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Abstract:

We study how reputation price premia are obtained in markets for experience goods and how they are associated with names identifying products with increasing specificity (nested names), such as region-of-origin, brand and product names. A model of price variation as a function of historical quality performance is estimated via quantile regression. Findings include that multiple factors, in addition to past average quality, influence the magnitude of the premia. These premia migrate from aggregate names to more specific ones as the consequences of experiencing poor quality overcome the cost of forming detailed quality expectations. The application is the California wine industry.

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The Economics of Nested Names: Name Specificity, Reputations, and Price Premia

What's in a name? Asking this question, Tadelis (1999) modeled a hypothetical market in which a firm's name is its only asset. We ask a new question: what's in a series of nested names? Like Chinese boxes or Matryoshka Russian dolls, names (or any other term used to identify one or more goods) can nest within each other to categorize goods with increasing specificity. In addition to product names, a wide variety of goods are identified by the firm that produces them and the region or country of origin, such as designer shoes "made in Italy" or Irish whiskey. A car may be categorized by the country or continent in which it was manufactured, the make, the model and the style. Since reputations are essentially consumers' *a priori* (pre-consumption) association of a name to a quality expectation, multiple reputations may relate to a single experience good (adopting Nelson's, 1970, definition). This article analyzes the reputation dynamics of the market for such goods.

The radically different structure of incentives inherent to private and common reputations has lead economist to study them independently, and the existing literature has developed in two parallel streams: one focused on firm reputations (starting with Klein and Leffler, 1981 and Shapiro, 1982) and another centered on collective reputations (Tirole, 1996).

The main finding of Klein and Leffler (1981) is that reputation-based price premia are necessary to induce producer investment in quality, while Shapiro (1982) shows that, for the case of a monopolist, the optimal quality output decreases when consumers cannot immediately verify it. After these first articles, many other contributions on the economics of firm reputation ensued, with a preponderance of theoretical work. Examples include the use of game theory to study the role of reputations in establishing market power (Kreps and R. Wilson 1982; Milgrom and Roberts, 1982), the conditions under which high quality and reputation are followed by low quality in a cyclical pattern (Gale and Rosenthal, 1994), and the role of adverse selection

(Tadelis, 1999, 2003). Many empirical studies on firm reputations have examined how the sudden release of information on (generally poor) quality performance affects the value of a firm, as measured by the stock market. For example, Jarrell and Peltzman (1985) and Barber and Darrough (1996) consider product recalls, Karpoff and Lott (1993) consumer fraud, and Mitchell and Maloney (1989) airplane crashes.

Tirole (1996) introduced the term "collective reputation" in the economics literature and used it to study the persistence of corruption in groups of agents sharing a common name. The term is also used in the context of multiple firms sharing a common name (e.g., see Blair and Kaserman, 1994, on franchising companies) or instances in which products are traced to groups of firms. Agricultural products, which are often pooled from multiple producers for the purpose of distribution or processing, offer an illustration of the latter, where quality is associated with the region of production.[1] Theoretical work in this area has focused on the public good nature of collective reputations and how free rider problems may be addressed (e.g., Winfree and McCluskey, 2005). For many agricultural products, empirical research has quantified *ceteris paribus* the existence of price premia specific to certain production regions (e.g., Combris et al. ,1997, for French wines; Loureiro and McCluskey, 2000, for Galician veal; and Fotopoulos and Krystallis, 2003, for Zagora Greek apples), demonstrating that consumers are indeed willing to pay premium prices for good reputations.

Perhaps because of this parallel evolution of the literature, the existence of a particular reputation structure is generally taken as an (exogenous) product or application-specific matter; and it is not clear *why* economic agents form quality expectations on specific names for certain products, but use aggregate ones for others. Considering the cases in which firm and collective reputations coexist provides an opportunity to investigate the matter.

The automobile industry is a good example. Since each manufacturer usually has access to different technological resources and managerial skills, forming quality expectations on firm names is a sensible discerning criterion. Barber and Darrough (1996) find that, among the six major manufacturers operating in the US from 1973 to 1992, Toyota produced the most reliable vehicles, while Ford had the greatest number of product recalls. The study also shows that reputations are embedded in stock prices, and lack of product reliability hinders shareholders' returns. At the same time, because Japanese and US firms operate in different business and cultural environments, we argue that consumers may also form more generic expectations on the quality of vehicles manufactured in the US versus those built in Japan. Indeed, Barber and Darrough (1996) state: "Japanese automakers have enjoyed a significant advantage over their American counterparts in terms of vehicle reliability"[2].

