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Michael Gibbs, Mikel Tapia and Frederic Warzynski

Globalization, Superstars, and the Importance of Reputation:
Theory & Evidence from the Wine Industry

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Globalization, Superstars, and the Importance of Reputation: Theory & Evidence from the Wine Industry[1]

Michael Gibbs
University of Chicago GSB & IZA

Mikel Tapia
Universidad Carlos III de Madrid

Frederic Warzynski
Aarhus School of Business, Aarhus University

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We develop a simple model of the effects of reputation on wine prices. An increasing fraction of consumers who are "naïve" (less well informed about wine quality) results in a stronger sensitivity of wine prices to ratings of quality. We then use data on prices and Robert Parker's ratings of wines, to show that prices have become more related to Parker ratings over time. In addition, we find that a change in Parker rating has a stronger effect on price, the stronger is the wine's reputation.

[1] This paper benefited from comments from participants at the "Competitive Forces Affecting the Wine and Winegrape Industries: An International Conference on World Wine Markets", UC Davis, California, August 8-11, 2007 and the AAWE conference, Portland OR, August 2008. The usual disclaimer applies.

Globalization, Superstars, and the Importance of Reputation: Theory & Evidence from the Wine Industry

Michael Gibbs, Mikel Tapia, & Frederic Warzynski

Introduction

Every bottle of wine is different. That is true for a collection of bottles of the same wine (region, vintner and vintage), but even more so across types of wine. Subtle differences in terroir, weather, harvesting, production, blending and aging can cause important differences in the quality of wine. There are also a large number of vintners. These product traits make assessment of the quality of a bottle of wine very difficult for consumers. For this reason, wine prices may reflect reputation. That reputation may be based in part on the region, in part on the vintner, or in part on the recommendations of wine experts such as Robert Parker. Reputation and wine ratings are especially important for less experienced buyers, who know less about specific regions, vintners, vintages, etc. For these reasons, the wine market is an interesting one in which to empirically explore the economics of reputation.

Globalization has increased the demand for fine wine worldwide. The best wines now have strong markets in Moscow, Beijing, or Sao Paolo. However, many buyers in new markets have less experience with wine than do buyers in more mature markets. This suggests that a greater proportion of buyers of fine wine may rely heavily on published wine ratings, especially those of Robert Parker. If so, then wine prices would be more strongly related to wine ratings, particularly for the highest quality wines. In addition, less experienced wine consumers would be more likely to respond to new information, such as a chance in wine ratings. In this paper, we explore these issues.

We first present a simple model of the pricing of wine based on reputation. There are two types of consumers, naïve and sophisticated. Naïve consumers have less precise estimates of the quality of a given bottle of wine. For this reason, they rely more on outside reputational information, such as Parker ratings. The equilibrium price of wine then depends on the proportion of consumers who are naïve or sophisti-

cated, among other variables. The greater the proportion of buyers who are naïve, the greater the reliance on published ratings. In addition, relatively more naïve buyers implies that wine prices become more sensitive to new information (a change in rating). We argue that these dynamics are likely to be reflected in the current wine industry, as globalization brings new and relatively naïve buyers into the market.

We then test these ideas using data on Parker ratings and wine prices from a sample of red wines from France, Spain and California. We show that the relationship between prices and Parker ratings has increased over time, especially for the highest quality wines. We also show that the price elasticity of fine wines with respect to Parker ratings has increased over time.

Model

In this section we present a simple model of the effects of different types of consumers on wine prices. Naïve consumers are less informed about wine quality than sophisticated consumers. For this reason, they respond more strongly to wine rankings, and to changes in those rankings – rankings are more informative to less informed consumers.

Wine is of uncertain quality. The only two attributes that consumers care about are the mean and variance of this quality, μ and σ^2. Consumers have a private taste for wine, based on their utility and budget, distributed $\tilde{t} \sim U[-t, +t]$. They are also risk averse, with coefficient of absolute risk aversion r.

Buyers are willing to pay more for a wine with better reputation μ. To capture these ideas, assume that the maximum amount a buyer is willing to pay for a bottle of wine is $\tilde{t} + \mu - \frac{1}{2}r\sigma^2$.

