AUSTRALIAN ECONOMIC PAPERS

ANALYSING FIRM-LEVEL PRICE EFFECTS FOR DIFFERENTIATED PRODUCTS: THE CASE OF AUSTRALIAN WINE PRODUCERS*

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The paper discusses and illustrates estimation methods for identifying and modelling the influence of producers on the prices for a differentiated product. A two-step fixed effects approach is contrasted to the random effects specification. The techniques are employed to analyse prices for over 260 Australian premium wine producers. The fixed effects specification is preferred given significant correlation between wine attributes and random producer effects. The estimation of fixed producer price effects identifies statistically significant price premiums and discounts, which average 15%. Fixed producer price effects are estimated to depend on the quality reputation of the producer, its level of experience, producer size and the use of multibrands by conglomerates. In part, results indicate that price discounts are associated with producers who have low-quality reputations, are small and recently established.

JEL Classification: D40, L11, L66, Q13

I. Introduction

Hedonic price functions are typically used to analyse prices for differentiated products. Rosen's (1974) pure competition theoretical framework matches buyers and sellers who are willing to trade various 'types' of the product. This matching results in a market equilibrium price function that depends on the product's characteristics. The framework has been used to examine the price determinants for differentiated goods such as houses (Hansen, 2009), personal computers (Berndt & Rappaport, 2001), automobiles (Andersson, 2005), art (Higgs, 2012) and agricultural products (Teuber & Herrman, 2012, for coffee; Nolan *et al*., 2014, for wool). Many applications of the framework also exist for wine products, where a wine's sensory quality rating plays an important role in price determination (Oczkowski & Doucouliagos, 2015).

An important implication of Rosen's (1974) framework is that equilibrium prices are a function of the product's characteristics only and cannot uncover variations in buyers' tastes or producers' costs. Agents are assumed to be price takers, and thus, consumer and producer attributes typically do not appear in estimated hedonic price functions. Explicitly or implicitly, however, some empirical studies have recognised the importance of producer attributes in determining prices. In some cases, these studies attempt to account for elements of imperfect competition and producer price-making behaviour. For example, Parker and Zilberman (1993) recognise the impact of a large producer on

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Californian peach prices. Nelson *et al*. (1994) examine the influence of major manufacturers on personal computer prices. Jabbar and Diedhiou (2003) examine the effect of some buyer and seller attributes such as origin, type and travel mode, on West African cattle prices, while Carlucci *et al*. (2013) examine the impact of various brand names and store types on prices for Italian yogurt.

Building on these previous empirical models that incorporate producer attributes in price functions, the purpose of this study is to estimate explicitly and model the individual price effects for Australian wine producers. Importantly, we draw on a particularly large wine database (Halliday, 2014) that allows us to extract extensive information on price, quality and other variables, for multiple wines from an individual producer. For modelling, we consider and contrast the cluster fixed effects (FE) and random effects (RE) panel data specifications for individual producer effects. The analysis requires a clear distinction between wine and producer attributes. Wine attributes relate to variables such as its sensory quality, vintage, variety and region. Producer attributes capture characteristics such as producer size, experience and the impact of wine conglomerates. It appears that our study is one of the first to examine explicitly reasons for variations in price premiums and discounts associated with different wine producers.

The results from the analysis will provide new insights into how producers influence prices for differentiated products and more generally illustrate the usefulness of the alternative estimation procedures. In the next section of the paper, we briefly review previous theoretical and empirical literature on the potential determinants of individual producer effects. Section III outlines the econometric methods. Section IV presents estimates for the impact of wine and producer attributes on wine prices, while Section V presents estimates and predictions of the individual price effects of wine producers. Finally, Section VI offers some concluding comments.

II. Theoretical Considerations and Previous Literature

Compared with other producers, individual wine producers may have an impact on prices. Producer premiums or discounts from average prices may exist even after controlling for other wine price-determining characteristics such as its quality, vintage, variety and region. In this section, we examine some previous literature that provides motivation for the existence of producer effects. The review focuses on some potential key factors that determine producer effects such as producer reputation, producer experience, producer size and producer multibrands.

In terms of the impact of producer reputation on producer effects, many hedonic wine price studies (e.g. Schamel & Anderson, 2003 for Australian wines; Zhao, 2009; Costanigro *et al*., 2010) have explicitly considered a measure of producer reputation for producing high-quality wines directly into price functions. The rationale for the inclusion of producer reputation is typically based on Shapiro's (1983) theoretical model that suggests that high-quality reputation producers can command premiums in the presence of consumers who lack information about quality. Effectively, consumers are willing to pay a price premium to producers with a high reputation as that serves as an indicator of product quality, while producers view the premium as a return for previous investment in establishing a reputation. Invariably, these empirical models (in over 80% of cases) estimate a significant positive impact for producer reputation on price (Oczkowski & Doucouliagos, 2015). This empirical regularity suggests that price premiums are likely to be associated with producers who have a high-quality reputation.

Relatedly, the impact of producer reputation on producer effects can be viewed through the literature on strategic firm behavioural models that focus on quality differences and price setting in the face of consumer incomplete information; for a summary, see Schnabel and Storchmann (2010). It is argued that when buyers have incomplete information (as with wine) and incur costs in attaining quality information, producers can strategically benefit from setting prices that deviate (over and underpricing) from full-information price-quality levels. For example, Nelson (1970) suggests that high-quality producers may underprice in the short run to fend off low-quality producers in the long run. This strategy, however, may not be viable for a high-quality producer if its marginal costs are excessively high, while Bagwell and Riordan's (1991) model predicts that high-quality producers will overprice given that low-quality producers could not follow such a strategy in the long run as quality information improves. For wine, Roberts and Reagans (2007) and Schnabel and Storchmann (2010) have drawn on Bagwell and Riordan's (1991) theoretical foundation to confirm empirically the importance of the quality of the producer in determining premiums. Neither of these wine studies, however, explicitly estimate nor model producer individual effects in drawing conclusions.

Related to the impact of producer reputation is the literature on the effects of 'collective reputation' on wine prices. For example, Schamel (2006, 2008) and Costanigro *et al*. (2010) discuss the notion that a collective group of producers may have a unique impact on wine prices. Typically collective reputation is manifested through some type of geographic proximity, for example, the effects of a named region on prices in a wide geographic cross-section of wines.

A small number of studies have included a producer experience (age) variable directly into hedonic price functions. Zhao (2009) motivates producer experience's inclusion on the basis that younger wineries lack the tradition of producing 'glorious wines' found in older wineries. The notion that the age or experience of a producer may serve as an indicator for the quality of its products dates from at least Scitovszky (1944). In any event, Zhao (2009) estimated a significant positive price impact for producer experience for Californian wines. In contrast, Roma *et al*. (2013) theoretically offer two opposing arguments for a producer's experience impact. Older firms may have 'higher knowledge of the market' and are strategically better positioned to deliver premiums, alternatively; younger firms may be more innovative and able to take up new market opportunities and therefore attract a premium. Empirically, Roma *et al*. (2013) identify for Sicilian wines a slight significant negative effect for producer age for one of their two data sets inferring that premiums may flow to younger producers who are better able to take up new opportunities in particular market segments.