Such taxonomical structure of reputations needs not to be confined to the automobile industry, or to firm and country-of-origin names: whenever a number of names share a common, distinctive set of quality-influencing traits (real or perceived), nested reputations may arise. A comprehensive list of examples would be very large, spanning from Suisse banks to Bordeaux wines. Indeed, the only article (of which we are aware) accounting for the simultaneous existence of firm and collective reputations is a study on French wines by Landon and Smith (1998). Even though the authors do not explicitly study the use of nested names to form quality expectations, they show that firm and collective reputations affect product prices more than current quality performance[3].

While it is widely agreed that agents form quality expectations based on indicators of past performance (e.g., Shapiro, 1982, Kreps and R. Wilson, 1982, Milgrom and Roberts, 1982, Diamond, 1989, Tadelis, 1999, Winfree and McCluskey, 2005); the exact relationship linking quality performance, reputation and (stock or product) prices is unknown. Empirical work, generally constrained by the nature and availability of data, adopted a variety of strategies, relating prices to the release of news on quality performance (Jarrell and Peltzman, 1985, Barber and Darrough, 1996, Karpoff and Lott, 1993, Mitchell and Maloney, 1989), latent reputation constructs (e.g., Quagrainie et al. 2003) or lagged quality ratings from consumer magazines (e.g., Landon and Smith 1998). In his concluding remarks, Shapiro (1982) asked: "How is the choice of product quality related to the information gathering activities of individual consumers or the information flows in the marketplace generally?" After three decades, the issue is not yet resolved.

The primary objective of this article is to study the economic rationale underlying the genesis of nested names and reputations. This objective is pursued by estimating, via quantile regression (Koenker and Bassett, 1978), a hedonic model of prices as a function of product attributes and the price premia associated to a three-tiered taxonomy of nested names. While *ceteris paribus*, name-specific price premia have been generally interpreted as direct measures of reputation, we note that such premia capture consumers' willingness to pay for a good reputations, *net* of the search cost necessary to associate quality expectations and names. This distinction is trivial when firm and collective reputations are studied in independently, but, as it will be shown, becomes pivotal for the case of nested names. A secondary objective of this study is investigating how multiple indicators of quality performance influence reputation price premia, thereby producing some results regarding how reputations can be managed.

The empirical application is the California wine industry, for the principal reason that blind quality ratings, exogenous to reputations, are available. While the wine market is used here as an application, we strive to “distill” a broadly applying set of results from the model, contributing to several fronts of the reputation literature. First, we address the economic implications of forming quality expectations on nested names. Second, we consider several indicators of past quality performance (average past quality, its consistency and name longevity) to understand how firms and group of firms may manage reputations and obtain price premia. Finally, by adopting a quantile regression approach, we obtain a series of snapshots portraying how the structure of reputation changes as product prices, and consumers’ cost of “being wrong”, increase.

I. The Model

Economists routinely use the hedonic framework (Rosen, 1974) to value product attributes that are not marketed directly. The approach is based on the premise that, in a market with perfect information and product differentiation, equilibrium prices will depend on differences in product attributes, *ceteris paribus.* The basic model is in the form $P_i = \Pi(\mathbf{z}_i)$, where P_i is the price of product i, $\mathbf{z}_i$ is a row vector of product attributes and Π is the hedonic function relating product prices and attributes. If we assume that a quality index $\mathbf{q}$ exists and it is known to consumers, the model modifies to $P_i = \Pi(q_i, \mathbf{z}_i)$; where the presence of the quality index in the hedonic function may make certain product attributes redundant, while horizontal attributes relating to alternative uses of a product will maintain non-zero implicit prices.
We posit that, for experience goods, consumers approximate the unknown q_i by using the quality expectations they associate to the (nested) names identifying a product. Assuming a three-tiered taxonomy conforming to the nature of our data, these will be the reputations associated with the name of the k^{th} region of production, R_k; the reputation of the j^{th} firm, r_{jk}; and

that of a particular product b_{ijk} (for wine this includes the specific vintage and variety of a bottle). Introducing reputations and adding the time dimension by using the subscript t, we obtain $P_{ijkt} = \Pi(b_{ijkt}, r_{jkt}, R_{kt}, \mathbf{z}_i)$. While the reputation of a particular product provides more relevant information than those of aggregate names, some individuals might have formed quality expectations only for the region names, and not for products or firms. Thus, it is legitimate to assume that equilibrium prices will depend on the reputation of all names, and not only the most specific ones. Adding a vector of parameters, $\boldsymbol{\beta}$, and an *i.i.d.* stochastic error term, we can express the equilibrium hedonic price as:

(1)
$$P_{ijkt} = \Pi\left(b_{ijkt}, r_{jt}, R_{kt}, \mathbf{z}_i; \boldsymbol{\beta}\right) + \varepsilon_{ijkt}$$

