have remained so over time.

Key words: Wine quality, regional reputation, brand reputation, hedonic pricing

JEL codes: C50, D12, Q13

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1. Introduction

For more than a dozen years now the wine industry has been booming in Australia and New Zealand. Both the area planted to vineyards and the volume of wine produced have grown at about 7 per cent per year on average since the late 1980s, while the two countries' exports of wine have been growing at more than 20 per cent per year (from a low base). Simultaneously, wine exports from California, South Africa and the Southern Cone of Latin America have been soaring too, such that the share of global wine production that is exported has risen by more than 50 per cent (Anderson and Berger 1999). Yet the volume of wine consumption per capita in Australia, New Zealand and globally, has been static. Indeed consumption has been falling steadily in the traditional wine-consuming countries of Europe and South America, offsetting demand growth in the UK, the US, and (from a tiny base) East Asia. In each of these markets, however, as in Australia and New Zealand, there has been a dramatic substitution of quantity for quality: premium (bottled) wine sales are growing steadily while non-premium (cask) sales are in decline (Anderson 2001).

With global demand static and export supplies from the New World booming, the average price of internationally traded wine is bound to come under pressure to decline in the years ahead. In this more-competitive and more-globalized environment, the extent to which the price declines (or rises) for a particular group of producers will depend very much on the quality upgrading of its product, absolutely and relative to that of other producer groups, as perceived by consumers at home and abroad. This raises the question of what determines the consumer's perception of quality when they buy wine.[1] In particular, what are the market values

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[1] This is to be distinguished from the quality of super-premium wine as it matures in the years following its initial sale by the winery, as captured by time series of prices in the secondary market. According to Ashenfelter (2000), Ashenfelter, Ashmore and Lalonde (1995) and Byron and Ashenfelter (1995), the key determinants of the vintage-

of such things as the reputation of the producing region as distinct from corporate brand reputation, or grape variety reputation, or the published ratings of wine writers/judges/critics?

This paper addresses these questions as they relate to Australian and New Zealand wines, using a hedonic pricing model. It begins by briefly reviewing the literature on such pricing models and their application to wine. It then presents the model and data used here and details the empirical results for prices in the Australian and New Zealand markets separately. The final section summarizes what has been learnt and suggests areas for further research.

2. Literature review

A number of studies apply hedonic price analysis to estimate implicit prices for wine *quality* attributes.[2] They are based on the hypothesis that any product represents a bundle of characteristics that define quality. Their theoretical foundation is the seminal paper by Rosen (1974) positing that goods are valued for their utility-generating attributes. He constructs competitive implicit markets that define implicit prices for embodied product attributes. Consumers evaluate product attributes (e.g. features of a car, indicators of air or water quality) when making a purchase decision. The observed market price is the sum of implicit prices paid for each quality attribute. Rosen also recognizes an identification problem for supply and demand functions derived from hedonic price functions, because implicit prices are equilibrium prices jointly determined by supply and demand conditions. Hence, implicit prices may reflect not only consumer preferences but also factors that determine production. In order to solve the identification problem it is necessary to separate supply and demand conditions. Arguea and Hsiao (1993) argue that the identification problem is essentially a data issue that can be avoided by pooling cross-section and time-series data specific to a particular side of the market.

In addition to strict quality effects, the *reputation* of wine regions and individual producers also affect wine prices. Shapiro (1983) presents a theoretical framework to examine reputation effects on prices. He develops an equilibrium price-quality schedule for high-quality products assuming competitive markets and imperfect consumer information to demonstrate that reputation allows high-quality producers to sell their items at a premium that may be

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to-vintage variation in the ultimate quality of mature wine are a few straightforward weather variables in the growing season, information that consumers appear to have been ignoring.

interpreted as revenue for producer investments in reputation. On the demand side of the market, consumers face costs to improve their information about product quality. Although an improved market transparency leads to increased consumer welfare, perfect information is shown not to be optimal as long as information is not available without cost. Thus, the concept of reputation as a quality indicator is only evident in an imperfect information environment.

Oczkowski (1994) provides one of the first empirical studies applying a hedonic pricing model to wine. He estimates a log-linear function for premium Australian table wine, relating retail prices to six attribute groups and various interaction terms.