Assume two types of consumers, naïve and sophisticated. Of the total population N, a fraction η are naïve. Naïve and sophisticated consumers are identical in all respects but one: they differ in the precision (variance) of their estimates of wine quality, with $\sigma^2_N > \sigma^2_S$. Thus, they have the same risk aversion, distribution of tastes for wine, and mean assessment of the quality of a given bottle of wine. We use this simple form to highlight the role played by uncertainty (σ^2) about the quality of wine. Note that these as-

sumptions imply that a naïve consumer is less likely to buy a given wine than is a sophisticated consumer, because of their greater risk. Naïve consumers who buy a given wine will have higher average taste for wine than will sophisticated consumers who buy that same wine.

Consider the pricing of a specific type of wine, with supply B bottles. Supply is fixed to capture the fact that a specific type of wine (region, grape, etc.) has very inelastic supply even in the long run. Price P clears the market, with supply equal to total demand by naïve and sophisticated consumers (Pr(·) means probability):

$$B = N\eta \Pr(\textit{naive customer buys}) + N(1-\eta)\Pr(\textit{sophisticated customer buys})$$
$$= N\eta \Pr(\tilde{\tau} + \mu - \tfrac{1}{2}r\sigma_N^2 \geq P) + N(1-\eta)\Pr(\tilde{\tau} + \mu - \tfrac{1}{2}r\sigma_S^2 \geq P)$$
$$= N\eta[t - P + \mu - \tfrac{1}{2}r\sigma_N^2] + N(1-\eta)[t - P + \mu - \tfrac{1}{2}\sigma_S^2].$$

In the last line we assume for simplicity that the equilibrium price is such that $P - \mu + \frac{1}{2}\sigma^2_{N,S}$ fall within the bounds of [–t, +t] of the distribution of τ. Some algebra yields the equilibrium price:

$$(1) \qquad P = t + \mu - \left(B/N\right) - \tfrac{1}{2}r\sigma_S^2 - \tfrac{1}{2}\eta r(\sigma_N^2 - \sigma_S^2).$$

We are now in a position to state our predictions (some of which are not testable with our data, but could be with other data). Wine prices are rising in average quality, all else equal. They are declining in the scarcity of the wine (B/N), while increasing in the overall population N. They are declining in risk aversion and the degree of uncertainty that sophisticated consumers have about the particular wine.

Holding the overall population N constant, wine prices are *declining* in the proportion of consumers who are naïve. This is because naïve consumers require a larger risk premium (lower price) in order to consume wine, as they have less precise estimates of quality than do sophisticated consumers. It is likely that globalization has led to increases in prices of fine wines. If so, according to our model that would be driven by greater total demand, though mitigated by a higher proportion of naïve consumers. Finally, wine prices decline in the degree of additional uncertainty that naïve consumers have about the wine compared to sophisticated consumers. This suggests that over time, as new consumers become more ex-

perienced with fine wine, the market should gradually move toward one that is more like the market prior to globalization (unless substantial additional naïve consumers keep entering the market as globalization moves to new regions).

The Effect of Wine Ratings

What about the effect of new information on the reputation, and hence price, of wines? Assume that a wine may receive a new rating (e.g., from Robert Parker). Standard Bayesian updating implies that naïve consumers update their prior about the wine more strongly than do sophisticated consumers, and that their confidence in their estimate of quality rises (variance falls). In other words, if a wine receives a new favorable rating, this should increase μ, decrease σ^2_S, and decrease σ^2_N even more. To model this situation in a simple way, assume a wine rating W, where $W > 0$ means that the wine's appraisal has increased (or it has received its first positive review), and $W < 0$ means the opposite. Assume that $d\mu/dW > 0$, and $d\sigma^2_N/dW < d\sigma^2_S/dW < 0$. From these and (1) it follows (not surprisingly) that a wine's price rises if it receives an increased rating:

$$\frac{\partial P}{\partial W} = \frac{d\mu}{dW} - \tfrac{1}{2}(1-\eta)r\frac{d\sigma_S^2}{dW} - \tfrac{1}{2}\eta r\frac{d\sigma_N^2}{dW} > 0.$$

More interestingly,

$$\frac{\partial^2 P}{\partial W \partial \eta} = \tfrac{1}{2}r\frac{d\sigma_S^2}{dW} - \tfrac{1}{2}r\frac{d\sigma_N^2}{dW} > 0.$$

In other words, the greater the fraction of naïve consumers, the greater the effect of a change in rating on the price of the wine. The intuition for this should be clear: naïve consumers have relatively diffuse priors, so they give new information greater weight than do sophisticated consumers.