Before proceeding, a further clarification is needed. When forming quality expectations, consumers face two important choices. First, they need to decide at what level(s) of name specificity they will collect information and form quality expectations. For example, an uninformed consumer may need to decide whether to focus on collecting information on alternative manufacturing countries, firms, product models, or all of them. This is the process we seek to model. After selecting the level(s) of specificity, sources of information (or an optimal mix of media) need to be chosen. Sources of quality information include direct experiences (personal or reported by others), expert reviews and advertisement. Each medium provides a different amount of trustworthy information, for a different search cost (in money and time), but we assume that in the long run consumers will form unbiased expectations.[4]

Our next modeling step consists in specifying how reputations evolve over time, and what affects them. As it was argued earlier, the only consensus arising from the literature is that reputations depend on historical quality performance. Indeed, if quality is revealed after consumption, in a repeated-purchase scenario expectations will be based on information regarding present and past quality,[5] independently of the chosen medium.[6] Empirical research cited in this article generally related prices to location-type measures of quality performance. In dynamic models (Shapiro, 1982 and Winfree and McCluskey, 2005), reputations have been represented as state variables whose current value increases or decreases based on the discrepancy between current average quality and past reputation. We adopt this general idea but, in addition to a location measure (the mean), we add two other dimensions to the determinants of reputation: quality consistency and the history of a name. The rationale is that risk-averse consumers should penalize names producing goods of inconsistent quality, and longevity in business may communicate high quality. Moreover, both factors directly relate to the search cost implied by forming quality expectations: inconsistent producers force consumers to search more (at parity of "true" mean quality and the precision of its estimate), and so does a new name (existing reputations on older names only need to be updated). Formally, we assume that the reputation of a name, say the k^{th} region of production, evolves according to the following process:

$$R_{k,t=T} = R\left[\Psi\left(\mu(q_{kt})\big|_{t\leq T}, \sigma(q_{kt})\big|_{t\leq T} \right); T - t_{ko} \right]; \tag{2}$$

where $\mu(q_{kt})$ and $\sigma(q_{kt})$ are the mean and standard deviation of the quality of the products marketed under region name *k* during time period *t*; Ψ is an unknown weighting function governing how quickly/slowly exceptional performances or past sins are forgotten, and t_{k0} represents the year in which a name enters the market. Firm and product reputations are assumed to evolve analogously.

Jointly, equations (1) and (2) depict a model in which equilibrium prices are a stochastic function of multiple reputations and a vector of horizontal product attributes. In turn, reputations evolve through time according to a deterministic process depending on the mean and standard deviation of present and past quality, and the longevity of a name.

II. Methods

Quantile regression, a technique pioneered by Koenker and Bassett (1978), provides a straightforward methodological strategy to examine if and how the reputation dynamics change as the cost of being wrong increases. Furthermore, the approach allows controlling for market segmentation and possible structural breaks in implicit prices of the attributes occurring across price ranges (see Costanigro et al. 2007). In quantile regression, parameters estimates are obtained by solving the minimization problem: $\min_{\beta\in\Re^p}\sum_{i=1}^{N}\rho_\tau\left(y_i-\mathbf{x}_i'\boldsymbol{\beta}\right)$, where ρ_τ represents a function which, by asymmetrically weighting residuals, yields the τ_{th} conditional quantile, *y* is the regressand, ***x*** the regressors, and *p* specifies the number of parameters to be estimated.

Estimation can be repeated for all the quantiles of interest, thereby obtaining multiple, quantile-specific estimates of the same model parameters. Re-casting equation (1) in its conditional quantile-specific form, we obtain:

(3) $$P_{ijkt}^{\tau}=\Pi\left(b_{ijkt},r_{jkt},R_{kt},\mathbf{z}_i,\boldsymbol{\beta}^\tau\right);\ \tau\in\left(0,1\right).$$

III. Data

The wine market provides a unique opportunity to analyze the relationship between prices, reputation and quality. First, blind quality assessments by experts, *exogenous to prices*, are available from specialized magazines.[7] Second, wine characteristics that can be easily evaluated in-store (i.e., red or white wines, grape variety, bottle size and label) are relatively homogeneous, yet wine prices span a wide range, suggesting that reputation effects play a prominent role.

Finally, multiple names are used to identify each wine, each with its own reputation. While the winery name relates to the skills of its winemaker; the production region, the American Viticultural Area (AVA) for U.S. wines, identifies groups of wineries with similar weather and “terroir” conditions, which exogenously influence the quality of the grapes and ultimately the wine (Wilson, 1998).