Nerlove (1995) examines the Swedish wine market, which is characterized by no domestic production, a small share of global consumption, and government control of prices. This allows him to presume that prices are exogenous (as opposed to assuming supply is exogenous) and to estimate a reduced form hedonic price function regressing quantities sold on various quality attributes and prices. Thus, Nerlove assumes that wine consumers in Sweden express their valuation of a particular quality attribute by varying the derived hedonic demand for it.

Golan and Shalit (1993) identify and evaluate quality characteristics for wine grapes produced in Israel relative to California wine. Thus, they analyze hedonic grape pricing, i.e. the input supply side of the wine market. Their premise is that high-quality wines are produced only when growers are given a strong enough price incentive to supply better grapes. In a two-stage model, they first develop a quality index by evaluating the (relative) contributions of various physical grape attributes to wine quality. Second, they construct a quality-price function relating the price of Californian wine to the quality index developed in the first stage. Analogous to Nerlove, they also assume that prices are exogenous.

Combris, Lecocq and Visser (1997) estimate a hedonic price equation and what is referred to as a jury grade equation for Bordeaux wine to explain the variations in price and quality, respectively.[3] Landon and Smith (1997, 1998) also present empirical analyses of Bordeaux wine, focusing on reputation indicators in addition to sensory quality attributes. In

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[2] This work builds on a long stream of agricultural econometric research on product quality. See, for example, Waugh (1928).
[3] On its own, the jury grade equation has no economic meaning, and no theoretical or empirical reason is presented as to why it is estimated in addition to the hedonic price equation. In a review of the above four empirical wine

both papers, they study the impact of current quality as well as reputation indicators on consumer behavior using hedonic price functions. Lagged sensory quality ratings define individual product reputation. Regional reputation indicators are government and industry classifications. In addition, their 1997 paper analyzes five individual vintages over the period 1987 - 1991. Their main conclusions are: reputation indicators have a large impact on consumer willingness to pay; an established reputation is considerably more important than short-term quality improvements; and ignoring reputation indicators will overstate the impact of current quality on consumer behavior. Their estimated coefficients vary substantially across the five vintages examined.

In an analysis of the U.S. wine market, Schamel (2000) estimates a hedonic pricing model based on sensory quality ratings, individual wine quality and regional reputation indicators for two premium wine varieties: a white (Chardonnay) and a red (Cabernet Sauvignon). The paper examines seven regions (Napa and Sonoma Valley, Sonoma County, Oregon, Washington State, Australia, Chile, South Africa) and includes observations from a pool of eight vintages between 1988 and 1995. However, it does not estimate coefficients for individual vintages. The estimated price elasticity of sensory quality is larger for white wine, indicating that U.S. consumers were willing to pay a higher quality premium for white compared to red wine at that time. However, the results suggest both regional reputation and individual quality indicators seem to be more important to U.S. consumers of red wine. They also suggest that marketing regional origin as a quality attribute may have a higher payoff for regions primarily growing red wine. In other words, it seems that the public good value of a regional appellation is higher for red wine regions and that individual producers in those regions may benefit more from collective marketing efforts.

Finally, in a recent working paper, Oczkowski (2000) examines hedonic price functions for wine assuming attribute measurement errors. In an empirical application to Australian wines, he finds significant reputation effects but insignificant quality effects.

In the present paper, we extend previous work by analyzing wine quality and reputation indicators for premium wines from Australia with a large sample of more than 4500

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studies, Unwin (1999) stresses the difficulties associated with identifying appropriate variables to include, the varying definitions of wine quality used, and the possible inconsistencies in their data.

observations. In addition, we compare the Australian results to an analogous hedonic model that for the first time examines a sample of premium wines from New Zealand with more than 800 observations. Moreover, we individually examine seven recent vintages, from 1992 to 1998, in addition to the set as a whole for each country. During this period the wine markets in Australia and New Zealand underwent substantial changes; analyzing how estimated coefficients developed over time allows us to draw important marketing and policy conclusions.