This implication is relevant for thinking about the effects of globalization on wine pricing. Globalization brings new consumers, and these new consumers are by and large "naïve." The proportion of wine drinkers who are relatively uninformed about wine quality is likely to have grown very rapidly, es-

pecially as consumption of wine increases rapidly outside of Europe, to the US, Asia and so forth. Every year in the last decade or so, it is quite likely that the fraction of naïve wine consumers has grown.

Our model does not predict a separate effect of total growth in consumers on the effect of Parker ratings, due to the simple functional forms that we assume (where the fraction of naïve and sophisticated consumers drives our predictions, and where marginal utility of wine quality is constant). It is likely in practice that growth in the total market for wine will lead to greater sensitivity of price to reputation / rating. The reason for this is that, more realistically, consumers might have increasing marginal utility for wine quality. Growth in absolute numbers of consumers would then mean that those who buy a better quality wine have higher average marginal utility from that wine – the equilibrium price sweeps an increasingly smaller fraction of the right tale of the consumer taste distribution τ.

The fraction of sophisticated wine consumers has been high in Europe for a long time. In the United States, wine consumption and production has risen for many years, so it is plausible that the fraction of sophisticated consumers is rising there. However, wine is traded internationally. Wine already on one continent is unlikely to be shipped to another continent to arbitrage price differences, but wine producers face the tradeoff each year of shipping their product to different economies for sale. Therefore, they will respond when, say, demand in China rises relative to demand in France. For this reason it seems likely that the fraction of naïve consumers *worldwide* will affect the relative price of various wines, and how they respond to Parker notes or other wine ratings. This seems especially so for better quality wines, which are more likely to be shipped overseas (shipping costs will be a smaller fraction of total value). That said, it would be interesting to see if wine prices are more sensitive to ratings in countries where wine consumption has grown more rapidly. Unfortunately, our data do not allow such a test.

Our model is a simple one of pricing based on a wine's reputation to consumers. Rosen's superstars model (1981) would yield similar implication. For example, he notes that imperfect substitution between quality-differentiated products implies convexity in a consumer's value of a good as function of quality. He similarly argues that some goods have a public good aspect of joint consumption. It is possible that this is true for high quality wines, due to either literally sharing a good bottle with friends, or to

"snob effects." We have ignored these possibilities by assuming that willingness to pay for wine is linear in μ. Such effects would only increase the importance of quality, and signals about quality such as wine ratings, for pricing. Thus, they would reinforce our predictions.

Data

We extracted the information available on the website eRobertParker.com regarding all the tasting notes from Robert Parker for Californian, Spanish and Bordeaux wines. The data were collected during the fall of 2006 and spring of 2007. We use 15 vintages of data (1990-2004). These tasting notes were published in the Wine Advocate or in books written by Robert Parker. Table 1 shows the number of observations by "regions" as defined by Robert Parker. We know the tasting date (month, year), the Parker note, the name of the wine, the vintage, the region, the average quality of the vintage for the year, and we also have an estimated cost of the wine in the U.S. for most wines. We can therefore run some regressions of the price over ratings as repeated cross-sections and then look at the evolution of the sensitivity[2]. An interesting feature of the data for our purposes is that Parker sometimes tastes the same wine from the same vintage more than once, so that we can observe the dynamic effect of a change in opinion. We are also interested in differences of wines from the same vineyard but with vintages of different years and rated differently by Parker.