For the relation between producer effects and producer size, only a small number of hedonic price functions have directly estimated the impact of producer size on prices (e.g. Oczkowski, 1994; Ling & Lockshin, 2003; Roma *et al*., 2013.)[1] For Australian wines, Oczkowski (1994) estimates an important inverse relation between size and prices and argues that for small producers, consumers are willing to pay premiums because of the limited availability and rarity of the associated small production levels, while large producers leveraging from the benefits of economies of scale pass on price discounts as an oligopolistic type of price setting strategy to undercut competitors and attain larger volume sales. Ling and Lockshin (2003) confirm that very large producers discount their prices for Australian wines and refer to their relative efficiency. Roma *et al*. (2013) confirm this inverse price–size relation for Sicilian wines suggesting that small producers specialise in high-end wines, while a large portion of large producers' production is related to cheaper wines. For a discussion of scale effects and their potential benefits in the wine industry, see Anderson (2001) and Hussain *et al*. (2008).

[1] The lack of substantial literature on the impact of producer size on wine prices contrasts to a significant literature on the impact of the number of cases produced for the individual wine on prices; see, for example, Haeger and Storchmann (2006), Schamel (2006), Costanigro *et al*. (2007) and Kwong *et al*. (2011). Invariably, these studies identify a significant negative relation between prices and size and refer to explanations such as it is the rarity, scarcity, collectability, exclusivity and cult status of small production levels that lead to a price premium.

Theoretically, the ownership of multibrands by a conglomerate may also have a price impact. A vast body of literature exists on the motivations for and strategies about brand portfolios. A useful recent study and discussion of previous literature can be found in Morgan and Rego (2009). In summary, a series of motivations exist, which determine the number of brands in a portfolio. Arguments for more brands include achieving greater market power to deter rival brand entry and scale and scope economy benefits from selling in various market segments. Arguments for having fewer brands include decreased price competition among brands, and having too many brands may dilute the value of a firm's brand. Whatever the motivations for developing multibrands in the Australian wine industry, the possibility that a portfolio of wines may have a potential price impact cannot be discounted and warrants examination.

In the Australian context, it appears that only Carew and Florkowski (2008) have examined the hedonic pricing of Australian conglomerates. A hedonic model of Australian wines in the British Columbia market that regresses price against (among other things) dummies for individual wines was employed for analysis. Estimates of individual wine (and implicitly producer) effects were possible as the employed data measured prices and sales in a series of retail locations. In part, the results indicate that generally Penfolds wines attract a premium while De Bortoli wines a discount. Unfortunately, the analysis excludes a measure of the wine's quality, and the identified wine (producer) effect may be solely because of quality variations and not the producer. Moreover, the precision of the estimates is largely dependent on the price variation for each wine across many selling locations.

Related to the previous discussion about the producer attributes that may impact on producer price effects is the literature on brand equity. A body of marketing literature (e.g. Aaker, 1996; Lockshin & Spawton, 2001, for Australian wineries; Keller & Lehmann, 2006) has conceptualised a producer's brand equity as composing of brand loyalty, brand awareness, brand association, perceived quality and other factors. The literature illustrates how developing brand equity results in price premiums and how perceived quality plays an important role (e.g. Aaker, 1996). The concepts of brand loyalty and awareness are also potentially important in the wine context, but clearly building a brand loyalty and awareness takes significant time. Beverland's (2005) research on premium wines suggests, in part, that high levels of brand equity are typically associated with well-established wineries with a long track record, access to old vines, a strong pedigree and a proven ability in producing wines that age well.

Finally, we note that a number of wine studies have previously estimated hedonic price models that include producer effects. Among others, Haeger and Storchmann (2006), Zhao (2008, 2009), Delmas and Grant (2014) and Cardebat *et al.* (2014) only include producer effects to control for the impact of any possible unobservable firm effects on other parameter estimates, while Ali and Nauges (2007) and Cuellar and Claps (2013) do explicitly present and discuss individual producer estimates.

Ali and Nauges (2007) employ a RE specification to account for individual reputation or market power of Bordeaux châteaux. The model considers 132 châteaux over 15 vintages to examine over 1100 wines. The employed specification includes wine-specific variables, such as wine quality, and also producer-specific variables, such as the châteaux' ranking. The RE specification explicitly assumes that the quality ratings and other wine attributes are unrelated to the unobserved producer effects.[2] Ali and Nauges (2007) did not examine the suitability of the RE against the alternative FE specification, which permits correlation between producer effects and wine attributes.

Cuellar and Claps (2013) employ a FE specification to identify the impact of brands on Californian wine prices. They examine 154 unique wines made by 107 producers but accumulate

[2] For the RE model, any correlation between individual effects and the employed explanatory variables leads to inconsistent parameter estimates; see Wooldridge (2010).

over 30 000 price observations across 8500 US locations and fifty-five 4-week time periods. Unlike Carew and Florkowski (2008), they do control for quality but not for vintage variations. Given the nature of the data, the bulk of the price variation is due to differences across time and selling locations/attributes.

III. Econometric Methods

We outline the estimation techniques for identifying and modelling individual wine producer individual effects. The general cluster panel data model framework (Cameron & Trivedi, 2005, pp. 829–845) where clusters refer to wine producers and the individual observations are separate wines can be written as

$$y_{jc} = \alpha \ + x_{jc}^{'}\beta \ + \alpha_c \ + \varepsilon_{jc} \quad j = 1, \ldots\ldots N_c, \quad c = 1, \ldots\ldots. C, \ \ N = \sum_{c=1}^{C} cN_c \tag{1}$$

$$\alpha_c = z_c^{'}\gamma \ + u_c \tag{2}$$

where c counts over C wine producers (clusters), j counts over N_c wines for each wine producer, N is the total number of wines, y is the (log) price of wine, α_c are the individual producer effects, x represents regressors that vary within and across wine producers (wine attributes), z represents regressors that only vary across wine producers (producer attributes), and u are error terms with $\varepsilon_{jc}\sim IID\left(0, \sigma_\varepsilon^2\right)$ and $u_c\sim IID\left(0, \sigma_u^2\right)$. We consider the FE and RE specifications.