Because consumers are uncertain or have incomplete information about sensory wine quality, we assume that when making their buying decisions they use available information on how wine experts judge particular wines and individual wineries, as well as their own personal judgment about each growing region's reliability as a supplier of premium wine. In addition to the ratings of an expert taster (Halliday 1999 and earlier issues), we focus on differences between varieties and between regions and how those two attributes have evolved in importance over time. Our main interest is to quantify the value of quality characteristics to buyers of premium wine, and to draw out the marketing implications for producers.

3. The hedonic model, data and results

The model

Following conventional hedonic pricing models, we propose that a bundle of quality characteristics defines any premium wine. Consumer willingness to pay is a function of that bundle of wine quality characteristics, which include variety, sensory quality and winery rating as well as regional reputation. Because consumers are uncertain about quality ratings, they use additional information available to judge the quality of a particular wine. Imagine yourself as a consumer looking for a bottle of (recently released) premium wine as a gift or to accompany a meal. You want to buy wine a particular grape variety (e.g., Shiraz) and you are using available information from wine experts about the sensory quality of a particular wine and the winery producing it (published vintage and winery ratings, commonly available for perusal in wine shops). You adjust the expert quality rating and therefore your willingness to pay for a wine to reflect the regional reputation of the growing region as a reliable supplier of premium wine. For example, given an equal expert quality rating of 90 points for a Barossa Valley Shiraz and a

Hunter Valley Shiraz, you may be willing to pay less for the Hunter Valley red because you are less certain about whether it will be as good as the expert rating promises. Moreover, an individual quality indicator such as a classic wine rating assigned by wine critics also affects your buying decision.

In general, suppose that a bundle of n different quality characteristics describe any bottle of premium wine: $\mathbf{Z} = z_1, ..., z_n$ (e.g. variety, sensory quality rating, regional origin). Associated with this bundle is a unit price $P(\mathbf{Z})$. A hedonic price function describes the price of any particular wine i (Pw_i) as a function of its characteristics:

(1) $P_{w_i} = P_w(z_{i1}, ..., z_{ij}, ..., z_{in})$

We assume that the market is in equilibrium. That is, consumers have made their utility-maximizing choices, given their knowledge of prices and characteristics of alternative wines and other goods. Moreover, all firms have made their profit-maximizing decisions, given their production costs and the costs of alternative wine qualities producible, and that the resulting prices and quantities clear implicit markets.[4]

Hedonic price analysis relates the price of a good to its utility-generating characteristics and yields implicit prices for these characteristics. Thus, any quantitative or qualitative variable that affects consumer utility may be included in a hedonic price function. We formulate a model assuming that consumers, uncertain about the true sensory quality of a particular wine, adjust their willingness to pay using variety, expert quality and producer ratings as well as regional reputation as important criteria.

The data

Table 1 provides an overview of the variables we have used in estimating the hedonic price equations. The data source for our analysis is a large set of wine and winery ratings, including a classic wine rating where appropriate, published by the noted Australian wine critic James Halliday (1999a, b). A consistent set is available for each vintage from 1992 (1993 in the case of New Zealand) to 1998, amounting to 4,584 Australian observations and 836 New Zealand ones. For the Australian sample, the average quality rating is 87 points (range 65-97)

and the average price is A\$23.50 (range A\$5-250). For New Zealand, the average quality rating is 88 points (range 73-97) and the average price is NZ\$22.10 (range NZ\$7-90).

The value of sensory wine quality is defined by the *vintage rating*. The *winery rating* is an expert assessment of the producer as a reliable supplier of premium wine. The *classic wine* ratings are special recommendations also assigned by Halliday. To evaluate differences in the willingness to pay for different grape varieties, we distinguish six different red and six white wine varieties or variety groupings, respectively. In order to assess regional denominations we distinguish wines from 27 different regions in Australia as well as six different regions in New Zealand. Separate equations are estimated for Australia and New Zealand mainly because the price data reflects retail prices in Australia and New Zealand, respectively.[5]

The theoretical model described so far does not restrict the functional form to be estimated, but it limits the type of explanatory variables. In the empirical literature on hedonic wine pricing, a variety of different functional forms have been explored and reported. For example, Landon and Smith (1997) examine five different functions choosing the reciprocal square root form, Oczkowski (1994) reports a log-linear form, and Nerlove (1995) compares log-linear, log-log and Box-Cox transformations. Heteroskedasticity is a potential problem given the nature of the data set. In our case, when we apply a simple Breusch-Pagan test to the linear, log-linear, and log-log functional forms and fix the level of significance for the critical χ^2 test statistic at 1%, we cannot reject the hypothesis of homoscedasticity for the log-linear form (Breusch and Pagan 1979). Hence that is the form we use. Our examination of the correlation matrices for the coefficient estimates revealed no serious degree of multicollinearity is present in the data.

