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The Value of Expert Opinion in the Pricing of Bordeaux Wine Futures*

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Abstract

The value of expert opinion for establishing prices in the Bordeaux futures market is analyzed. The expert opinions examined are the wine quality ratings provided by two of the world's foremost wine experts, Robert Parker and Jancis Robinson, for more than 1,700 red Bordeaux wines over the period 2004–2012. The results show that the experts' ratings have both a statistically and practically significant impact on prices after controlling for the effects of other known determinants of price. Thus, expert opinion has significant value in this setting. The results further show that although Parker's impact on prices is significantly greater than Robinson's, combining the quality ratings of both experts has a significantly greater impact than Parker's ratings alone. As hypothesized, the strength of the results differs for wines produced in different regions of Bordeaux because of differences in the availability of other quality-related information. All results are robust to several alternative sample specifications and other research design choices. (JEL Classifications: C52, G13, L11, L15, M21)

Keywords: Bordeaux wines, combining judgments, expertise, hedonic analysis, value of expert opinion.

> The opinion of 1 highly qualified expert can be far more valuable than the opinion of 100 novices.
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> —Weiss and Shanteau (2004, p. 227)

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I. Introduction

Expert opinion can be valuable in many settings that are highly consequential to both the experts and those who rely on their judgments and recommendations. As a result, a considerable body of research has examined both inherent features of expert opinion (e.g., reliability and consensus) and its economic consequences (e.g., Ashton, 2011, 2012, 2013; Cardebat and Paroissien, 2015; Hodgson, 2008, 2009a, 2009b; Storchmann, 2012). One setting in which economic consequences are increasingly studied is the influence of wine quality ratings on the prices of wines in the Bordeaux futures market. The present study adds to this literature by examining the influence of Robert Parker and Jancis Robinson on the prices of more than 1,700 red Bordeaux wines.

Wine is a classic example of an experience good (Nelson, 1970, 1974). Unlike search goods, whose quality can be evaluated prior to purchase, the quality of experience goods can be evaluated only after purchase and consumption. Economic theory holds that people rely on external cues such as reputation and expert opinion to judge the quality of experience goods prior to purchase (e.g., Allen, 1984; Mahenc and Meunier, 2003; Riordan, 1986; Shapiro, 1983). In the case of wine, expert opinions are publicly disseminated by world-renowned wine experts who provide numerical quality ratings for thousands of wines each year.[1]

Research shows that demand for wine in the retail market is greater for higher-rated wines than for lower-rated wines (Friberg and Grönqvist, 2012; Hilger, Rafert, and Villas-Boas, 2011), confirming that expert opinion has value with respect to wine demand. Like other recent studies, however, I examine the influence of expert opinion on the price of wine, not the demand for wine. Several features of the Bordeaux futures market make it a rich setting for studying the value of expert opinion. First, prices vary dramatically (from a few dollars to thousands of dollars per bottle), even for wines produced in the same year and in the same geographic area of Bordeaux. Second, price differences in the futures market have subsequent price implications for consumers in the wine retail market and for collectors and investors in the wine auction market. Third, as a sensory judgment, wine quality evaluation involves considerable subjectivity about what constitutes quality. Finally, in the Bordeaux futures market experts taste samples of wine "in barrel"—some 18–24 months before the different lots of wines have been blended, bottled, and made available to consumers. Thus, uncertainty, which is a necessary condition for expert opinion to have value in any setting, is especially acute in the evaluation and pricing of wine futures.

Two additional features of the Bordeaux futures market make it a challenging setting for demonstrating that expert opinion has value. First, in the principal

[1] In addition to numerical ratings, wine experts provide "tasting notes," the value of which is a matter of some dispute (e.g., Quandt, 2007; Ramirez, 2010.) The present article focuses only on numerical ratings.

wine-producing regions of Bordeaux, officially sanctioned classification systems serve as quality signals, and a wine's place in the official quality hierarchy exerts an extremely significant influence on price. In Bordeaux's Medoc region, for example, wines in the top tier of the five-tier quality hierarchy are priced much higher than wines in the fifth tier, which, in turn, are priced much higher than wines that are omitted from the classification altogether. Second, the substantial variation in Bordeaux weather conditions from year to year results in sizable differences in average wine quality across vintages, with corresponding differences in price. A wine from an acknowledged "classic" vintage will be priced much higher than the same wine from a merely "very good" vintage.

Both a wine's classification status and the weather conditions of the year in which it is produced are known to all market participants—wine producers who set futures prices, wine brokers who are confronted with those prices, and wine experts who rate the quality of particular wines from particular vintages. If the experts' ratings simply mirror classification status and weather conditions, their opinions will have no incremental value and thus should have no influence on prices. However, if the experts' sensory judgments discriminate among wines in ways that add market relevance beyond that provided by classification status and vintage, their opinions will be valuable and that value should be reflected in prices.