The core of the dataset consists of 9,261 observations obtained from the *Wine Spectator* (issues from 1992 to 2003) spanning ten vintages (1991-2000) of blind tasting quality scores (SCORE) for California red wines. We use these quality scores as an unbiased measure of wine quality. Varieties (VAR) include Cabernet, Zinfandel, Pinot Noir, Syrah and blended reds. For each wine, the producing winery, the AVA,[8] the vintage, the price, and the number of cases produced are also recorded. The data set was compiled with information regarding the year in which the 51 AVAs in the dataset were officially recognized by the U.S. Alcohol and Tobacco Tax and Trade Bureau, and the year of establishment of the wineries (1,049 in total) from several issues of *Wines and Vines Directory of Wineries/Buyer's Guides.*

IV. Empirical specification

In order to estimate (3), equation (2) needs to be operationalized. We do so by specifying Ψ as a moving average processes, and by using blind tasting scores to measure quality. To be precise, we build *average quality* and *standard deviation constructs* which, for the j^{th} winery name, take the form $FIRMPQ_{jt} = \frac{1}{2}\left[FIRMPQ_{j(t-1)} + \underset{j}{avg}\left(SCORE_{ijk(t-1)} \right) \right]$ and $FIRMSD_{jt} = \frac{1}{2}\left[FIRMSD_{j(t-1)} + \underset{j}{sd}\left(SCORE_{ijk(t-1)} \right) \right]$, where *t* is the issue year of the *Wine Spectator magazine*, and $\underset{j}{avg}$ and $\underset{j}{sd}$ represent the average and standard deviation operators applied to all wines of winery *j*, rated in period *t-1*. Thus, FIRMPQ and FIRMSD are computed using information from two adjacent time periods,[9] and recent quality performance affects reputations more than the quality output of the more distant past. The longevity component of firm reputation is simply the scalar $FIRMY_{jt} = \left(t - t_{j0} \right)$; the number of years since the j^{th} winery was founded. The regional reputation components are specified analogously and are constructed using the wine ratings relative to each AVA. We represent them by substituting FIRM- with the AVA- prefix. We do not have the data to build equivalent constructs at the highest level of specificity (a particular wine)[10], but little is lost by specifying $b_{ijkt} = SCORE_{ijkt}$: for a given winery, we expect the variance in quality across all the bottles of a specific wine to be small; and the relevant name longevity effects are captured by the firm-level name. Table 1 presents descriptive statistics of our dataset and data constructs.

Assuming that the price effect of each reputation determinant is additively separable, the model is estimated as

$$(5) \quad P_{ijkt} = \beta_o^{\tau} + \beta_1^{\tau}\left(SCORE_{ijkt}\right) + \beta_2^{\tau}\left(FIRMPQ_{jt}\right) + \beta_3^{\tau}\left(FIRMSD_{jt}\right) + \beta_4^{\tau}\left(FIRMY_{jt}\right) + \beta_5^{\tau}\left(AVAPQ_{kt}\right) + \beta_6^{\tau}\left(AVASD_{kt}\right) + \beta_7^{\tau}\left(AVAY_{kt}\right) + \sum_{z=9}^{13}\beta_z^{\tau}\left(VAR_i\right) + \varepsilon_{ijkt}$$

The use of current quality scores for b_{ijkt} (while for R_k and r_{jk} are based on past scores), the large number of firms residing in each AVA and the robustness of the AVA-level moving average constructs to changes in the quality and standard deviation of an individual firm; all concur in allowing the identification of the model's parameters.

While most hedonic studies adopt log-linear specifications, here we allow the implicit prices of each regressor to change with the dependent variable by means of quantile regression, so that the imposition of a specific functional form is not necessary. Therefore, the dependent variable, *price*, is maintained in its linear form, and parameter estimates can be interpreted as quantile-specific marginal effects.

V. Results and Discussion

Table 2 presents quantile regression estimates for the 20th, 40th, 50th, 60th and 80th quantiles and ordinary least squares estimates from a log-linear specification of the model. For the quantile estimates, standard errors were calculated by bootstrapping.[11] Most parameter estimates are significant at conventional levels. The coefficients relative to the quality consistency constructs, while still significant, yielded noisier estimates.[12] All signs but one (i.e. the FIRMY parameter estimates) are consistent with *a priori* expectations. To ease interpretation, we also estimated the model parameters at each fifth quantile within the 20th and 80th interval and present them graphically in Figure 1. All estimates referring to the same regressors are different when the 20th and 80th quantiles are compared pair-wise (at the nominal size $\alpha = 0.5$), with the exception of the FIRMSD, AVAPQ and AVASD estimates (p=0.11; 0.32 and 0.88 respectively). Firm-level estimates are statistically different from their AVA-level analogous in the median and lower quantiles, while they are not at the highest quantiles.[13]

There are three main dimensions to our results: first, the estimates relative to the median quantile are discussed to show how firms or groups of firms can obtain and manage reputation premia; then we examine how, at a given conditional quantile, reputation premia distribute across nested names. Finally, estimates are compared across quantiles to understand if and how reputation dynamics are different for low-priced and expensive products. Jointly, these three dimensions compose a rather general picture, within which we propose some hypotheses regarding the genesis of the use of nested name and it economic rationale.