Australian results

Table 2 presents the estimation results for Australia. Shiraz and Barossa Valley were chosen as the comparator variety and region (necessary to avoid the dummy variable trap). The

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[4] For a more detailed description of the underlying theoretical model, see Schamel (2000).
[5] This implicitly assumes the 'law of one price' is operating for each wine in these markets, an assumption that is becoming more and more reasonable over time as both Australia and New Zealand become integrated into the international wine market through exports and import competition, including through two-way trade across the Tasman Sea.

first column reports implicit prices for the complete pooled sample. The other columns show the estimation results for each of the seven sub-samples of individual vintages. The coefficients for "vintage rating" and "winery rating" measure the percentage price premiums for a one-point increase, respectively. Dummy variable coefficients for variety and regional origin are to be interpreted as a percentage price impact relative to Shiraz and Barossa Valley wines, respectively. The coefficient for "classic wine" reports the percentage premium for a wine that obtained this special recognition.

The parameters for "vintage rating" (sensory quality) are all significant and fairly constant over time. The price premiums are about 2.4% to 3.8% for a one-point improvement in the sensory quality rating. That is, a one point increase in Halliday's quality rating would yield an increase in the price per bottle of 56 and 89 cents on an average–priced bottle of wine. The coefficients for "winery rating" (producer reputation) are significant for all vintages except '92. The price premium averages 6% (or A$1.41) for a one-point increase in Halliday's winery rating. However, it ranges between 3.5% and 9.3% and appears to be on a downward trend over the period analysed. The "classic wine" rating is significant for all vintages in Australia except '98 (the sample for which is incomplete because many premium reds from that vintage were still to be released), and adds a price premium of about 3% (or 70 cents) on average, all other things equal.

Turning to the wine variety dummies, the changes over time in the parameter values for varieties reflect relative changes in consumer tastes and preferences for the various varieties. For example, Semillion and Sauvignon Blanc parameters become less negative, that is, the price discount for them relative to Barossa Valley Shiraz decreases implying that these varieties have become less unpopular over the latter 1990s. On average they attract about a one-third discount relative to Barossa Shiraz, other things equal. For Chardonnay the discount was only half as large whereas for Riesling it averaged 50% (although less so in the late 1990s). Among the reds, Pinot Noir, Cabernet and Cabernet blends attracted similar prices to Shiraz, but Shiraz blends and other reds were sold at discounts of 10% to 20% below the Barossa Shiraz price, again all other things equal.

When examining the regional dummies, notice that they become increasingly significant over time. For the '92 vintage, only one region (Eden Valley) is significantly different from Barossa Valley while for the '97 vintage, only 4 out of 27 regions are not significantly different. (Because the '98 data set excluded many super premium reds still awaiting release, less store can be put on the regression for that year.) This pattern is a clear indication of an intensifying regional quality differentiation in Australia, with coefficients for some regions trending down while others are trending up. For example, the Tasmanian coefficients increase which means that Tasmanian wines have become more popular with consumers relative to Barossa wines. Even stronger upward trends are evident for the newly developing super premium cool climate regions of the Adelaide Hills and Mornington Peninsula.

New Zealand results compared with Australia's

The results for New Zealand, shown in Table 3, differentiate 10 varieties and 5 regions. (Absence of an entry means there were no observations.) The Chardonnay variety and the region of Marlborough are chosen as the New Zealand bases to avoid the dummy trap. A number of interesting results, especially in relation to the Australian model, are worth highlighting. For example, the parameters for "vintage rating" are all significant and fairly constant over time, with almost the same sensory quality price premium for New Zealand as for Australia (2.0% versus 2.7% for one additional quality point over the full sample period). For the individual vintages, the premiums vary between 1.8% and 3.1% (or 40 and 68 cents calculated at the average NZ price). The "classic wine" parameter is almost equally significant and averages about the same as Australia (2.5% or 55 cents). But the parameters for "winery rating" are smaller and much less significant for New Zealand than for Australia.