Like other recent studies, I construct hedonic pricing models to investigate the value of expert opinion. Hedonic price analysis maintains that consumers value products for their utility-bearing attributes or characteristics. Products are viewed as bundles of quality attributes that differentiate them from other related goods, and observed product prices are considered a function of the (implicit) prices of each quality attribute.[2] I estimate a series of hedonic pricing models in which price is first regressed on variables that represent only a wine's classification status and vintage (baseline models). I then add quality ratings provided by one or both of two of the foremost wine experts in the world, Robert Parker and Jancis Robinson. Importantly, instead of simply describing the influence of classification status, vintage, and expert opinion on prices, I use outputs from the models to test hypotheses about the value of expert opinion in this setting.

I focus solely on prices in the futures market. The association between expert opinion and prices in the retail and auction markets has also been investigated, but the results of those studies are more difficult to interpret than those in the futures market. Two issues tend to arise in retail-market studies: (1) Whereas experts' ratings are provided before futures prices are established, thus preventing the possibility that ratings are driven by prices, this is not necessarily the case in the retail market. (2) Many economic and other factors that do not have an

[2]The theoretical foundation for hedonic modeling is provided by Lancaster (1966) and Rosen (1974). Costanigro and McCluskey (2011) describe the empirical application of hedonic modeling to a wide array of products, with special attention to foods and beverages.

impact on futures prices can affect retail prices in specific countries (or in cities that are sampled within countries). Indeed, research has documented substantial price dispersion in the retail wine market (Schnabel and Storchmann, 2010; Storchmann, Mitterling and Lee, 2012). In auction-market studies, prices may be affected by a wine's collectibility and investment potential (Ashenfelter and Jones, 2013), the effects of which are difficult to isolate from the influence of experts' ratings.

The next section describes the research setting, including the Bordeaux futures market, wine quality ratings, and the importance of a wine's classification status and vintage. This is followed by a summary of prior studies that have examined the influence of expert opinion on Bordeaux futures prices and the development of four hypotheses. The data source for the study is then described, and the principal results, as well as several robustness tests, are presented. A brief final section concludes.

II. Research Setting

A. The Bordeaux Futures Market

In the Bordeaux futures market (also called the *en primeur* or "in youth" market), an entitlement to receive a given quantity of wine in the future is sold through "negociants" who effectively act as agents for the châteaux (wine producers). Negociants allocate the wines to brokers who sell them to importers, where they are sold again to distributors and eventually to retailers. The *en primeur* market occurs in the spring following the fall in which the grapes are harvested. In the intervening months, the juice that has been extracted undergoes various processes, including fermentation and aging in oak barrels. A key *en primeur* event is the tasting of barrel samples by the world's leading wine critics, after which prices are set by wine producers. At the point of tasting, the wines are not only extremely young and unbottled but also "unassembled." That is, wine from different parcels of land within the vineyard, as well as wine made from different grape varieties, has not yet been blended to create the final product; instead, the sample that is evaluated by critics is an approximation of the final blend. Final assembly and bottling will not occur for another 18–24 months.

Prices in the futures market are set by wine producers with the expectation that they will flow through, after several markups, to wine consumers in the retail market and to wine collectors and investors in the auction market. Producers benefit by receiving cash up-front. Buyers benefit by securing wines that may be in limited supply and difficult to purchase years later. As in any futures market, buyers may benefit if later prices in the retail market or auction market are greater than what was expected when futures prices were set. Conversely, buyers may lose if later prices in the retail or auction market are below earlier expectations.

The buyers in this market face tremendous uncertainty in trying to assess the quality and ageability of wines that will not be assembled or bottled for up to 2 years. Consequently, they must rely on proxies for quality. The three principal proxies are the official classification status of the producer, the overall quality of the entire vintage, and the expert opinions of prominent wine critics who provide numerical ratings for specific wines tasted in barrel. The critical importance of the first two proxies is described later. Concerning expert opinion, Hay (2007, p. 188) observes, "In an instant the palates of influential wine critics can decisively shape the market for specific wines, making and breaking the reputations of chateaux."

The *en primeur* market opens at the end of April and continues until June. Both Robert Parker (http://www.erobertparker.com) and Jancis Robinson (http://www.jancisrobinson.com) typically taste samples in late March or early April. Parker's ratings are usually published in the April issue of the *Wine Advocate*, and Robinson's ratings are published on her website, also largely in April. Thus, Bordeaux wine producers, who set futures prices during the weeks and months following the *en primeur* market, have ample opportunity to take into account (or not) both experts' ratings when setting prices.

Many observers maintain that Bordeaux wine producers are especially interested in Robert Parker's ratings (e.g., Hay, 2007; Langewiesche, 2000; Lewin, 2009; McCoy, 2005). Lewin (2009, p. 143) captures Parker's perceived influence well, quoting the remarks of a Bordeaux wine producer: "One chateaux owner recently said to me, without any perceptible sense of irony, 'Nobody pays any attention to the *Wine Spectator*—it all depends on God's rating.' (It goes without saying that God is Parker.) The proprietor went on to say that now the negociants just quote Parker, essentially replacing what used to be their own comments with his ratings."