The FE specification uses $\alpha_c = \sum_{c=1}^{C} \alpha_c d_c$, where d_c represents dummy variables identifying individual producers. The procedure requires two steps: first, estimate equation (1) and then employ $\widehat{\alpha_c}$ in equation (2). For the FE specification, it is important to note that cluster-invariant regressors (z) cannot appear in equation (1) as their effect cannot be independently determined from the individual fixed effect (α_c), identification problems result (perfect multicollinearity). However, the impact of cluster-invariant regressors (z) on y can be assessed through their impact on ($\widehat{\alpha_c}$) in equation (2) and thus on y in equation (1).

The second step of the FE procedure assumes cov(u_c, z_c) = 0, that is, the error term in equation (2) is uncorrelated with producer attributes. In this context, u_c potentially captures at least two effects: (i) the error in estimating α_c to generate on $\widehat{\alpha_c}$ and (ii) additional un-modelled unobserved producer effects. Given this complexity, it may be difficult to determine the precise nature of u_c and hence any possible relation to the z regressors.

This two-step FE technique has been employed by Barth (1997), Meng (2004) and Griffiths *et al.* (2011) among others, in different economic contexts. The approach is equivalent to the first two steps of the FE vector decomposition method of Plümper and Troeger (2007).[3] Moreover, the model is similar in structure to hierarchical linear models (single level 2) typically used in other disciplines (Hofmann, 1997; Raudenbush & Bryk, 2002).

For the FE specification, applying ordinary least squares to equation (1) results in unbiased estimates for α_c and β, which are best linear unbiased estimators (Wooldridge, 2010). However, in small clusters (N_c small/fixed and $C \rightarrow \infty$, many wine producers each making a small number of wines) even though β is consistently estimated, $\hat{\alpha}_c$ is inconsistent as insufficient information accumulates for the estimator given that an infinite number of FE must be estimated. This inconsistency relates

[3] Plümper and Troeger (2007) propose a three-step procedure for estimating the effect of time-invariant (cluster-invariant) variables (z) on y; however, Greene (2011) points to the difficulties and redundancy of the third step and recommends only the first two steps if the technique is to be employed.

to the incidental parameter problem (Lancaster, 2000). The problem does not arise, however, if also $N_c \to \infty$ as then $\hat{\alpha}_c$ would generate sufficient information for FE estimation (Cameron & Trivedi, 2005, p. 840).[4] To this extent, to mitigate against any possible undesirable consequences of inconsistent estimates, a sample size with sufficiently large clusters (N_c) would be needed for estimation. Moreover, having too few observations for each cluster results in unstable and imprecise estimates.

Given that the individual FE estimator is unbiased but inconsistent (for fixed N_c), it would be useful to examine the sample sizes for some empirical studies that have explicitly modelled individual FE. Barth (1997) identifies and models 549 firm-specific wage premiums from 2321 employees; this implies an average $N_c = 4.2$. Meng (2004) employs the wages of 3356 men and 2962 women from 576 firms (average $N_c = 5.8$ and 5.1) to model firm-level gender pay differences. While to identify and model firm-level abnormal profits, Griffiths *et al.* (2011) employ a panel data set for 2689 companies over 17 years ($N_c = 17$). In the general hierarchical linear model literature, the highly cited Raudenbush and Bryk (2002, p. 267) recommends that at least 10 observations exist for each cluster to facilitate the precise estimation of individual effects.

The RE specification works with the reduced form by substituting equation (2) into equation (1); see Greene (2011, p. 143):

$$y_{jc} = \alpha + x_{jc}'\beta + z_c'\gamma + u_c + \varepsilon_{jc} \tag{3}$$

Equation (3) can be estimated using generalised least squares as u_c is a cluster-specific random variable. This is a one-step procedure that assumes both $\mathrm{cov}(u_c, z_c) = 0$ and $\mathrm{cov}(u_c, x_c) = 0$. Biased and inconsistent RE generalised least squares estimates result if RE are correlated with the employed regressors (z and x); see Wooldridge (2010). This no covariance assumption is typically difficult to justify in practice, and consequently, FE models are usually preferred to RE models in economics (Wooldridge, 2012, pp. 495–496). Most researchers check the validity of this assumption by employing an appropriate Hausman test.

It is important to note that the interpretation of u_c differs between the RE and FE specifications. Unlike the FE specification, for equation (3), u_c captures only un-modelled producer effects, that is, unobserved individual effects over and above those due to the employed z regressors.

IV. Hedonic Wine Price and Producer Attribute Estimates

The wine attributes to be considered for modelling prices are

$$x = \{\text{Quality Rating, Cellaring Potential, Vintage, Variety, Region}\} \tag{4}$$

where quality rating is a sensory quality score for the wine; cellaring potential measures the longevity of the wine; and a series of dummy variables are employed to identify a wine's vintage

[4] The FE estimator for α is inconsistent only for the fixed N_c and $C \to \infty$ case (small clusters); see Cameron and Trivedi (2005). Wooldridge (2010, pp. 284–285) argues that the relevance of asymptotic estimators depends upon how they reflect their finite counterparts in practical situations and hence in our case the relative sizes of C and N_c. For any large representative sample of wines (N), there is an expectation that the number of wine producers (C) will exceed the number of wines produced by individual producers (N_c), and as such, the asymptotics associated with small clusters are most relevant for equation (1). In contrast, in the context of the FE vector decomposition method, Plümper and Troeger (2011) stress the importance of the finite sample properties of the estimators and suggest that the asymptotic properties of estimators should not inform applied researchers if finite sample properties are known.

(including non-vintage wines), grape variety/style and the region from where the grapes were sourced. The employed variables are commonly used in hedonic wine price studies; for a summary of some models, see Fogarty (2003) and Estrella Orrego *et al*. (2012), while for a meta-analysis, see Oczkowski and Doucouliagos (2015).[5]

An important issue in the hedonic price literature relates to the potential subjective bias of individual expert quality ratings, for example, Ashton (2011) and Cardebat *et al*. (2014). This literature recognises that even though there may exist some degree of consensus between experts in assessing wines, differences do exist, and these may impact on hedonic price estimates. At least two approaches have been used to address the inconsistency of quality scores on hedonic price estimates. First, some correction for measurement error is made, for example, using scores from other experts (Oczkowski, 2001)[6] or climatic variables and other variables (Cardebat *et al*., 2014) as instruments in an instrumental variables approach. Second, the issue is ignored, the argument being that consumers are more likely to act upon observed expert quality scores rather than some notion of latent or unobserved 'objective' quality; see Ling and Lockshin (2003) and Fogarty (2003). Implicitly, the majority of hedonic price studies employ the latter approach. In part, the relevance of an observed quality score on prices depends upon the expertise and public profile of the wine critic. We employ the ratings from Halliday (2014), which is recognised as Australia's best-selling and most definitive wine guide. James Halliday has had a long and distinguished career as a wine maker, judge and critic and has won numerous awards for his achievements; see Port (2015). Further, Halliday's quality scores have been employed in numerous studies, including Ling and Lockshin (2003), Oczkowski (2001, 2010, 2015) and Schamel and Anderson (2003).