Variety differences are less pronounced in New Zealand, but note that Riesling is discounted by two-fifth and other whites by 24-30% relative to the base variety (Chardonnay) whereas Pinot Noir is at a slight premium and Cabernet and Merlot enjoy considerable premia, other things equal.

Most strikingly, however, are the differences in the degree of regional differentiation between the two countries. For New Zealand, only two regional dummies are significantly

different from the base region (Marlborough) over the full sample period, and the degree of difference is not large. This could mean there is little actual regional differentiation across New Zealand in terms of price premia, but the more likely explanation is that less has been invested in regional promotion there than in Australia to date. New Zealand producers may instead have focussed more on generic national promotion or individual brand differentiation relative to Australia.

Finally on the results, note that the variation in prices explained by the model (R^2) in all sub-samples is always higher for New Zealand, despite much smaller sample sizes and fewer explanatory variables.

4. Implications and areas for further research

Two clear lessons can be drawn from these results. One is that sensory quality ratings, winery ratings, and classic wine categorization by independent writers/critics/judges (in this case those of James Halliday) each appear to have a significant positive impact on the prices consumers are willing to pay for premium wines, after taking region and variety of wine into account. This is equally true for Australia and New Zealand. It is consistent with Schamel's (2000) findings for the United States, based in that case on ratings published in *The Wine Spectator*, and suggests consumers value this information in their quest for greater knowledge about available wines.

Also clear is the trend towards greater regional differentiation within Australia on the one hand, and on the other the much weaker regional differentiation and the absence of any trend within New Zealand. The difference in degree of differentiation may simply reflect the fact that Australia has more major premium regions that have been producing continuously for a long time than does New Zealand. The greater extent to which regional differentiation is increasing in Australia partly reflects the rapid growth in the 1990s of new super-premium cool-climate regions, which are challenging the supremacy of the long-established regions. But it is also partly a reflection of the fact that, unlike New Zealand, Australia established legislation (in 1993) to allow legal registration of regional names (technically, "geographical indications").[6]

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[6] This was to enable Australia to fulfill its agreement with the European Union on trade in wine, following the Uruguay Round of multilateral trade negotiations. For details see www.awbc.com.au/arms/a_regions.html. An anaylsis of its possible effects can be found in Kok (1999).

That legislation is providing stronger rights over the intellectual property value of regional names, thereby raising the rates of return on investments in regional promotion. Even though they cannot say anything about the profitability of such investments, the above results are not inconsistent with the view that price premia can be generated through such promotion. The European tradition of emphasizing region in addition to nation of origin would appear to be gradually taking hold in Australia.

As for the signs and sizes of the premia/discounts attached to variety, they are consistent with common knowledge. But the fact that there are distinct premia for particular varieties, over and above a premium (or discount) for region of origin, distinguishes the Antipodes from Western Europe where varietal distinctions are down-played.

There is much scope for further empirical work of this sort. Two examples of question that might be addressed are mentioned by way of conclusion. First, to what extent are sub-national regions beginning to enjoy a price premium in overseas markets, or is it just national recognition ("Brand Australia") that matters at this stage? An answer to this question would help to fine-tune the direction of promotional efforts of regional wine associations. It would also give the bodies responsible for national promotion[7] more scope in attracting (i) funds for their generic promotion and (ii) support for regulation of wine exports to ensure the national reputation for quality exports is not tarnished. Second, hedonic pricing models in principle could be applied to better understand the demand for winegrapes by wineries. Various technical features of grapes contribute to the quality of the wines made from them, but in ways that are not very transparent to grapegrowers. As quantitative measures improve for measuring those attributes winemakers are looking for, so will the scope for addressing this issue with hedonic price modeling, building on the work begun by Golan and Shalit (1993) with respect to Israeli grapes. If indeed weather variables during the growing season are crucial, as the empirical research by Ashenfelter (2000) and his colleagues suggests, those too would need to be included in addition to such variables and grape sugar level and acidity.

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[7] The Australian Wine and Brandy Corporation and the Wine Institute of New Zealand, respectively.