For the median wine, reputation premia are increased by marginal changes in current quality scores (by $1.17), the firm average quality construct (by $1.34), and the AVA average quality construct (by $1.84). Conversely, a marginal increase in the standard deviation construct reduces reputation premia (by -$0.29 for the firm and by $-0.85 for the AVA) [14]. From a producer's perspective, these results imply that, at parity of cost, policies aimed at increasing average quality *and* consistency should be preferred to the ones focusing on only one of the parameters.[15] More importantly, our results suggest that location is not the only parameter of the quality density function relevant in determining reputations, as previous research generally assumed. The negative price effect of inconsistent quality is likely related to both consumers risk aversion, and the fact that variance in quality makes the task of forming expectations more costly, eroding the premium associated with a name.

According to our estimates, the AVA premium of the median wine increases each year by an average of $0.29, implying that older AVAs fetch higher prices at parity of (present and past) quality. Surprisingly, the analogous result at the firm level of specificity is negative (-$0.03), which oddly implies that older firms capture lower reputation premia. Some reflections will help interpreting this result. As argued before, name longevity will affect price premia if consumers consolidate their quality expectations overtime: if a name has been consistently producing high quality for a long period of time, consumers may be willing to pay a higher price for an older name to avoid the hassle of collecting information on other, more recent names. On the other hand, if the historical performance of a name has not been satisfactory, consumer may stigmatize it and not care to update their expectations, even if real quality increases. We can expect this phenomenon to be more relevant when many alternative names are available (as for the case of wine), and the cost of avoiding a particular name is low. The history of the California wine industry provides some reasons to believe that poor expectations have crystallized on the names of certain older Californian wineries (hence causing the negative estimate), while positive expectations have consolidated on most AVA names (which were established more recently).[16]

The second layer of results is found by considering how reputation price premia change as names become more specific. For the median quantiles, the price effect associated with the quality of an individual bottle is smaller than the firm and AVA premia. In turn, AVA-level effects dominate all others in term of absolute magnitude. Indeed, the size and economic significance of collective reputations effect on the price of Californian wines is striking and in some ways paradoxical. If consumers value information, expectations consolidated on specific names should be valued more than the ones relative to generic names, *ceteris paribus*. The paradox vanishes if we consider that search costs curtail the ability of a name to capture all of consumers' willingness to pay for information on quality. These search costs obviously increase with the level of name specificity: as names become more specific in a nesting sequence, a larger number of quality expectations need to be formed and compared.[17] If these costs are large enough, a consumer will trade the increased accuracy of using specific name for the convenience offered by a more aggregated one. Indeed, the number of wines and winery names can be intimidating for many non-connoisseurs, and many consumers may prefer a simpler reference structure to compare products.

The last layer of interpretation resides in analyzing how estimates change from the lower to the higher quantiles. What can be seen by tracking this dimension in Figure 1 is an increase in the magnitude of the premia associated with the quality constructs for the firm and individual wine names, while AVA-specific estimates remain stable. From the 70^{th} quantile, the firm-level point estimates become larger than the AVA counterparts. The fact that reputation premia grow larger as wine prices increase is somewhat expected: the greater the monetary investment, the more consumers are willing to pay for information on quality to insure against bad experiences. What is perhaps less obvious is the finding that, in relative terms, the price impact of reputation premia migrate from aggregate names to specific ones as prices increase. Our interpretation of this result relies once more on the role of search costs. While these are high for specific names and low for aggregated ones, price variations leave the cost of searching relatively unchanged. Thus, most consumers may find it optimal to use aggregated names for inexpensive products, but at high prices they may be willing pay to search more and form quality expectations on more specific names. Following this reasoning, it is not necessary to invoke exogenous causes to explain why, for many low-priced agricultural products, firm level information is not available and reputations form only at aggregate levels: given a low cost of being wrong, consumers may just be unwilling to form the reference structure of quality expectations necessary to use firm names. Along the same lines, food contamination (e.g., *E. coli*) and animal disease outbreaks (e.g., Bovine Spongiform Encephalopathy, or "mad cow" disease) represent interesting case studies in which the existing reputation structure is made inadequate and suboptimal by a sudden and unexpected variation in the cost of being wrong.