B. Wine Quality Ratings

In many domains, expertise can be evaluated with performance-based criteria such as validity, reliability, calibration, and coherence. In sensory domains like wine, such criteria are less applicable because of the greater role of personal preferences in sensory judgments. A more social-psychological view of expertise is relevant. This view is exemplified by Shanteau (1987, 1992), who emphasizes experts' highly developed content knowledge, their outward confidence in their own abilities, and the critical importance of effectively communicating their expertise to others. It is also exemplified by Agnew, Ford, and Hayes (1997), who maintain that expertise is a social attribution conferred by a constituency that perceives someone to be an expert and believes that person can help them manage uncertainty and make decisions they find difficult to make by themselves. In this view, renowned wine critics are experts whose status has been socially conferred by constituencies that rely on their analyses and opinions.

Robert Parker and Jancis Robinson are two of the foremost wine experts in the world. Both have deep content knowledge, long experience, excellent reputations,

and large constituencies that rely on their opinions. Those opinions are communicated via the many books each has published and by their subscription-based websites, in the form of both numerical ratings and "tasting notes." In contrast to other major sources of wine reviews and ratings (e.g., *Wine Spectator* and *Decanter*), neither Parker nor Robinson accepts any form of advertising, which they maintain enhances the independence of their opinions. Although Parker and Robinson prefer different styles of wines, each is consistent in what they prefer, allowing those who rely on their opinions to "calibrate" their own preferences against those of the experts and thus make informed choices (Taber, 2011).

(1) Robert Parker

Robert Parker is widely regarded as the world's most influential wine expert (e.g., Colman, 2008; Gibbs, Tapia, and Warzynski, 2009; Hay, 2008; McCoy, 2005; "Playing the Rating Game," 1999). Some consider him to be the most influential critic in any field (Langewiesche, 2000). Trained as an attorney, Parker began writing about wine in the 1970s, publishing a direct-mail newsletter (the *Wine Advocate*) and later establishing a comprehensive website (http://www.erobertparker.com) that contains tasting notes and numerical ratings for approximately 250,000 wines. He has published numerous authoritative books (e.g., Parker, 2003). He specializes in French wines, and in 2005 was awarded France's highest civilian honor, Officier de la Légion d'honneur, by President Jacques Chirac.

Parker rates wines on a scale of 50–100, although scores below 75 are rare. The scale Parker uses is shown in Table 1. His numerical ratings and tasting notes reveal a preference for a particular style of wine that has been described as rich, fruity, intense, extracted, ripe, and high in alcohol (Colman, 2008); dense, dark, and dramatic (Langewiesche, 2000); and jammy, oaky, hedonistic fruit bombs (Shapin, 2005). The power of "Parker points" is believed to be so great that it overwhelms whatever influence the opinions of other wine experts might have: "The trade has never known such a voice, such a power, before. When it comes to the great wines—those that drive styles and prices for the entire industry—there is hardly any other critic now who counts" (Langewiesche, 2000, p. 44).

(2) Jancis Robinson

Jancis Robinson has been described as "probably the most influential critic in the world after Robert Parker" (Nossiter, 2009, p. 188). Nossiter asserts that Robinson is "head and shoulders above Parker, both intellectually and as a taster" (2009, p. 189). Others describe Parker as "the reference for Bordeaux wines" and Robinson as his "British counterpart" (Masset, Weisskopf, and Cossutta, 2015, p. 81). After earning a degree in mathematics and philosophy from Oxford University, Robinson began writing about wine in the 1970s and by 1990 had become a wine columnist for the *Financial Times*, a position she still holds. Like Parker, she has published many authoritative books (e.g., Johnson and Robinson, 2013; Robinson,

Table 1
Wine Rating Scales

Robert Parker's scale	*Jancis Robinson's scale*
96–100: An extraordinary wine of profound and complex character displaying all the attributes expected of a classic wine of its variety. Wines of this caliber are worth a special effort to find, purchase, and consume.	20: Truly exceptional
90–95: An outstanding wine of exceptional complexity and character. In short, these are terrific wines.	19: A humdinger
80–89: A barely above-average to very good wine displaying various degrees of finesse and flavor, as well as character with no noticeable flaws.[a]	18: A cut above superior
70–79: An average wine with little distinction except that it is soundly made. In essence, a straightforward, innocuous wine.[a]	17: Superior
60–69: A below-average wine containing noticeable deficiencies, such as excessive acidity and/or tannin, an absence of flavor, or possibly dirty aromas or flavors.	16: Distinguished
50–59: A wine deemed to be unacceptable.	15: Average, a perfectly nice drink with no faults but not much excitement
	14: Deadly dull
	13: Borderline faulty or unbalanced
	12: Faulty or unbalanced
	10.5–11.5: Faulty
	10: Undrinkable

Notes: [a] Parker further distinguishes between the top and bottom halves of the 80–89 and 70–79 categories, noting that wines in the 85–89 range are "very, very good [and] often are great values," and wines in the 75–79 range are "generally pleasant, straightforward wines that lack complexity, character, or depth."

Sources: http://www.erobertparker.com; http://www.jancisrobinson.com

2006) and has received many honors and awards including, since 2005, serving on the Royal Household Wine Committee, advising on Queen Elizabeth's wine cellar.