Based on theoretical considerations and previous empirical literature, there is an expectation that a higher quality rating, longer cellaring potential and older vintage will lead to higher prices. Also, over and above these impacts, certain varieties and regions typically impact on price variations. In the Australian context, there is some evidence (Schamel & Anderson, 2003; Oczkowski, 2010) that varieties and regions such as pinot noir, viognier and areas of Tasmania may attract premiums, while price discounts may be associated with riesling, semillon, Murray Darling and Riverina. For the dummy variables, we estimate coefficients without the need to omit a control; see Oczkowski (1994, p. 100). That is, the estimated coefficients for vintage, region and variety dummy variables reflect deviations from the average of the dependent variable, evaluated at the means of the other non-dummy variable regressors. Similarly for the FE producer dummy variables (d_c), coefficient estimates are interpreted as deviations from average prices.

To examine the influence of producer attributes on prices, we employ

$$z = \{\text{Producer Rating, Producer Size, Producer Experience, Producer Multibrands}\} \tag{5}$$

where producer rating is a quality reputation rating of the winery; producer size measures the size of the producer in cases produced; producer experience measures the recency of winery establishment;

[5] The absence of producer attributes directly in the FE hedonic function may not be a particular concern. Previous hedonic price models have found that 'objective' readily accessible label attributes are more important than attributes less known by consumers (Oczkowski & Doucouliagos, 2015). In this context, consumers readily observe the producer/brand of the wine but would likely have less knowledge of attributes such as the producers' size, age and whether it was part of a conglomerate. The individual producer effect will capture the impact of these producer attributes on prices.

[6] To employ an instrumental variables approach, scores from multiple tasters are required, and this severely limits data set sizes. As a consequence, insufficient observations will exist to permit the accurate estimation of individual producer effects.

and producer multibrands measures the impact of a conglomerate having multibrands.[7] Apart from producer rating, all variables are measured using dummy variables, and coefficients are interpreted as deviations from average effects. For producer size, dummies are employed given the approximate range nature of available data. Two broad categories were employed for producer experience, new and old wineries. For multibrands, dummy variables are employed to identify each conglomerate that has two or more brands in the analysed data set.

We employ the log of recommended retail prices for modelling. These are retail prices recommended by the wineries. The log-linear form is most commonly employed in the literature, given the positively skewed nature of premium wine prices. There is also some evidence to suggest that the use of recommended or actual retail prices makes little difference to marginal attribute estimates; see Oczkowski (2015).

The data set (Halliday, 2014) relates to Australian wines and their prices available during in 2014.[8] Motivated by the practice of previous FE studies (Section III) and recognising the need to have a sufficient large number of wines in each cluster to estimate acceptably precise individual producer effects, only producers who had 10 or more wines reviewed were included in the final analysis. This led to the examination of 3929 wines from 261 producers with an average cluster size of 15.[9] Having more producers with fewer reviewed wines led to too many insignificant and imprecisely estimated producer FE of little meaning, while having fewer producers with 15 or more reviewed wines led to a significant loss in the richness of the data set, with less than 2000 wines for 92 producers. Summary data statistics are provided in Table I, with detailed data descriptions provided in the Appendix.[10]

The estimates for the impact of wine attributes (x regressors, equation (4)) on the log of prices are presented in Table II. Both the FE and RE specifications employ cluster robust standard errors that explicitly recognise the dependence of errors for wines produced by the same producer. The estimates for the impact of producer attributes (z regressors, equation (5)) on individual producer effects (for FE) and prices (for RE) are presented in Table III. For the FE specification (non-clustered), robust standard errors are employed as the second step is based on the sample of individual producers.

In comparing the FE and RE estimates in Table II, we note that a high degree of similarity exists for wine quality, cellaring potential and vintage. Greater differences, however, emerge for variety and particularly for region. Of the 54 varieties, five have different degrees of statistical significance between the two estimators. Of the 53 regions, 24 have different degrees of significance, and of these differences, nine regions were statistically significant at 1% for one specification and not 3significant (at the 10% level) for the other specification. This difference between the estimates is manifested through the auxiliary regression cluster robust Hausman test (Wooldridge, 2010,

[7] The notion of collective reputation is effectively captured through the regional variables in the wine attribute regressors. As a consequence, little unexplained variation will remain for its impact on individual producer effects. Further, a meaningful measure of 'region' cannot be assigned to many individual producers who make wines sourced from numerous regions across Australia.

[8] A small number of wines (12) had prices of over \$200; these were outliers and excluded from subsequent analysis.

[9] A wine producer is defined by an individual brand name and is identified as a separate winery entry in the wine guide. In some cases, a conglomerate owns a series of brands; the effects of conglomerates will be explicitly considered when modelling producer effects.

[10] Some relatively minor multicollinearity problems emerged between some of the region variables and d_c (producer dummies). This occurred where a few dominant producers existed in a single region. This issue was alleviated by combining regions into meaningful coarser classifications.

Table I Descriptive statistics

		Mean	*Standard deviation*	*Min*	*Max*
Wine attributes					
Price (logs)		31.91 (3.32)	20.81 (0.51)	5 (1.61)	195 (5.27)
Quality rating		91.48	3.34	83	99
Cellaring potential		2020.4	6.99	2013	2062
Vintage		2006	0.4%	2010	6.2%
		2007	0.4%	2011	13.2%
		2008	0.8%	2012	42.3%
		2009	2.4%	2013	30.1%
		Non-vintage	4.2%		
Variety		54 varieties			
Region		53 regions			
Producer attributes					
Producer rating		5.193	0.438	4	5.5
Producer size (1000 cases)		0–5	14.9%	50.1–100	9.2%
		5.1–20	35.6%	100.1–500	6.9%
		20.1–50	23.4%	Over 500	10.0%
Producer experience (year established)		2000 or later	18.4%	Before 2000	81.6%

Notes: $N = 3929$ encompassing 261 producers.

pp.331–333), which has a highly significant test statistic: 471.1 distributed as χ^2 (115). This suggests that the RE estimates may be biased and inconsistent and the FE estimates preferred; however, recall that the individual FE estimates of α_c even though unbiased are inconsistent.