References:

Anderson, K. 2001. "Where in the World is the Wine Industry Going?" Plenary Paper presented at the AARES Annual Conference, Adelaide, 23-25 January.

Anderson, K. and Berger, N. 1999. "Australia's Re-emergence as a Wine Exporter: The First Decade in International Perspective," *Australian and New Zealand Wine Industry Journal* 14 (6): 26-38, November/December.

Arguea, N. and C. Hsiao. 1993. "Econometric Issues of Estimating Hedonic Price Functions." *Journal of Econometrics* 56: 243-67.

Ashenfelter, O. 2000. "Liquid Assets: The International Guide to Fine Wines." In *Optimus: The Magazine for the Private Investor*, Volume 2.

Ashenfelter, O., D. Ashmore and R. Lalonde. 1995. "Bordeaux Wine Vintage Quality and the Weather." *Chance* 8(4): 7-14.

Breusch and Pagan. 1979. "A Simple Test for Heteroskedasticity and Random Coefficient and Variation." *Econometrica* 47: 1287-94.

Byron, R.P. and O. Ashenfelter. 1995. 'Predicting the Quality of the Unborn Grange." *Economic Record* 71(212): 40-53, March.

Combris, P., S. Lecocq, and M. Visser. 1997. "Estimation of a Hedonic Price Equation for Bordeaux Wine: Does Quality Matter?" *The Economic Journal* 107: 390-402.

Golan, A. and H. Shalit. 1993. "Wine Quality Differentials in Hedonic Grape Pricing." *Journal of Agricultural Economics* 44: 311 - 21.

Halliday, J. 1999a. *Australia and New Zealand Wine Companion 2000*. Sydney: Harper Collins (and earlier issues of the book).

Halliday, J. 1999b. *Australia and New Zealand Classic Wines*. Sydney: Harper Collins.

Kok, S. 1999. *The Economics of Geographical Indications: A Case Study of the EU-Australia Wine Agreement*. Unpublished Honours thesis, School of Economics, University of Adelaide, November.

Landon, S. and C. E. Smith. 1997. "The Use of Quality and Reputation Indicators by Consumers: The Case of Bordeaux Wine." *Journal of Consumer Policy* 20: 289 - 323.

Landon, S. and C. E. Smith. 1998. "Quality Expectations, Reputation and Price." *Southern Economic Journal* 64(3): 628 - 47.

Nerlove, M. 1995. "Hedonic Price Functions and the Measurement of Preferences: The Case of Swedish Wine Consumers." *European Economic Review* 39: 1697 - 716.

Oczkowski, E. 1994. "A Hedonic Price Function for Australian Premium Table Wine." *Australian Journal of Agricultural Economics* 38: 93-110.

Oczkowski, E. 2000. "Hedonic Wine Price Functions and Measurement Error." Working Paper No. 24. School of Management, Charles Stuart University, Wagga Wagga.

Rachman, G. 1999. "The Globe in a Glass: Christmas Survey, Wine." *The Economist* 353(8150): 97-115, 18-30 December.

Rosen, S. 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy* 82: 34 - 55.

Schamel, G. 2000. "Individual and Collective Reputation Indicators of Wine Quality." CIES Discussion Paper 00-09. Center for International Economic Studies, University of Adelaide, March.

Shapiro, C. 1983. "Premiums for High Quality Products as Returns to Reputations." *Quarterly Journal of Economics* 98(4): 659 - 79.

Unwin, T. 1999. "Hedonic Price Indexes and the Qualities of Wine." *Journal of Wine Research* 10(2): 95-104.

Waugh, F.V. 1928. "Quality Factors Influencing Vegetable Prices." *Journal of Farm Economics* 10: 185-96.