Unlike Parker, who has no formal training in wine, Robinson has earned the prestigious Master of Wine designation (in 1984), one of only 391 people to do so in the past 62 years (http://www.mastersofwine.org). Robinson also differs from Parker in terms of the rating scale she employs (and her view of numerical rating scales in general) and in the style of wine she prefers. Although Parker staunchly defends numerical ratings of wines and maintains that objective quality standards and benchmarks exist, Robinson regards numerical scores as "a necessary evil" for a quick expression of a wine's quality and aging potential (http://www.jancisrobinson.com). She uses a 0–20 scale (although scores below 12 are rare) and makes liberal use of fractional scores (16.5, 17.5, etc.). Robinson's scale is shown in Table 1. In describing the style of wine she prefers, Robinson explicitly observes that her scores reward "balance, eloquence and finesse" more than "sheer mass" (http://www.jancisrobinson.com), in direct contrast to the style preferred by Parker.

Disagreement among the quality ratings of prominent wine critics is not uncommon (see, e.g., Reuter, 2009). In fact, two recent studies find substantial disagreement in Parker's and Robinson's ratings, presumably due to differences in their preferred

wine styles.[3] Ashton (2013) reports pairwise correlations among the ratings assigned to 98 red Bordeaux wines over the 2004–2010 period by six prominent wine critics—two from the United States (including Parker), two from the United Kingdom (including Robinson), and two from France. With six critics, there are 15 possible pairs of critics. The average correlation over the 7 years between the ratings of Parker and Robinson across the 98 wines is 0.45, the lowest of all pairs of critics (range = 0.45 to 0.69). In a similar vein, Masset, Weisskopf, and Cossutta (2015) analyze the ratings of 12 prominent critics (4 from the United States, 4 from the United Kingdom, and 4 from France) for 122 red Bordeaux wines over the 2003–2012 period. The correlation between the ratings of Parker and Robinson (0.44) is the third lowest of the 66 pairwise correlations.

C. Classification Status

An extremely important determinant of Bordeaux futures prices is the official classification status of the château that produces the wine. Bordeaux châteaux are located on both banks of the Gironde estuary, formed by the meeting of the Garonne and Dordogne Rivers. A distinction is made between Left Bank wines and Right Bank wines because of differences in both soil composition and the dominant grape varieties that are planted. The combination of different soils and grape varieties results in wines with different sensory characteristics and aging potential (Coates, 2004). Left Bank and Right Bank wines also differ substantially in the status of the official classification systems that have been developed as quality signals.

(1) Left Bank Wines

The principal wine-producing areas on the Left Bank are Medoc and Graves. Medoc wines include those from highly regarded appellations such as Margaux, Pauillac, St. Estephe, and St. Julien, as well as less renowned appellations like Listrac and Moulis.[4] Medoc wines were classified in 1855 at the request of Emperor Napoleon III in preparation for the Universal Exposition in Paris, which was intended to showcase a variety of regional products. Leading wine brokers of Bordeaux were asked to create a five-level quality hierarchy of the best wines in the region, which were to be displayed at the exposition by the Bordeaux Chamber of Commerce. The short time period during which the brokers worked (about 2 weeks) precluded either tasting the wines or investigating the soils or other growing conditions that might indicate

[3] I exploit this disagreement in H4, which maintains that including the ratings of both Parker and Robinson in the hedonic pricing model will result in a greater association between ratings and prices than that provided by Parker's ratings alone.

[4] As explained in Section V, the great majority of observations in the present sample (for both Left Bank and Right Bank wines) are from highly regarded appellations, as these are the wines that critics such as Parker and Robinson prefer to evaluate.

quality. Instead, the hierarchy was based on the wines' prevailing market prices of the time. In fact, the Bordeaux Chamber of Commerce explicitly opposed any other measure that had the potential to disrupt the existing market order (Markham, 1998).

The 1855 Medoc classification was intended only as a contemporary guide for displaying the wines at the exposition. Yet, the classification became firmly institutionalized, according to Malter (2011), for three reasons: (1) the occasion for which it was developed, (2) the legitimizing effect of the parties involved, and (3) its repeated publication over many decades in the standard book on Bordeaux wines of the time (Cocks and Feret, 1883). The classification was inscribed into French law in 1949 (Markham, 1998).

Only 61 châteaux are included in the 1855 classification—5 first growths, 14 second growths, 14 third growths, 10 fourth growths, and 18 fifth growths. The first growths, the top level of the hierarchy, now include Château Mouton-Rothschild, which was promoted from second-growth status in 1973, the only promotion in the history of the classification.

The first growths include one château (Haut-Brion) that is not located in Medoc but in the other principal Left Bank area, Graves.[5] A separate classification of wines from Graves was established in 1953 and updated in 1959, with no further revisions. Thirteen red wines are included in the single tier of the classification, all from the Pessac Leognan appellation, with no attempt to distinguish among them. Because of the small number of wines in the classification and the lack of revision since 1959, as well as concerns about some of the wines that are and are not included, the Graves classification is not generally viewed as particularly informative (see, e.g., http://www.bbr.com/wine-knowledge/graves-classification).[6]

(2) Right Bank Wines

The most highly regarded wine-producing areas on the Right Bank are St. Emilion and Pomerol. As with Left Bank wines, however, the Right Bank includes several appellations of less renown—such as Lalande de Pomerol, Cotes de Bourg, Cotes de Castillon, and Fronsac. The first classification of St. Emilion wines appeared in 1955, a century later than that for Medoc. The St. Emilion classification is revised regularly (about every 10 years), with the latest revision occurring in 2012. The classification has three levels—*premier grand cru classé* (A), *premier grand cru classé* (B), and *grand cru classé*. Currently, 82 St. Emilion wines are classified—4 in *premier* (A),

[5] When the 1855 classification was developed, Haut-Brion was the only wine outside Medoc that commanded a market price comparable to the top wines of Medoc. No wines from St. Emilion or Pomerol, on the Right Bank, commanded such prices, so they were completely omitted from the classification.