In part, the rejection of the RE specification may relate to the correlation between the region variables and producer effects, that is, in some cases, individual producers only produce wines from their own regions. As a consequence, erroneously, many more significant region effects are estimated by the RE specification. This effectively questions the plausibility of the $\mathrm{cov}(u_c, x_c) = 0$ assumption for the RE specification but not $\mathrm{cov}(u_c, z_c) = 0$ for the FE specification. In other words, individual producer effects appear to be correlated with wine attributes but possibly not with any additional unique producer effects. Given this recognition, our focus later on is mainly on the FE estimates and presents the RE estimates for contrast only.[11]

For the FE specification, the R^2s for equations (1) and (2) are 0.697 and 0.200, respectively. For the FE equation (2), the robust RESET test indicates an absence of specification error ($p = 0.80$). For equation (2), the auxiliary regression robust test for endogeneity (Wooldridge, 2010, pp. 126–132) was employed to examine the plausibility of the $\mathrm{cov}(u_c, z_c) = 0$ assumption. The average wine rating score for each producer was used as an instrument for producer rating and the number of wines in the sample for the producer employed as an instrument for the smallest producer size variable. The robust test statistic of $2.122 \sim F(2, 246)$ is not statistically significant at the 10% level, which provides some support for the $\mathrm{cov}(u_c, z_c) = 0$ assumption.[12] For the RE specification, the 'overall' R^2 is 0.628 with $\widehat{\sigma_u} = 0.121$ and $\widehat{\sigma_\varepsilon} = 0.294$ implying that 14.4% of the variance is due to random producer effects.

[11] Even reducing the number of x regressors did not produce any insignificant Hausman test statistics. For example, for the simplest specification that only includes wine quality as an x regressor, the robust Hausman test statistic is $5.02 \sim \chi^2(1)$, which is significant at a 5% level.

[12] The first-stage regression robust F statistics using the two instruments are highly significant, indicating that they are not 'weak instruments'.

Table II Fixed and random effects hedonic price estimates

	Fixed effects	*Random effects*	*Significant variety and region estimates*
Constant	−54.4*** (−17.0)	−55.0*** (−17.9)	Significant variety estimates Positive
Wine quality (0–100)	0.0433*** (11.4)	0.0441*** (12.4)	Arneis***, Barbera**^^, Cabernet Franc***^^^, Chardonnay***^^^, Fiano***^^^, Gewurztraminer*^^, Grenache**^^^, Muscat***^^^,
Cellar potential (drink to year)	0.027*** (16.0)	0.027*** (16.7)	Nebbiolo***^^^, other red varietals**^^, Pinot Gris*^^, Pinot Noir***^^^, Port*, Sangiovese**^^, Sauvignon Blanc***^^^,
Vintage			Tempranillo***^^, Tokay/Muscadelle***^^^, Vermentino*^^ and
2006	0.516***(5.73)	0.528*** (6.28)	Viognier***^^^ Negative
2007	0.373***(4.17)	0.383*** (4.39)	Cabernet Blend***^^^, Cabernet Merlot***^^^, Cabernet Sauvignon**^^, Grenache Shiraz Blend***^^^, Grenache Shiraz
2008	0.424***(5.21)	0.422*** (5.35)	Mourvedre**^^, Merlot Blend***^^^, Riesling***^^^, Rose***^^^, Semillon***^^^, Semillon Sauvignon Blanc**^^^, Shiraz***^^^,
2009	0.364***(7.69)	0.366*** (8.03)	Shiraz Blend** ^^, Shiraz Cabernet**^^ and Shiraz Grenache***^^^
2010	0.254***(7.70)	0.251*** (8.14)	Significant region estimates Positive
2011	0.162***(6.48)	0.167*** (6.97)	Barossa Valley**^^, Canberra District***^, Geelong^^^, Mornington Peninsula^^^, Mudgee^, Northern Tasmania*^^^, Orange^^, Other
2012	−0.051*** (−5.70)	−0.051*** (−6.14)	Tasmania**^^, Port Phillip Zone^^^, Strathbogie Ranges^ and Yarra Valley^^^
2013	−0.121*** (−9.70)	−0.123*** (−10.6)	Negative Adelaide Zone^^^, Frankland River^^^, Geographe^^, Great
Non-vintage	0.127** (2.40)	0.123** (2.44)	Southern^^^, Hilltops^, Kangaroo Island*, Langhorne Creek^, Manjimup***^^^, Margret River^^, Murray Darling***^^^, Nagambie Lakes***^^^, other South Australia**^^^, other various Australian regions***, other Victoria*^^, other West Australia**^^^, Pyrenees***, Riverina**^^^ and Swan Hill^^^

Notes: Dependent variable: *ln*(price). $N = 3929$. *T*-ratios are in parentheses and employ cluster robust standard errors using 261 producer clusters.
* Significance at the 10% level.
** Significance at the5% level.
*** Significance at the 1% level.
For the variety and region estimates, the following symbols denote significance levels for the RE specification:
^ Significance at the 10% level.
^^ Significance at the 5% level
^^^ Significance at the 1% level.

Table III Fixed and random effects producer attribute estimates

	Fixed effects	*Random effects*
Producer rating	0.047* (1.69)	0.040* (1.73)
Size (1000 cases)		
0–5	0.067** (2.07)	0.038 (1.34)
5.1–20	0.061*** (3.98)	0.055*** (3.58)
20.1–50	−0.029* (−1.65)	0.007 (0.43)
50.1–100	−0.020 (−0.60)	−0.014 (−0.45)
100.1–500	−0.111*** (−3.04)	−0.080** (−2.41)
Over 500	−0.155*** (−3.91)	−0.112** (−2.47)
Experience		
2000 or later	−0.072*** (−2.99)	−0.052** (−2.36)
Before 2000	0.016*** (2.99)	0.011*** (2.36)
Multibrands		
Accolade Wines	−0.050 (−0.63)	−0.013 (−0.14)
De Bortoli	−0.224 (−1.61)	−0.244*** (−3.00)
McWilliams	−0.155*** (−3.65)	−0.147*** (−2.70)
Premium Wine Brands	0.034 (0.50)	0.018 (0.23)
Treasury Wine Estates	0.139* (1.87)	0.149** (2.15)
Single Brand	0.0001 (0.02)	−0.007 (−0.16)

Notes: Dependent variables: estimated individual fixed effect for FE and *ln*(price) for RE. $N = 261$ for FE and $N = 3929$ for RE. *T*-ratios are in parentheses and employ robust standard errors for FE and cluster robust standard errors using 261 producer clusters for RE.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

The FE estimates in Table II generally align with expectations: higher prices result from higher quality, longer cellaring potential and older vintages, with non-vintage wines commanding a premium. The quality variable suggests a 4.3% increase in price for a unit increase in the rating, and this is only slightly higher than previous estimates from earlier versions of Halliday's data. Schamel and Anderson's (2003) quality score estimates for the years 1992–2000 range from 2.5% to 4.1% and average 3.1%. More broadly, a statistically significant quality rating effect is consistent with the general hedonic wine price literature that finds a significant effect in 90% of models and a moderate (precision weighted) partial correlation of 0.3 between prices and quality ratings; see Oczkowski and Doucouliagos (2015). Fewer regional variables are significant for the FE specification than previous studies (Schamel & Anderson, 2003; Oczkowski, 1994, 2001) given the inclusion of producer effects and their permitted correlation with the regional variables.