Returning to the estimates of Figure 1, one may also expect that if a consumer forms quality expectation at the firm level, he or she will not consider at all the less accurate quality cues contained in collective names. Instead, we find that, rather than replacing them, for expensive wines firm reputation premia are "added" to the AVA premia, which remain stable across quantiles. This finding is consistent with a two-stage decision making process in which, when facing choices related to important consequences, consumers use the reputations of aggregate names as a sorting device to reduce the number of more specific names on which they collect additional information. Extending the inference outside of experience goods, a patient may decide where to perform knee surgery based on the reputation of a few alternative hospitals, but he/she may also collect information on the individual surgeons for more dangerous surgeries. Such hierarchical structure of decision making would have important implications for those high quality firms which are trapped in collective names with poor reputations.

VI. Conclusions and Future Research

This article contributes to the literature on reputation in two principal ways. First, we modeled the hierarchical structure of names, laying the foundations of how to think about reputations for nested names. In an empirical application to the wine market, the article documents that reputation dynamics change across the price spectrum; and reputation premia migrate from collective to specific names as prices increase. These findings suggest that tradeoffs between the (negative) consequences of experiencing poor quality and the variable costs of forming quality expectations determine which names will develop reputations, and hence capture price premia in the market. This basic intuition, we believe, contains the seed for the formal development of a theory in which firm or collective reputations arise endogenously and, under certain conditions, jointly. Second, we presented empirical evidence that reputation premia are related to a series of factors summarizing the *distribution* of the quality performance of a name, and not only location measures. Here, we considered average quality, quality consistency and name longevity. The exact process describing how reputations evolve through time and the complete array of factors influencing them remains nevertheless an open question, as the specification of the adopted reputation constructs is a maintained assumption of the article, rather than a tested one.

Table 1: Descriptive Statistics of Dependent and Independent Variables

	PRICE*	SCORE	FIRMPQ	FIRMSD	FIRMY	AVAPQ	AVASD	AVAY
N**	9261	9261	7717	6115	8183	9074	8949	9199
mean	$37.18	86.54	86.65	2.36	25.42	86.25	3.50	14.51
min	$6.05	60	62.00	0.00	1	74.67	0.00	1
p25	$19.76	84	85.00	1.53	9	85.42	3.14	12
p50	$27.12	87	87.00	2.19	17	86.24	3.49	15
p75	$39.78	89	88.48	2.98	25	87.68	3.86	18
max	$2,140.00	99	96.63	14.14	149	91.00	7.78	22

*CPI adjusted to 2003

**Differences in number of observation across variables are to be attributed to non-AVA wines, scarcely populated series of quality ratings or missing data.

Table 2: Selected [a] Estimates for the 20th, 40th, 50th, 60th and 80th Conditional Quantiles and OLS estimates. Coefficient Estimates Represent Marginal Effects. Standard Errors in Parenthesis.