[6] Because Graves does have a classification, in the main pricing results presented later I include a separate category for classified Graves wines. In subsequent analyses, I test the robustness of the main results by excluding all wines from Graves.

14 in *premier* (B), and 64 in *grand cru classé*. The most important revision of the St. Emilion classification was the promotion in 2012 of two châteaux—Angelus and Pavie—from *premier grand cru classé* (B) to *premier grand cru classé* (A), the only promotions to *classé* (A) in the history of the classification.

Unlike wines from Medoc, Graves, and St. Emilion, wines from Pomerol have never been officially classified. It is widely accepted, however, that the quality and market following of several Pomerols is at least equal to that of many of the classified Medocs, Graves, and St. Emilions (e.g., Coates, 2004; Johnson and Robinson, 2013; Parker, 2003).[7] In sum, the strength of the official classification systems differs substantially among Bordeaux regions. These differences are well known by both buyers and sellers, implying that the value of expert opinion in this setting may differ between Left Bank and Right Bank wines.[8] The key issue, however, is whether expert opinion has an incremental influence on Bordeaux futures prices beyond that associated with the official classification systems that are in place.

D. *Vintage*

The other important determinant of Bordeaux futures prices is the vintage, or the year in which the grapes are grown and harvested. The vintages in the present sample differ substantially in terms of "vintage ratings," a summary indicator of the overall quality of wines from an entire region within Bordeaux. In 2004–2012, vintage ratings range from 85 to 99 for Left Bank wines and from 86 to 98 for Right Bank wines. These vintage ratings are taken from *Wine Spectator*, which describes its vintage rating scale as follows: 95–100, classic, or great; 90–94, outstanding; 85–89, very good; 80–84, good; 75–79, mediocre; and 50–74, not recommended.[9] The overall quality of a vintage reflects the influence of weather conditions, which vary substantially both across vintages and between Left Bank and Right Bank wines within the same vintage (Ashenfelter, 2008; Dimson, Rousseau, and Spaenjers, 2015; Dubois and Nauges, 2010; Lecocq and Visser, 2006; Malter, 2014). Studies that have examined the influence on auction prices of both weather and expert opinion (Ashenfelter and Jones, 2013; DiVittorio and Ginsburgh, 1996; Jones and Storchmann, 2001) suggest that expert opinion influences prices in addition to weather-related variables. However, two of these studies (Ashenfelter and Jones, 2013; DiVittorio and Ginsburgh, 1996) incorporate only the experts' overall vintage ratings, not their ratings for specific producers, whereas the other (Jones and Storchmann, 2001) does incorporate producer-

[7] Because they are not officially classified, the main pricing results presented later do not include a separate category for Pomerols; instead, they are simply grouped with the other "nonclassified" wines. In subsequent analyses, I test the robustness of the main results to this treatment of Pomerols.
[8] This possibility is explored in H2.
[9] Other sources, such as http://www.erobertparker.com and *Decanter*, provide similar vintage ratings.

specific ratings but examines only 21 wines (a mixture of Left Bank and Right Bank wines).

Moreover, these studies focus on auction market prices realized after the wines have matured for several years, whereas the present study focuses on prices in the futures market before the wines are even bottled. A priori, it is not clear whether the influence of expert opinion on prices should be stronger or weaker in the futures market than in the auction market. The fact that more information about a wine is available to buyers in the auction market (after the wine's maturation and aging potential are better known) suggests a greater role for expert opinion in the futures market (Hay, 2007). On the other hand, as Ashenfelter and Jones (2013) observe, buyers in wine auctions may value wines that experts such as Robert Parker have rated highly, especially if they intend to resell the wines and believe that other buyers will find highly rated wines more desirable; in that case, expert opinion could be less influential in the futures market than the auction market. Of course, in the futures market, as in the auction market, wine experts will be aware of the weather conditions that prevailed for each vintage, and their ratings of particular wines are likely to take that knowledge into account. Thus, the issue is whether expert opinion has an incremental influence on futures prices beyond that associated with weather-related and other vintage-specific information.

Bordeaux futures prices for particular vintages are also influenced by general economic conditions and demand from major new buyer segments. With downturns in the global economy, for example, consumers may be less inclined to spend on luxury goods such as Bordeaux wines, and thus prices for particular vintages may fall. The principal new buyer segment in recent years has been Chinese buyers (Peterson and Chow, 2010). Malter (2014) traces the initial influx of Chinese buyers to 2004, the first year of the data on which the present article is based. Chinese demand has been strong since that time. In 2009, for example, 18 million bottles of Bordeaux wine were exported to China, compared with 15 million bottles exported to the United States (Haushalter, 2010). There has, of course, been variability since 2004 in the demand from China (Booth, 2010; Flannery, 2011), providing an additional reason to control for vintage effects.