The substantive findings of the FE specification for producer attributes in Table III generally align with some of the previously developed theoretical expectations. As expected, a higher producer rating results in a significantly higher producer effect, a 4.7% increase per rating point. The producer size effect in general appears to be monotonically decreasing in producer size, with the end points being statistically significant. Very small producers (less than 5000 cases) command a premium of 6.7%. Very large producers (more than 500 000 cases) provide a discount of 15.5%. New producers (established 2000 or later) attract an important discount of 7.2%. Older wineries only have a negligible (1.6% premium) influence on prices. A number of conglomerates with multibrands appear to have an important impact. A premium of 13.9% exists for Treasury Wine Estates. Substantial discounts appear to exist for De Bortoli 22.4% and for McWilliams 15.5%. For these multibrand discounts, only the effect for McWilliams is statistically significant.

The FE 4.7% producer reputation marginal premium impact is broadly consistent with Schamel and Anderson's (2003) results. Schamel and Anderson's (2003) estimates indicate a declining importance of the producer rating overtime (1992–2000), and the most recent estimates (1997–2000) range from 2.1% to 5.5% (average 4.3%).[13] For our estimate at average prices, a half-star increment translates to a $0.75 increase, which compares with an average of $0.49 for the most recent (1997–2000) estimates from Schamel and Anderson (2003). Given that producer effects have been estimated after controlling for the wine's quality, see equation (1), then these results again illustrate the importance of producer reputation in explaining wine prices over and above wine quality variations.

For the FE specification, new wineries are estimated to have a 7.2% discount, which at average prices translates to a $2.30 fall. This result is broadly consistent with Zhao's (2009) finding for Californian wines and his notion that new producers lack a tradition for producing quality wines. Effectively, consumers expect that new wineries produce wines of lower quality and thus compared with average prices attract a discount. This argument, however, may conflate the impact on prices of producer experience with producer reputation. However, with the inclusion of both the reputation and experience variables in our model, the newer winery's discount is estimated to occur independently of its reputation.

Two arguments for the independent effect of producer experience on prices may be offered. First, the employed producer rating variable may inadequately measure and capture the quality reputation effects on prices, and so producer experience measures some additional reputational aspects. In this case, it is the experience of the producer that serves as an additional indicator of the quality of its products that provides the underpinning rationale.[14] Second, producer experience may capture aspects of brand equity such as brand loyalty and awareness and the notion that high levels of brand equity are only established over time. Newer wineries typically do not have the resources or have been established long enough to develop a significant brand loyalty and awareness (Beverland, 2005). In part, the lack of brand loyalty and awareness relates to Roma *et al.*'*s* (2013) argument that new producers have less knowledge of the market and hence are less able to influence prices to command premiums compared with their more established competitors.

The FE estimates for producer size point to significant producer premiums (at average prices) for very small producers (less than 5000 cases) of $2.14 and for small producers (5000–20 000 cases) of $1.95. Significant discounts are estimated for large producers (100 000–500 000 cases) of $3.54 and for very large producers (over 500 000 cases) of $4.95. It is hypothesised that demand influences primarily drive the 'exclusivity' and 'rarity' premiums associated with very small producers. The discounts provided by very large and large producers are broadly consistent with oligopolistic strategies to set lower prices in the pursuit to maximise sales revenue rather than profit (e.g. Amihud & Kamin, 1979). Effectively, very large producers benefit from significant economies of scale for

[13] This consistency between our estimate and those of Schamel and Anderson (2003) occurs despite the change in scale (an addition of a five-red-star classification in recent editions of the guide) and a narrower coverage of the quality of producers (from four stars to five gold stars in our sample and from 2.5 to five stars in Schamel and Anderson (2003)).

[14] Relatedly, Fleming *et al*. (2014) identify a positive producer experience–winery rating relation for Victorian wineries. Fleming *et al*.'s (2014) rationale for a positive experience–winery rating relation includes the following: lower-quality grapes are produced by younger vines found in new wineries; older wineries are further along the learning curve in producing quality wines; and younger wineries may find it difficult to attract highly talented winemakers. These arguments may also explain the expected lower-quality wines emerging from new wineries and the associated estimated discount.

high-volume low-quality wines and appear willing to discount their prices across their product line (including for high-quality wines) in an effort to extract a larger market share.

Finally, we turn to the FE estimates of the influence of multibrands on producer price effects. Treasury Wine Estate Wines (TWE) attracts the largest premium while De Bortoli the largest discount. Carew and Florkowski (2008) also identify similar premiums and discounts for Australian wines sold in Canada but employ a different method. Rice and Galvin (2005) and Keys (2013) discuss some aspects of mergers in the Australian context and in particular the emergence of TWE. In part, the merger development for TWE was motivated by standard cost reduction and marketing efficiency benefits but also by the need to better compete against large international wine producers and to countervail the market power of dominant Australian retailers. Even though both Rice and Galvin (2005) and Keys (2013) point to some problems with the various TWE mergers, our FE estimates point to an overall premium of 13.9% for the sampled brands.

In a general sense, the RE specification estimates are broadly similar to those produced by the FE specification for producer attributes. The main differences appear to relate to the insignificance of the smallest producer size and the greater degree of significance for some producer multibrand variables.

V. Individual Producer Effect Estimates

From a wine industry perspective, it is important to identify what premiums/discounts are associated with each producer after controlling for the effects of wine attributes. Effectively, we wish to capture the unique producer effect on prices. For the FE specification, the individual effects are estimated parameters with an associated variance about which significance tests can be performed; these effects only control for wine attributes.

For the RE specification, the individual effects are predictions or realisations of a random variable and represent best linear unbiased predictions; see Searle *et al.* (2006). As a consequence, statistical tests for the individual RE predictions are not available. The predictions from the estimated $\widehat{u_c}$ in equation (3) are not comparable with those from the FE specification $(\widehat{\alpha_c})$, as equation (3) also includes and controls for producer attributes. In other words, $\widehat{u_c}$ from equation (3) are producer effects predictions over and above the employed producer attributes of producer rating, age, size and conglomerate effects. As a consequence for the RE specification, we re-estimated equation (3) but without the producer attributes (z regressors) to generate predictions. The revised RE estimates in general are practically identical to the original RE estimates presented in Table II. The overall R^2 slightly falls from 0.628 to 0.613, and the random producer effect standard error $\widehat{\sigma_u}$ rises from 0.121 to 0.128 implying that the variance due to random producer effects rises from 14.4% to 16.0%.