Tables 1a,b and 2 provide summary statistics. We have 9,410 observations, on vintages from 1970 through 2004, rated and priced from 1992 through 2006. Age is the year of the Parker points and price data, minus the vintage; it is the age of the bottle of wine. For virtually all observations, the data include Parker points, ranging from 64 to 100, and an estimate of the price in the US, ranging from $2 to $1,295 per bottle (prices are converted to 2006 dollars using the year-average CPI for all consumers).

[2] Unfortunately, this measure of price does not fully capture the dynamic adaptation of prices following new information. Therefore, we also used a panel of prices of Bordeaux wines from one of the main brokers in Bordeaux. The dataset provides "en primeur" and spot prices for 254 châteaux (estates) over 16 vintages, starting in 1982 (this dataset is well known and used quite extensively in the wine economics literature, see e.g. the updated version in Hadj Ali et al., 2008). Spot prices are available quarterly for a period of 4 years, from July 1996 to December 2000. We found qualitatively similar results. See Tapia and Warzynski (2006).

Many wines were rated more than once (in some cases, more than twice). Therefore, roughly one third of the observations, over 3,000, are updated points and prices.

In some analyses we will use a baseline measure of "reputation" of the wine. We explored various measures, but the one that we use here is the number of times a vineyard has received a Parker note above 90. Therefore, we use two potential measures of the quality of the wine that might be relevant for consumers: past reputation and current performance.

Results

Effects of Quality Indicators on Price: Repeated Cross-Section

Table 3 presents regressions analyzing the relationship between price and various measures of quality: age of the wine; reputation; and Parker points. We use natural logs of price, reputation and points in all analyses and plots.

The first panel regressions ln(Price) on the three available measures of quality. For ln(Points) and ln(Reputation), the coefficients can be interpreted as estimates of price elasticities. The most interesting results in the first panel are the effects of reputation and Parker points. The effects of Parker points are striking. They are very strongly related to price; indeed the elasticity is estimated to be about 7. This effect diminishes when we control for reputation and age of the wine. In fact, we observe that all three measures are positively related to the price of the wine, suggesting that both current performance and past reputation. However, our model suggested that there might be an interaction between these two measures. We get back to this question later in our analysis.

The second panel examines the effect of changes in Parker points on changes in the price of wine. Not surprisingly, we find a similar effect: as a wine's rating changes, its price tends to change strongly in the same direction.

Trends in Effects of Quality on Price

Figures 1-4 build on this basic analysis by asking whether the relationship between price and measures of wine quality has changed over time. For these figures, regressions similar to those in Table 3 were run separately for each year and regional group indicated. Those regressions had either ln(Price) or the change in ln(Price) as the dependent variable. In all cases regressions controlled for age and age^2.

Figure 1 shows how the price elasticity of region reputation evolved over time. In this plot we are able to show California and French wines separately. We observe a very clear upward trend over time in the effects of reputation on wine prices in both regions and for the sample as a whole. This figure indicates that reputation has a much stronger effect on wine prices in 2006 than it did in 1993.

A similar conclusion emerges in Figure 2, which shows how the price elasticity of Parker points evolved over time (here we also include Spain despite the fact that we have less observations than for the other regions). In all four series, there is a notable positive trend over time since the beginning of the sample. However, there is some suggestion that the effect of Parker points may have begun to decline in the last few years for California wines at least. It is difficult to say without additional data. Nevertheless, the long term trends are quite clear.

These two figures provide strong (suggestive) support for our prediction that indicators of the reputation of the wine will have stronger effects over time due to globalization. It is striking to see how much the effects of reputation and Parker points have on wine over time.

Figure 3 analyzes the effects of a change in Parker points on the change in the wine's price, using region-year regressions similar to those employed for Figures 1-3. The incremental effect of a change in wine rating on the wine's price has risen dramatically over time (recall that we deflated the price data).

Effects of Points on Price for Wines of Different Reputations

We now turn to our final prediction, that wines with higher reputations will exhibit stronger effects of Parker ratings on price than will wines with lower reputations. To study this, we divided the sample into three groups. Wines with no previous measure of reputation, i.e. no Parker notes at least equal to 91 were classified as in the "Low" reputation group (41.7% of the sample). Those with less than 10 Parker notes higher than 90 were put in the "Medium" reputation group (43.6% of the sample). Finally, wines with more than 10 observations above 90 were classified as in the "High" reputation group (14.7% of the sample).