III. Prior Research

A few earlier studies have examined the influence of Robert Parker's ratings on Bordeaux futures prices. These studies sometimes combine Left Bank and Right Bank wines, focus on a single area within Bordeaux (Medoc), focus on a single vintage, and/or rely on private data sources, all of which restrict the generalizability of results. The present study builds on the earlier research in ways described in Section IV.

Hadj Ali and Nauges (2007) studied *en primeur* pricing for 132 wines in the period 1983–1998 (excluding 1984). They relied on a private data set provided by a

Bordeaux wine broker and stated that their data are "fairly representative of the market for Bordeaux wines" (Hadj Ali and Nauges, 2007, p. 94). No distinction is made between Left Bank and Right Bank wines, as all observations are included in a single analysis. Independent variables include classification status, vintage, Parker's current-vintage rating of each wine, and Parker's average rating of previous vintages of each wine. Classification status was substantially more influential than the other variables, followed by vintage and previous ratings, with the influence of Parker's current-vintage rating being small: "a one-point increase in [Parker's rating] has almost no [marginal] effect on the price set by producers" (Hadj Ali and Nauges, 2007, pp. 95–96). A follow-up study by Dubois and Nauges (2010), focusing on a subset of 108 wines (from 1994 to 1998) that were included in the Hadj Ali and Nauges (2007) sample, found similar results, although Parker's influence was slightly greater for this subset of observations.

Hay (2007) examined Parker's influence for a single vintage, 2005, which is rated as "great," or "classic," by *Wine Spectator*. Focusing on all 60 Medoc wines included in the 1855 classification and on 68 St. Emilion wines (38 classified, 30 nonclassified), Hay found classification status to explain considerably more of the variance in prices than Parker's ratings for the Medocs, but less variance than Parker's ratings for the St. Emilions. In a follow-up study, Hay (2010) examined another single vintage, 2008, which is rated as only "very good" by *Wine Spectator*. Hay (2010) again focused on all 60 classified Medocs but added 14 wines to his earlier St. Emilion sample for a total of 82 wines (38 classified, 44 nonclassified). For the 2008 vintage, Hay (2010) found the influence on price to be somewhat greater for Parker's ratings than for classification status for both the Medocs and the St. Emilions.

A different approach to studying Parker's influence was taken by Hadj Ali, Lecocq, and Visser (2008), who cleverly exploited a natural experiment: Parker did not go to Bordeaux in spring 2003 to taste the 2002 vintage but went instead in fall 2003 and provided ratings after producers had already set 2002 prices. Hadj Ali, Lecocq, and Visser (2008) collected price data for 233 wines for both the 2002 vintage (when prices were set without knowledge of Parker's ratings) and the 2001 vintage (when prices were set with knowledge of his ratings). Of these 233 wines, Parker provided ratings for 158 (121) wines from the 2001 (2002) vintage. His mean rating for the 2001 wines (88.52) was lower than for the 2002 wines (89.40), but the mean price set for the 2001 wines (19.01 euros) was higher than for the 2002 wines (15.65 euros), suggesting that Parker's absence from the *en primeur* market in spring 2003 was costly for the producers. Because Parker had not rated all of the 233 wines for which prices were available, Hadj Ali, Lecocq, and Visser (2008) used a difference-in-differences approach (Abadie, 2005) to estimate the "Parker premium" as 2.80 euros per bottle for the entire sample. Although the study by Hadj Ali, Lecocq, and Visser (2008) has similar design characteristics as those of Hadj Ali and Nauges (2007) and Dubois and Nauges (2010), the natural experiment nature of the study suggests that Parker's ratings are influential.

Malter (2014) analyzed Bordeaux futures prices, but his data are restricted to only the 60 Medoc wines included in the 1855 classification. For the period 1991–2008, Malter estimates the impact on price of classification status (hierarchical level of the 1855 classification), reputation (Parker's average rating of previous vintages), and current quality (Parker's ratings of each wine in a particular year). Malter finds classification status to be much more influential than reputation or current quality, although the latter two variables are statistically significant.

Two recent studies investigate the impact of Jancis Robinson's ratings on wine prices. Masset, Weisskopf, and Cossutta (2015) examine the influence of 12 prominent critics, including both Parker and Robinson, on *en primeur* pricing in the 2003–2012 period. Parker's ratings have the greatest incremental impact on prices (followed closely by those of Jean-Marc Quarin, a local expert in Bordeaux), whereas Robinson's ratings have no incremental impact whatsoever. Cardebat, Figuet, and Paroissien (2014), who examine retail prices for Bordeaux, Spanish, and California wines combined, find that Robinson's ratings are substantially less influential than Parker's, and indeed less influential than any of the other critics studied, largely because her ratings tend to be lower than those of other prominent critics. The authors label this a "marketing effect," given that wine retailers naturally prefer to display the highest among a set of ratings on their retail shelves. Because the study involves retail prices, however, its relevance in the context of futures prices is unclear.