Plots of the individual producer effects are provided in Figures 1 and 2.[15] The estimates and predictions are measured from average prices, and so positive values represent fixed proportionate premiums and negative values discounts. Given the Hausman test results, our focus is again on the FE estimates. For FE, the distribution of effects has a relatively flat peak and tails that drop quickly. For individual producer FE, 31% of producers have a 10% or more premium, while 29.5% have a 10% or more discount. The average premium is 15.4%, which at average prices translates to \$4.91, while the average discount is 14.5%, which translates to \$4.63. Approximately 54% of FE are significant at a 10% or stronger level of significance (27.6% positive and 26.8% negative), while 36.4% are significant at the 1% level.

[15] A full list of the producer effects with associated brand names is available from the author on request.

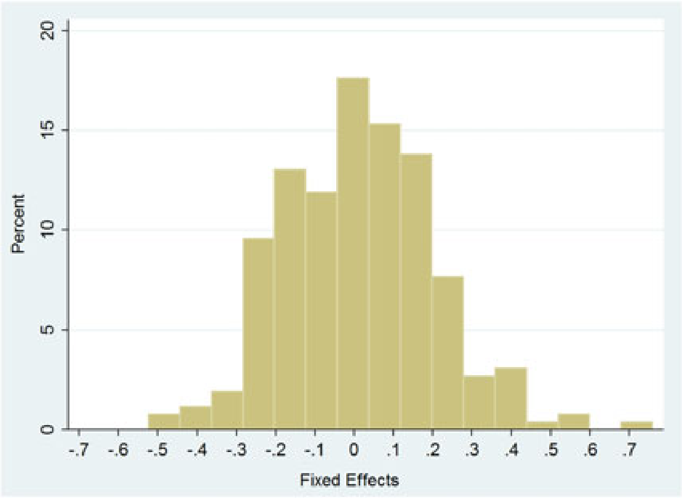

Figure 1. Wine producer fixed effects
Note: Fixed effects represent the proportionate change in price due to the producer measured from average prices.

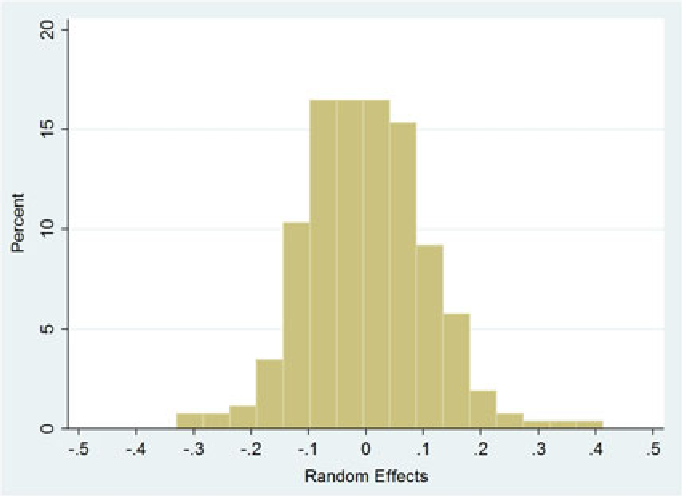

Figure 2. Wine producer random effects
Note: Random effects represent the proportionate change in price due to the producer measured from average prices.

The pairwise correlation between the FE estimates and RE predictions is 0.881. The RE predictions of individual effects exhibit a smaller variation than the FE estimates. The sample standard deviations are RE = 0.105 and FE = 0.190, and the inter-quartile ranges are RE = 0.142 and FE = 0.273.

The extreme individual producer effects are presented in Table IV. Some of these effects are clearly very important. For example, for Sutton Grange, the individual fixed premium of 41.4% equates to $13.21 at average prices, while Echelon offers a 40.7% discount, which at average prices

Table IV Wine producer effects

Producer	*Fixed effects*	*Random effects*
Discounts		
De Bortoli (Riverina)	−0.524*** (−9.92)	−0.286
Quarisa	−0.454*** (−10.9)	−0.273
Berton Vineyard	−0.414*** (−10.4)	−0.330
Echelon	−0.407*** (−11.7)	−0.254
Patritti	−0.394*** (−8.55)	−0.219
Michelini	−0.330** (−2.38)	−0.135
Delamere Vineyard	−0.328* (−1.74)	−0.065
Calabria Family	−0.31*** (−6.20)	−0.113
Hardy's	−0.319*** (−7.77)	−0.197
Shingleback	−0.293*** (−5.83)	−0.178
Premiums		
Tobin Wines	0.760*** (13.3)	0.413
Moss Wood	0.542*** (5.52)	0.295
Cullen	0.524*** (5.35)	0.272
Dalwhinnie	0.491*** (7.00)	0.158
Sutton Grange	0.414*** (3.63)	0.171
Golden Grove	0.397*** (7.00)	0.151
Tuck's Ridge	0.393*** (9.26)	0.178
Symphony Hill	0.392*** (7.23)	0.165
Jack Rabbit Vineyard	0.381*** (5.85)	0.164
Clarendon Hills	0.380*** (7.09)	0.326

Notes: Individual effects represent proportion change in price from average prices due to the producer. Producer cluster robust *t*-ratios are presented in parentheses. Random effects predictions exclude producer attributes in the specification.
* Significance at the 10% level for FE only.
** Significance at the 5% for FE only.
*** Significance at the 1% level for FE only.

translates to \$12.99. For these extreme effects, the RE predictions appear to have only some broad consistency with the FE estimates but generally are much lower. In a general sense, the size of these individual fixed producer effects (with premiums/discounts averaging about 15%) and that over 50% of individual effects are statistically different from average prices provide some justification for the use of producers with 10 or more reviewed wines for the analysis.

A full presentation of the effects for individual brands of the conglomerates is provided in Table V. For the FE estimates, five of the seven brands for TWE attract premiums. [16] Not unexpectedly for TWE, the highest premiums are attracted by Penfolds (20.9%), which is often suggested to be the globally most recognised prestige Australian brand (Keys, 2013).[17] Interestingly at the lower end for TWE, the Bailey's of Glenrowan 26.5% discount, in part, reflects its focus on very high-quality fortified wines that are significantly underpriced. The variation between the price effects for TWE (from premiums of 20% to discounts of 25%) clearly indicates that a significant portfolio of brands exists, each potentially with a different focus for different market segments.

[16] Given the sample design, not all the brands produced by the identified conglomerate are included in the analysis. To this extent, the multibrand estimates may not capture the entire wine portfolio of conglomerates. In any event, the relative differences between the brands for each conglomerate are meaningfully estimated.
[17] Penfolds' premium is estimated even with the exclusion of its iconic Grange from the sample. Penfolds Grange was considered to be one of the outliers, being priced over \$200.