Table 4 repeats regressions of changes in ln(Price) on changes in ln(Points) and a quadratic for age, but divided into the three reputational groups. The only variable that matters consistently is the change in ln(Points). This variable is always highly significant, confirming once again the importance of Parker points for wine prices. Most importantly, however, this variable's coefficient rises dramatically from the Low through High reputational categories (and is significantly different when comparing across regressions). Parker point changes do not have strong effects on lower quality wines, but do have large effects on Medium quality wines. They have even stronger effects still on the highest quality wines.

Our final test looks at the evolution of these parameters over time (Table 5). We notice that the sensitivity increases over time for all three groups. We might have suspected that sensitivity would increase faster in the segment with high reputation than in other segments. This does not appear to be the case.

Conclusions

In this paper, we developed a simple model of reputation in which some buyers are naïve and some are more sophisticated. Naïve buyers have greater uncertainty about the quality of wine. This means that equilibrium wine prices depend, in part, on the proportion of naïve buyers and their relative lack of confidence in their estimates of wine quality. In addition, wine prices are more sensitive to ratings of

quality such as Parker notes, the greater the proportion of consumers who are naïve. We use this model to make predictions about the effects of globalization on wine prices over the last two decades, under the reasonable assumption that globalization has increased the fraction of buyers who are "naïve" about wine quality.

We then presented preliminary evidence on these predictions using data from eParker.com. We find that wine prices are strongly related to measures of reputation of the wine's region in recent years. However, Parker points have a much more important effect on price. In addition, changes in Parker points lead to strong price changes, indicating that many buyers find these ratings to be valuable information in assessing the quality of wine. Finally, we showed that these price effects of changes in points are much stronger for higher quality wines than for lower quality wines. Apparently quality measures matter more at the high end of the market.

We also showed some interesting trends in wine pricing. Wine prices have become more strongly related to both reputation and Parker points over time. These strongly suggest that quality indicators are becoming more important with globalization. In future work, we plan to understand better the dynamics of reputation building, as well as to find direct measures of increased globalization.

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Table 1a. Regions

	Region	N
Bourdeaux	St. Emilion	1,495
	Pomerol	963
	Margaux	368
	Graves	443
	Pauillac	392
	St. Estephe	185
	St. Julien	257
Spain	Rioja	263
	Ribera del Duero	276
California	Zinfandel, N. Coast	1,723
	Central Coast	971
	Cabernet Sauvignon, N. Coast	2,074
Total		9,410

Table 1b. Vintages & Years

Year	Vintage	Year of Parker Points
1970-87	101	
1988	131	
1989	262	
1990	590	
1991	272	
1992	379	392
1993	523	652
1994	465	512
1995	547	462
1996	397	308
1997	529	649
1998	657	553
1999	859	205
2000	791	730
2001	1,106	659
2002	645	827
2003	714	1,103
2004	442	491
2005		1,218
2006		649

Table 2. Summary Statistics

	N	Mean	s.d.	Min	Max
Age	9407	2.7	1.2	1	24
Points	9408	88.9	4.0	64	100
lag(Points)	3882	88.6	4.0	64	100
Price	9410	48.8	62.8	2	1295
lag(Price)	3882	50.6	65.1	8	1295
Reputation	9410	3.8	6.2	0	32