Table 1: Description of the data from Halliday (1999a, b)

Variable	Characteristic	
Log(Price)	Dependent Variable	
Vintage Rating	Sensory Quality	100 Point Scale
Winery Rating	Winery Ranking	5-Star Rating (2.5 - 5, NR = 2)
Classic Wine	Special Rating	1 = Classic Rating; 0 = Not
Cab Sauvignon		
Cabernet Blend		
Pinot Noir	Red	
Shiraz [#]	Varieties	
Shiraz Blend		
Other Red		Variety
Chardonnay [†]		Dummies
Riesling		
Sauvignon Blanc	White	
Semillion	Varieties	
Sweet White		
Other White		
Great Southern		
Margaret River	Western	
Perth	Australia	
Other WA		
N Tasmania		
S Tasmania	Tasmania	
Adelaide Hills		
Barossa Valley [#]		
Clare Valley		
Coonawarra	South Australia	
Eden Valley		
McLaren Vale		
Other SA		
Bendigo		Regional
Goulburn Valley		Dummies
Grampians		for Australia
Macedon Ranges		
Mornington Pen.	Victoria	
Pyrenees		
Yarra Valley		
Other Vic		
Canberra		
Hunter Valley		
Mudgee	New South Wales	
Riverina		
Other NSW		
Queensland	Queensland	
Auckland		
Canterbury		
Hawkes Bay		
Marlborough [†]	New Zealand	Regional Dummies for NZ
Wairarapa/Wellington		
Other NZ		

[#] (Aus) and [†] (NZ) indicate the category base variables that have been dropped from the regressions.

Table 2: Regression results for Australia [Dependent variable: log(Price)]

Parameter	'92-'98	'98	'97	'96	'95	'94	'93	'92
CONSTANT	0.51*	0.33	0.33	0.63*	0.60*	0.65*	0.31	-0.35
Vintage Rating	0.027*	0.028*	0.028*	0.024*	0.027*	0.024*	0.028*	0.038*
Winery Rating	0.061*	0.035*	0.04*	0.086*	0.066*	0.093*	0.081*	0.07
Classic Wine	0.28*	0.04	0.21*	0.25*	0.22*	0.27*	0.35*	0.30*
Cab Sauvignon	-0.05*	-0.20*	0.04	-0.04	-0.08	-0.04	-0.11*	-0.03
Cabernet Blend	-0.02	-0.29*	-0.02	-0.06	0.02*	0.03	0.00	0.00
Pinot Noir	0.01	0.04	0.03	-0.04	-0.03	-0.03	0.15	0.24
Shiraz Blend	-0.20*	-0.37*	-0.05	-0.05	-0.20*	-0.28*	-0.33*	-0.31*
Other Red	-0.09*	-0.06	-0.01	-0.11*	-0.09	-0.15*	-0.13	0.01
Chardonnay	-0.16*	-0.13*	-0.12*	-0.21*	-0.18*	-0.18*	-0.11	-0.05
Riesling	-0.50*	-0.44*	-0.39*	-0.54*	-0.55*	-0.53*	-0.36*	-0.46*
Sauvignon Blanc	-0.31*	-0.25*	-0.22*	-0.39*	-0.36*	-0.34*	-0.63	-0.42
Semillion	-0.34*	-0.21*	-0.27*	-0.40*	-0.42*	-0.43*	-0.36*	-0.32
Sweet White	-0.27*	-0.05	-0.25*	-0.34*	-0.16	-0.26	-0.39*	-0.46*
Other White	-0.40*	-0.32*	-0.31*	-0.37*	-0.49*	-0.45*	-0.49*	-0.23
Great Southern	0.11*	0.26*	0.32*	0.17*	-0.01	0.06	0.06	-0.12
Margaret River	0.25*	0.32*	0.37*	0.31*	0.13*	0.25*	0.26*	0.12
Perth	-0.06	0.06	0.11	-0.21*	-0.03	-0.14	-0.06	-0.02
Other WA	0.24*	0.49*	0.39*	0.28*	0.19*	0.12	0.13	0.04
N Tasmania	0.13*	0.29*	0.29*	0.22*	0.03	-0.05	0.22	-0.25
S Tasmania	0.13*	0.29*	0.28*	0.20*	0.07	0.12	-0.15	-0.08
Adelaide Hills	0.17*	0.34*	0.38*	0.18*	0.09	0.14	0.02	-0.22
Clare Valley	0.04	0.22*	0.22*	0.09	-0.07	-0.01	0.01	-0.16
Coonawarra	0.06*	0.05	0.19*	0.04	-0.01	0.06	0.06	-0.05
Eden Valley	0.42*	0.47*	0.47*	0.46*	0.39*	0.36*	0.27*	0.50*
McLaren Vale	0.07*	0.38*	0.17*	0.04	-0.08	0.10	0.08	-0.11
Other SA	-0.04	0.11	0.18*	-0.09	-0.21*	-0.03	0.05	-0.29
Bendigo	0.09*	0.27*	0.29*	0.02	0.06	0.09	0.10	-0.19
Goulburn Valley	0.00	0.01	0.11	-0.05	-0.11	0.03	-0.02	0.00
Grampians	0.18*	0.32*	0.33*	0.11	0.27	0.09	0.06	0.19
Macedon Ranges	0.22*	0.39*	0.37*	0.33*	0.16	0.10	0.14	-0.13
Mornington Pen.	0.21*	0.34*	0.40*	0.29*	0.13	0.18*	0.07	-0.45
Pyrenees	0.23*	0.21	0.33*	0.20*	0.19	0.21	0.25	0.15
Yarra Valley	0.16*	0.22*	0.36*	0.17*	0.10	0.13	0.07	0.00
Other Vic	0.05*	0.14*	0.16*	0.06	0.03	0.00	0.02	-0.07
Canberra	0.05	0.42*	0.22*	0.05	-0.04	-0.07	0.13	-0.32
Hunter Valley	0.00	0.18*	0.19*	0.04	-0.08	-0.09	-0.16	-0.33
Mudgee	-0.18*	0.24	0.04	0.02	-0.35*	-0.37*	-0.40*	-0.45
Riverina	-0.29*	-0.27*	-0.20*	-0.26*	-0.50*	-0.16	-0.25	-0.11
Other NSW	-0.06	0.06	0.18*	-0.09	-0.15	-0.10	-0.10	-0.30
Queensland	-0.05	-0.06	0.09	0.20	-0.09	-0.20	-0.15	0.04
N	4584	638	887	882	754	720	448	255
R^2	43.0%	39.3%	48.1%	46.0%	46.1%	45.7%	48.6%	47.4%