Table V Multibrand wine producer effects

Producer	*Fixed effects*	*Random effects*
Treasury Wine Estates		
Penfolds	0.209***	0.237
Devil's Lair	0.199***	0.074
Seppelt	0.088	−0.028
Wynns Coonawarra	0.077	0.067
Saltram	0.031	0.064
Wolf Blass	−0.167***	−0.084
Bailey's of Glenrowan	−0.265*	−0.089
De Bortoli		
Victoria	−0.154***	−0.200
Riverina	−0.524***	−0.286
Accolade Wines		
Houghton	−0.042	−0.073
Bay of Fires	−0.220	0.010
Hardy's	−0.319***	−0.197
McWilliams		
McWilliams (Riverina)	−0.243***	−0.102
Mount Pleasant	−0.270*	−0.184
Echelon	−0.407***	−0.254
Premium Wine Brands		
Wyndham Estate	−0.050	−0.017
Jacob's Creek	−0.157***	−0.119

Notes:
* Significance at the 10% from average values, for fixed effects only.
** Significance at the 5% level from average values, for fixed effects only.
*** Significance at the 1% level from average values, for fixed effects only.

The largest multibrand discount is identified for De Bortoli wines (Table III) and indicates a clear delineation between its large-scale warm-climate operations in the Riverina (52.4% discount) and its smaller cool-climate operations in the Yarra Valley (15.4% discount). For the FE estimates, other significant differences between brands for a conglomerate also exist for Accolade Wines with Hardy's significantly greater discount of 32%, McWilliams with Echelon's higher discount (41%) and Premium Wine Brands and Jacob's Creek larger discount (16%).

VI. Conclusions

Two important general conclusions emerge from the analysis. First, we have identified the existence of important individual producer price effects for Australian wines. Variations in these producer effects were found to depend significantly on the quality reputation of the producer, producer experience, producer size and the existence of producer multibrands. Potential strategic implications result from these findings for producers. Efforts devoted toward improving a producer reputation may result in higher price premiums. Consistent with the employed reputation measure, activities devoted to producing a range of high-quality wines on a consistent basis over time are likely to improve reputation. The premiums associated with small producers have implications for any potential expansion strategies of small wineries. The benefits gained from increased sales need to be compared with likely falls in price premiums if small producers are considering extending their operations. Finally, new wineries are likely to experience price discounts during the early stages of their operations. Initial long-term planning would need to factor such discounts into business plans. Potentially, strategies such as buying in better-quality grapes and using established expert winemakers may alleviate some of the expected price discounts, as a new winery attempts to develop its brand equity over time.

The second general conclusion relates to the appropriateness of the FE and RE specifications for identifying and modelling individual producer effects. The two-step FE approach appears to have some useful properties: it permits correlation between wine attributes and producer effects, and it provides unbiased estimates of individual effects that permit statistical testing. However, for modelling individual effects, the two-step FE approach does assume that un-modelled individual effects are uncorrelated with producer attributes. Further, the FE approach produces inconsistent individual effect estimates for small clusters. This later recognition implies that practitioners need to employ data sets with a relatively large number of wines produced by individual producers.

For our application, the RE specification was rejected because of significant correlation between the individual effects and wine attributes. For other applications and sample designs, such correlation may not exist. At a minimum, users of the RE specification should perform the appropriate Hausman test. It is worth noting that the RE predictions of individual RE are realisations of a random variable and as such do not permit statistical testing.

Finally, as with most cross-section studies, the results are sample dependent. Our focus is only on Australian premium wines and those brands that can attract a significant number of reviews from a prominent wine guide. The results should be interpreted with recognition of this coverage. This caution is most pertinent for the estimates of the influence of the multibrands of a conglomerate on producer effects, given that not all brands produced by each conglomerate are included in the sample. However, this reservation possibly does not affect the estimated accuracy of the relative positions of brands for a conglomerate.

Appendix

Data relate to Australian wines available during 2014 and are sourced from the *Australian Wine Companion* published in Halliday (2014). Prices are those charged in 2014 and measured in AU$ per bottle. The quality rating measures out of 100 the overall sensory (colour, nose and palate) quality of the wine, using gradations of one point. Cellaring potential relates to a subjectively assessed ‘drink to’ year. Vintage represents the year when the grapes were crushed. Regions and varieties are combined to ensure that at least 10 wines are in each category. Producer rating represents a measure of a winery’s ability to produce a range of quality wines over time, typically over three vintages and uses 0.5 increments. Note that, consistent with the employed 0.5 increments, a score of 5.5 is given to winery that receives a five-red-star rating reflecting a long track record of excellence. For a number of wineries, producer size information is not available in Halliday (2014); missing data are sourced from Australian and New Zealand Wine Industry Directory (ANZWID) (2014), which uses ranges of cases and/or tonnage crushed; this necessitated the use of categorical producer size variable in estimation. The producer’s age of establishment and the use of multibrands are sourced from Australian and New Zealand Wine Industry Directory (ANZWID) (2014).

Regions are as follows: Adelaide Hills, Adelaide Zone, Barossa Valley, Canberra District, Central Ranges Zone, Central Victoria Zone, Clare Valley, Coonawarra, Currency Creek, Denmark, Eden Valley, Frankland River, Geelong, Geographe, Great Southern (WA), Heathcote, Henty, Hilltops, Hunter Valley, Kangaroo Island, King Valley, Langhorne Creek, Limestone Coast, Manjimup, Margaret River, McLaren Vale, Mornington Peninsula, Mount Barker, Mudgee, Murray Darling, Nagambie Lakes,

North-East Victoria, Northern Tasmania, Orange, other South Australia, other Tasmania, other various Australian regions, other Victoria, other Western Australia, Peel, Pemberton, Porongurup, Port Phillip Zone, Pyrenees, Riverina, South West Australia, Southern Highlands, Strathbogie Ranges, Swan Hill, Swan Valley, Tumbarumba, Wrattonbully and Yarra Valley.
Varieties are as follows: Arnies, Barbera, Botrytis, Cabernet Blend, Cabernet Franc, Cabernet Merlot, Cabernet Sauvignon, Cabernet Shiraz, Chardonnay, Chenin Blanc, Durif, Fiano, Fortified, Gewurztraminer, Grenache, Grenache Blend, Grenache Shiraz Blend, Grenache Shiraz Mourvedre, Malbec, Merlot, Merlot Blend, Mourvedre, Muscat, Nebbiolo, other red varietals, other white varietals, Petit Verdot, Pinot Grigio, Pinot Gris, Pinot Noir, Port, Red Blend, Riesling, Rose, Sangiovese, Sauvignon Blanc, Sauvignon Blanc Semillon, Semillon, Semillon Sauvignon Blanc, Shiraz, Shiraz Blend, Shiraz Cabernet, Shiraz Grenache, Shiraz Viognier, Sparkling Red, Sparkling Rose, Sparkling White, Sweet White, Tempranillo, Tokay/Muscadelle, Verdelho, Vermentino, Viognier and White Blend.

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