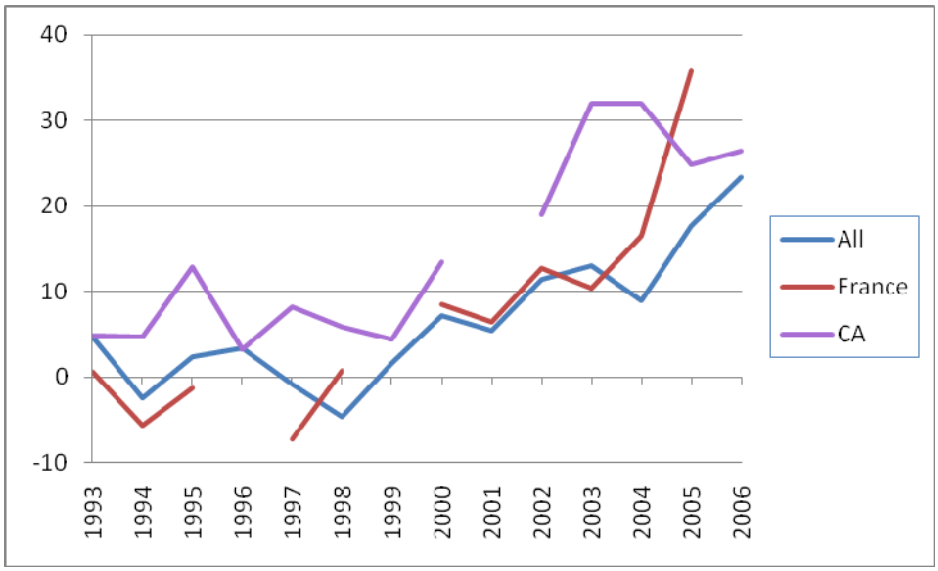
Table 3. Relationship Between Price & Quality

	Dep. var. = ln(Price)			
Intercept	-30.576*** (0.545)	-16.063*** (0.556)	-1.477 (1.257)	-15.872*** (0.551)
ln(Points)	7.543*** (0.122)			4.172*** (0.123)
ln(Reputation)		0.064*** (0.001)		0.047*** (0.001)
Age			0.029** (0.011)	0.061*** (0.001)
Age²			0.007*** (0.001)	0.001 (0.001)
N	9408	9410	9407	9405
R^2	0.50	0.56	0.33	0.62

	Dep. var. = ∆ln(Price)	
Intercept	-0.091*** (0.022)	-0.257*** (0.037)
∆ln(Points)	1.324*** (0.124)	1.377*** (0.124)
Age		0.106*** (0.017)
Age²		-0.015*** (0.002)
N	3882	3882
R^2	0.19	0.20

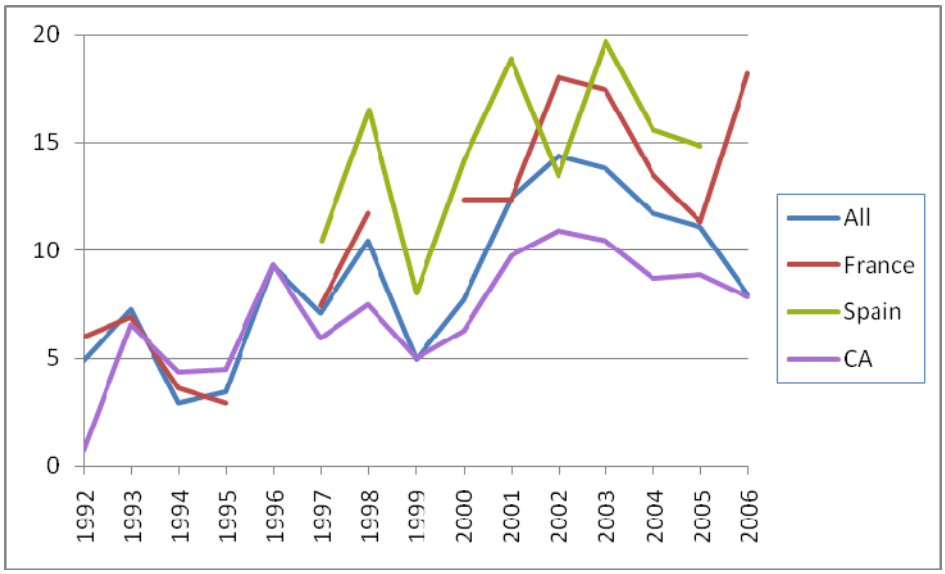
Notes: All regressions control for region and year of points / prices.
Standard errors in parentheses. ***/**/* indicates statistical significance at 1% / 5% /10%