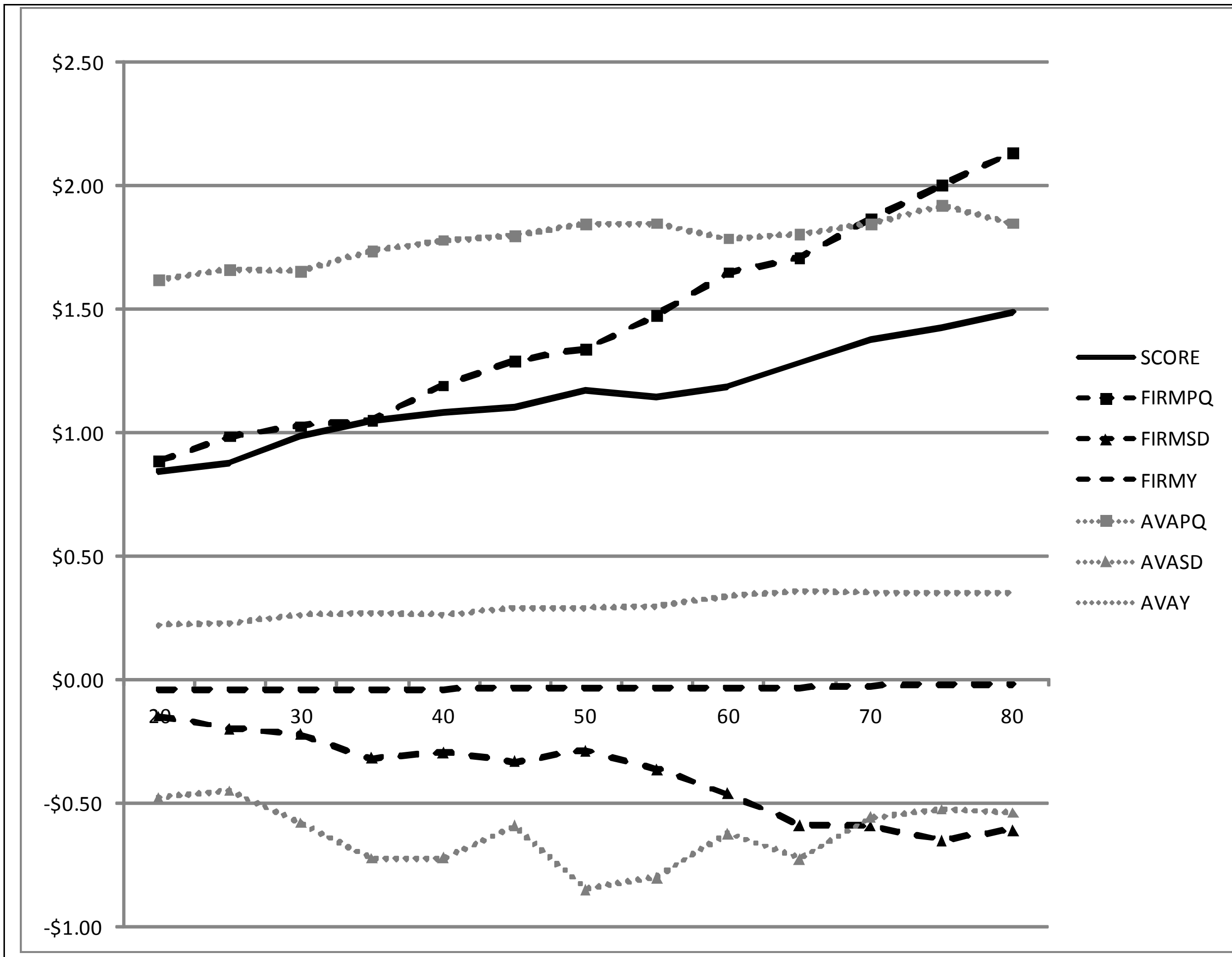
	τ=0.2		τ=0.4		τ=0.5		OLS[b]		τ=0.6		τ=0.8	
SCORE	\$0.84	***	\$1.08	***	**\$1.17**	***	**0.045/\$1.24**	***	\$1.19	***	\$1.49	***
	(0.044)		(0.064)		**(0.074)**		**(0.002)**		(0.080)		(0.104)	
FIRMPQ	\$0.89	***	\$1.19	***	**\$1.34**	***	**0.055/\$1.49**	***	\$1.65	***	\$2.13	***
	(0.053)		(0.075)		**(0.105)**		**(0.002)**		(0.108)		(0.192)	
FIRMSD	-\$0.15	*	-\$0.30	**	**-\$0.29**	*	**-0.008/-\$0.24**	**	-\$0.46	**	-\$0.61	**
	(0.085)		(0.122)		**(0.162)**		**(0.004)**		(0.186)		(0.310)	
FIRMY	-\$0.04	***	-\$0.03	***	**-\$0.03**	***	**-0.001/-\$0.03**	***	-\$0.03	***	-\$0.02	*
	(0.004)		(0.005)		**(0.006)**		**(0.000)**		(0.007)		(0.010)	
AVAPQ	\$1.62	***	\$1.78	***	**\$1.84**	***	**0.073/\$1.99**	***	\$1.79	***	\$1.85	***
	(0.095)		(0.125)		**(0.128)**		**(0.004)**		(0.180)		(0.252)	
AVASD	-\$0.48	**	-\$0.72	**	**-\$0.85**	**	**-0.02/-\$0.54**	**	-\$0.63	*	-\$0.54	
	(0.229)		(0.338)		**(0.415)**		**(0.008)**		(0.356)		(0.407)	
AVAY	\$0.22	***	\$0.26	***	**\$0.29**	***	**0.01/\$0.28**	***	\$0.34	***	\$0.36	***
	(0.036)		(0.040)		**(0.049)**		**(0.001)**		(0.042)		(0.069)	

*;**;*** imply significance at the 0.1, 0.05 and 0.01 respectively

a: grape varieties and constant omitted.

b: coefficients estimated with log-linear specification/marginal effects calculated at median price

Figure 1: Selected[a] Estimates for Each 5th Conditional Quantile $\in[20,80]$



a: grape varieties and constant omitted.

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[1] Collective names have been used to identify agricultural products since ancient times. In the words of Bertozzi (1995): "Already in the fourth century BC in ancient Greece, there existed wines from Corinth, almonds from Naxos, honey from Sicily, and marble from Paros, while in the Roman Empire under the reign of Augustus, there were well known dates from Egypt, cured ham from Gaul, oysters from Brindisi and marble from Carrara."