* = significant at the 5% level.

Table 3: Regression results for New Zealand [Dependent variable: log(Price)]

Parameter	'93-'98	'98	'97	'96	'95	'94	'93
CONSTANT	1.198*	1.401*	1.071*	0.933*	1.255*	1.136*	0.75
Vintage Rating	0.020*	0.018*	0.022*	0.023*	0.019*	0.02*	0.029*
Winery Rating	0.036*	0.023	0.048*	0.034	0.037	0.056*	-0.054
Classic Wine	0.25*	0.261	0.316*	0.198*	0.306*	0.165*	0.135
Cab Sauvignon	0.162*		-0.009	0.229	0.161	0.179*	0.24
Cabernet Blend	0.274*		0.326*	0.185*	0.476*	-0.038	
Merlot	0.185*	-0.157	0.151	0.125	0.509*	0.123	-0.134
Pinot Noir	0.093*	0.119	0.015	0.153*	0.065	0.045	0.133
Other Red	0.20*			0.261*		-0.156	
Riesling	-0.39*	-0.35*	-0.33*	-0.363*	-0.343*	-0.512*	-0.476*
Gewurztraminer	-0.242*	-0.25	-0.134	-0.192	-0.056	-0.363*	-0.587
Sauvignon Blanc	-0.302*	-0.268*	-0.37*	-0.267*	-0.254*	-0.324*	-0.29
Sweet White	0.022	0.223	0.004	0.0003	0.056	-0.02	-0.057
Other White	-0.272*	-0.225*	-0.215*	-0.191	-0.252*	-0.36*	-0.47
Auckland Area	-0.04	-0.04	-0.085	-0.036	-0.054	-0.013	0.057
Canterbury	0.046	0.022	0.003	0.072	-0.101	0.195*	0.116
Hawke's Bay	-0.001	0.317*	0.002	-0.008	-0.096	-0.036	0.058
Wairarapa/Well.	0.117*	0.017	0.17*	0.126	0.091	0.107*	0.20
Other NZ	0.071*	0.128*	0.022	0.094	0.142	0.02	0.067
N	836	112	183	215	117	143	53
R^2	58.9%	52.6%	64.6 %	51.3%	76.5%	70.1%	55.6%
CONSTANT	1.198*	1.401*	1.071*	0.933*	1.255*	1.136*	0.75

* = significant at the 5% level.