IV. Hypotheses

Prior research tends to confirm Robert Parker's influence on Bordeaux futures prices. As a complement to these studies, the first hypothesis addresses whether Parker's impact on prices is evident with a larger, more current, and better defined set of observations.[10]

H1: For both Left Bank and Right Bank wines, Robert Parker's ratings have a significant impact on Bordeaux futures prices after controlling for classification status and vintage.

One of the principal determinants of Bordeaux futures prices is the wine's classification status, including whether it is classified or nonclassified and, if classified, the hierarchical level of the classification to which it belongs. The principal Left Bank wine-producing area, Medoc, has a much older and more firmly institutionalized classification system than does the principal Right Bank wine-producing area,

[10] In the hypotheses statements and related discussion, I use the terms "Left Bank" and "Right Bank" simply for ease of exposition. Because the data used to test the hypotheses are not representative of all Left Bank and Right Bank wines—but focus instead on "high-end" wines, as described in the following section—caution is required in extrapolating the results to all Left Bank and Right Bank wines. This restriction of the sample to high-end wines is common in published studies of *en primeur* pricing.

St. Emilion. Prior studies typically have not distinguished between Left Bank and Right Bank wines but have combined the two or have examined only Medocs. Hay (2007, 2010) examined Medocs and St. Emilions separately, arguing that Parker should have less influence on the prices of Medocs because of the much greater institutional standing of the 1855 Medoc classification system relative to the newer classification system in St. Emilion. Hay analyzed only two vintages, however, and got mixed results. A similar argument to that of Hay is advanced by Zhao (2008), who suggests that critics' ratings should be more influential for California wines than Bordeaux wines because the former have a much weaker classification system.[11] Therefore, the second hypothesis is as follows:

H2: Robert Parker's ratings have a significantly greater impact on Bordeaux futures prices for Right Bank wines than for Left Bank wines.

If the widely held view that Robert Parker is the world's most influential wine critic is correct, it follows that his impact on Bordeaux futures prices is greater than Robinson's. Although I offer this as a formal hypothesis, the more interesting result in this regard may be documenting the extent to which Robinson's ratings do influence prices, although I have no basis on which to form a hypothesis about that issue.

H3: For both Left Bank and Right Bank wines, Robert Parker's ratings have a significantly greater impact on Bordeaux futures prices than Jancis Robinson's ratings.

Even though Robinson's ratings are expected to have less impact than Parker's ratings, the final hypothesis maintains that combining Robinson's ratings with Parker's explains significantly more variance in prices than Parker's ratings alone. This hypothesis rests on the fact that Parker's and Robinson's preferences for different styles of wines, described earlier, result in substantial disagreement in their overall ratings. The Pearson correlation between Parker's and Robinson's ratings of the wines included in the present study is only 0.495 for Left Bank wines and 0.401 for Right Bank wines,[12] consistent with earlier findings that the correlation between the ratings of these two experts is low (Ashton, 2013; Masset, Weisskopf, and Cossutta, 2015). As long as Robinson's ratings have a positive association with Bordeaux futures prices, even though it might be (perhaps substantially) less than that of Parker's ratings, combining the two experts' ratings can increase the amount of variance explained.

H4: For both Left Bank and Right Bank wines, the combination of Robert Parker's ratings and Jancis Robinson's ratings has a significantly greater impact on Bordeaux futures prices than Robert Parker's ratings alone.

[11] In spite of these arguments, it is by no means a foregone conclusion that Parker's influence will be greater for Right Bank wines. For example, Hadj Ali, Lecocq, and Visser (2008) analyzed several Bordeaux appellations and found a significant "Parker effect" for four appellations—two on the Right Bank (St. Emilion and Pomerol) and two on the Left Bank (Margaux and Pauillac).

[12] The Spearman correlations are even lower: 0.475 for Left Bank wines and 0.384 for Right Bank wines.

The hypotheses are tested by estimating hedonic pricing models—separately for Left Bank wines (models 1–4) and Right Bank wines (models 5–8). Each model regresses price (in constant euros) on a set of hypothesized price determinants. Because prices in the sample are skewed, the natural log of price is used in all models. Prices are deflated to 2004 euros using the French consumer price index. Models 1 and 5 are baseline models that reflect the impact on prices of only the two control variables, classification status and vintage. Models 2 and 6 add Parker's ratings to the baseline models to test H1 and H2. Models 3 and 7 add Robinson's ratings to the baseline models to test H3. Finally, models 4 and 8 include both experts' ratings to test H4.

The principal results are based on all Left Bank and Right Bank wines in the database for which price information and both experts' ratings are available, even though this combines wines that have strong classification systems (Medocs and St. Emilions) with wines that do not (Graves and Pomerols). The reason is to increase the generalizability of the results. In further analyses, I focus only on Medocs and St. Emilions and make other modifications to the main analysis, to assess the robustness of the results.