Figure 1. Effect of Region/Vintage Reputation on Price, Over Time



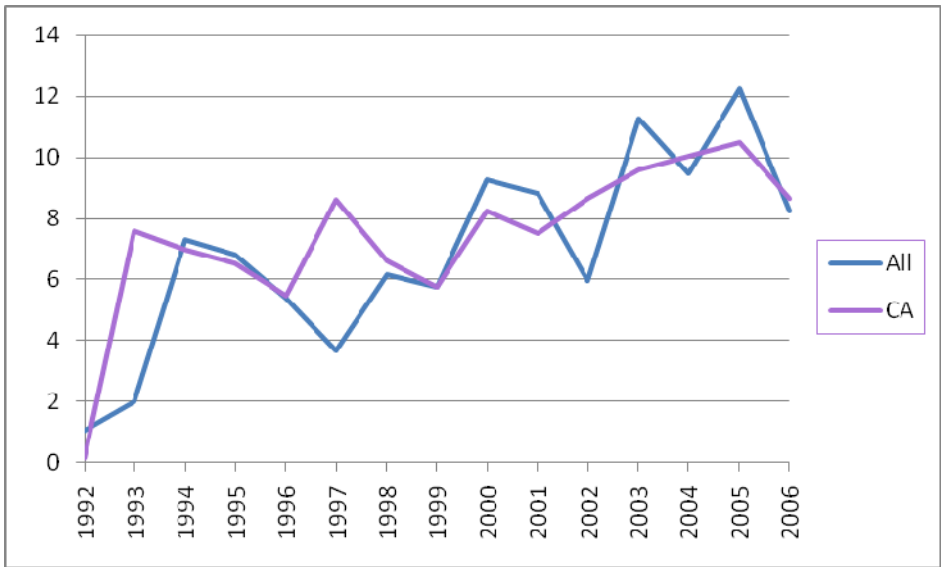
Notes: Plots of coefficients of ln(Reputation) on ln(Price) from yearly regressions that include controls for reputation, age and age². Spanish wines were included in the "All" category, but were not plotted separately due to small sample sizes in many years.

Figure 2. Effect of Parker Ratings on Price Over Time



Notes: Plots of coefficients of ln(Points) on ln(Price) from yearly regressions that include controls for reputation, age and age^2.

Figure 3. Effect of Changes in Parker Ratings on Changes in Price, Over Time



Notes: Plots of coefficients of Δln(Points) on Δln(Price) from yearly regressions that include controls for age and age^2. French and Spanish wines were included in the "All" category, but were not plotted separately due to small sample sizes in many years.

Table 4. Relationship Between Price & Quality

	Dep. var. = ln(Price)		
	Reputation		
	Low	Medium	High
Intercept	-5.37*** (0.72)	-18.40*** (0.93)	-32.41*** (1.66)
ln(Points)	1.82*** (0.16)	4.82*** (0.21)	7.95*** (0.37)
Age	0.042* (0.022)	-0.023 (0.018)	0.08*** (0.02)
Age²	0.006** (0.003)	0.010*** (0.002)	-0.0003 (0.001)
N	3922	4039	1447
Adj. R^2	0.47	0.49	0.56

Effects of Point Changes on Price Changes, by Wine Reputation

	Reputation		
	Low	Medium	High
Intercept	-0.21*** (0.05)	-0.07 (0.06)	-0.32*** (0.11)
∆ln(Points)	0.54*** (0.14)	0.91*** (0.19)	3.10*** (0.38)
Age	0.07** (0.03)	-0.03 (0.03)	0.15*** (0.05)
Age²	-0.005 (0.004)	0.005 (0.005)	-0.02*** (0.005)
N	1235	1896	751
Adj. R^2	0.22	0.18	0.30
Note:	See table 3		

Table 5. Evolution of the Sensitivity Between Price and Quality (By Reputation level)

	Dep. var. = ln(Price)		
	Reputation		
	Low	Medium	High
1992-1995	1.73*** (0.18)	3.24*** (0.36)	7.86*** (0.57)
1996-1999	2.35*** (0.29)	4.37*** (0.48)	9.36*** (0.85)
2000-2006	3.60*** (0.36)	7.31*** (0.30)	11.13*** (0.71)

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