[2] The study does not find evidence of spillover effects relating the quality performance of one firm to the stock market value of its competitors (located in the same or in another country). We suspect that this may be due to the short period of time (three-five days) over which stock market prices are monitored after a product recall.

[3] Two equations are estimated: one predicting quality as a function of past (lagged) tasting scores (a proxy for firm reputation) and a set of indicator variables for the region of production (a control for collective reputation), and one predicting prices as a function of current quality, expected quality and a vector of wine attributes

[4] Consumer magazines generally provide reliable information, yet a conscious effort to read them needs to be made, and sometimes subscription fees need to be paid. On the other hand, the information found in advertisement has almost zero cost, but its informational value may be dubious.

[5] Note that information on present quality does not eliminate the necessity of forming expectations, as the possibility of purchasing a defective product in the next purchase remains.

[6] We consider advertisement as one of the possible sources of information. We do not have the data to test whether advertisement influences quality expectations even after quality is revealed by consumption. In any case, we believe that wine advertisement in the United States was negligible in the time frame spanned by our data.

[7] Wine Spectator includes the following in their description of the tasting process: "Bottles are coded and bagged, and all capsules and corks are removed…No information about the winery or the price of the wine is available to the tasters while they are tasting."
http://www.winespectator.com/Wine/Free/Wine_Ratings/About_Tastings/0,4634,Format,00.html

[8] Certain AVAs in California are very large, overlapping or entirely including smaller ones. Generally, wine labels report only the smallest AVA name (and so does the Wine Spectator). In the few cases in which two AVA names were found, the name of the oldest AVA was used.

[9] The first of each series is missing, and the second is calculated using the average quality score of the first year in which a winery appears in the dataset

[10] The Wine Spectator publishes the rating of a particular bottle of wine only once.

[11] Three hundred random draws were taken. See Hahn (1995), and Buchinsky (1998) on the quantile regression bootstrap estimator of the variance-covariance matrix.

[12] It can be shown that, at parity of sample size, $\mathrm{var}(avg) < \mathrm{var}(s.d.)$

[13] A Wald test rejected the joint null hypothesis $H_0 : \beta_2^\tau = \beta_5^\tau ; \beta_3^\tau = \beta_6^\tau$ at any conventional level of significance for $\tau = 0.2, 0.4, 0.5$; but not for $\tau = 0.6, 0.8$ (p=0.74 and 0.69 respectively)

[14] Note that (table 2) a set of similar results can be obtained by estimating the model via OLS with a log-linear specification, and then calculating marginal effects at the median price. This approach introduces the dependency of the implicit prices on the dependent variable via the transformation imposed on the regressand. OLS conditional mean estimates are greater than the conditional median ones, as the OLS estimator is sensitive to outliers, while quantile regression is not. More importantly, OLS results will diverge from quantile regression in the tails: note that some implicit price functions in figure 1 cross each other (for example, FIRMPQ crosses AVAPQ at the 70th conditional quantile); while others have large effects which remain unchanged across quantiles. Had we estimated only a conditional mean log-linear model, such patterns would have been ruled out. A general comparison of linear conditional quantile models to transformed dependent variable conditional mean models is currently ongoing using multiple datasets.

[15] For example, an AVA seeking to increase its reputation premium might enforce minimum quality standards on its constituents, or incentivize quality by instituting competitions in which wine tasting scores are made public. The first policy will increase mean and reduce variance (by cutting the lower tail of the quality distribution), while the second may have an effect on average quality, but not necessarily on variance

[16] During the prohibition years, the California viticultural industry converted to table grape production (or grapes that "shipped well", for home fermentation). After the repeal of prohibition, wineries were forced to use such grapes in wine making, therefore producing low quality wines. Conversely, most AVA names were established during the 80's, when quality increased substantially and Californian wines could stand comparison with French products (see Taber, 2006).

A concurring explanation is a confounding effect caused by economies of scale, as in our dataset older wineries have larger production capacity than new wineries. Goodhue et al. (2008) find that the wine industry exhibits economies of scale in production and marketing, because of the distributors' and retailers' preference for larger volumes. The median firm longevity in our dataset is 17 years. Wines produced by firms more recent than 17 years have a median production of 800 cases. The median production rises to 1,600 cases for firms older than 17 years.

[17] We can think of three main costs associated with forming expectations: one related to accessing source(s) of information, one related to comparing expected quality across names, and finally there is the cost of updating the information through time. All of these costs are proportional to the number of names considered, and hence the level of specificity.