V. Data

The data source is the website Bordoverview (http://www.bordoverview.com), created and maintained by David Bolomey, a wine merchant/consultant in Amsterdam.[13] Beginning with the 2004 vintage, this source contains *en primeur* prices and numerical ratings assigned by several prominent wine critics from the United States and Europe for hundreds of red Bordeaux wines each year. I consider only the ratings assigned by Robert Parker and Jancis Robinson because earlier research establishes that their ratings agree less than those of other well-known critics.

The number of observations included in the database for 2004–2012 is 1,599 (1,752) for Left Bank (Right Bank) wines. Price information is sometimes unavailable, and not all of the wines are rated by Parker or Robinson. Table 2A shows the number of wines for which price information is available, as well as the number of wines that are rated by Parker and/or Robinson. The number of wines rated by both experts and for which price is available is 922 (834) on the Left Bank (Right Bank). Table 2B shows the distribution of both Left Bank and Right Bank appellations contained in the final sample. The principal results presented subsequently are based on this set of observations for which complete information is available.[14]

[13] I am indebted to David Bolomey for conversations that have helped to clarify both the database and the process of *en primeur* pricing.

[14] Parker sometimes uses a range of scores (e.g., 91–93) instead of a point estimate. In those cases, I have used the midpoint of the range. Robinson does not use ranges but sometimes appends a plus or minus sign to her ratings (e.g., 16– or 17.5+). In those cases, I have dropped any plus or minus sign that appears.

Table 2
Sample Description

A. Number of observations			*Left Bank*	*Right Bank*	
In database			1,599	1,752	
With price information			1,289	1,285	
Rated by Robert Parker (RP)			1,132	1,345	
Rated by Jancis Robinson (JR)			1,252	1,177	
Rated by RP and JR			1,016	991	
Rated by RP and JR and with price information			922	834	
B. Sample composition					
Appellation	*No.*	*%*	*Appellation*	*No.*	*%*
Left Bank			Right Bank		
Margaux	190	20.6	St. Emilion	492	59.0
Pauillac	177	19.2	Pomerol	250	30.0
Pessac Leognan	144	15.6	Fronsac	39	4.7
St. Julien	125	13.6	Cotes de Castillon	23	2.8
St. Estephe	114	12.4	Lalande de Pomerol	21	2.5
Haut Medoc	100	10.8	Canon Fronsac	3	0.4
Medoc	38	4.1	Cotes de Bordeaux	3	0.4
Moulis	23	2.5	Cotes de Bourg	2	0.2
Listrac	10	1.1	Cotes de Blaye	1	0.1
Graves	1	0.1		834	100.0
	922	100.0			

VI. Results

A. Descriptive Statistics

Tables 3–5 show the distributions of both experts' ratings and indicate the influence on prices of classification status and vintage. Table 3 reveals that for both Left Bank and Right Bank wines, almost 90% of Parker's ratings are in the 85–95.5 range, and more than half of his ratings are 90 or above. Parker's mean (standard deviation) rating is 90.02 (3.56) for Left Bank wines and 90.88 (3.45) for Right Bank wines. Approximately 88% of Robinson's ratings for both Left Bank and Right Bank wines are in the 15–17.5 range, with only about 7% above 17.5. Robinson's mean (standard deviation) rating is 16.46 (0.94) for Left Bank wines and 16.31 (0.97) for Right Bank wines. Although their rating scales are not directly comparable, it seems clear that Parker assigns somewhat higher scores, on average, than does Robinson. It is also apparent that the ratings of both experts tend toward the upper end of the scale they employ, consistent with the notion that they focus on a "high-end" subset of wines.

Table 4 provides a vivid indication of the importance of classification status for pricing. For Left Bank wines, the mean per bottle inflation-adjusted price of wines

Table 3
Distributions of Experts' Ratings

Left Bank						*Right Bank*					
Robert Parker			*Jancis Robinson*			*Robert Parker*			*Jancis Robinson*		
Ratings	*No.*	*%*	*Ratings*	*No.*	*%*	*Ratings*	*No.*	*%*	*Ratings*	*No.*	*%*
96–100	61	6.62	19–19.5	14	1.52	96–100	75	9.00	19–19.5	5	0.60
90–95.5	438	47.50	18–18.5	63	6.83	90–95.5	456	54.67	18–18.5	47	5.63
85–89.5	386	41.87	17–17.5	275	29.83	85–89.5	284	34.05	17–17.5	222	26.62
80–84.5	30	3.25	16–16.5	378	41.00	80–84.5	16	1.92	16–16.5	352	42.21
75–79.5	7	0.76	15–15.5	161	17.46	75–79.5	3	0.36	15–15.5	154	18.46
70–74.5	0	0.00	14–14.5	31	3.36	70–74.5	0	0.00	14–14.5	50	6.00
50–69	0	0.00	12–13.5	0	0.00	50–69	0	0.00	12–13.5	4	0.48
Total	922	100.00	Total	922	100.00	Total	834	100.00	Total	834	100.00

Table 4
Prices by Classification Status

	Prices		
	N	*Mean*	*Standard deviation*
Left Bank			
Classified wines			
Medoc first growth	43	497.30	301.41
Medoc second growth	118	85.11	58.68
Medoc third growth	89	58.13	53.40
Medoc fourth growth	78	39.00	15.61
Medoc fifth growth	135	35.93	21.96
Graves *cru classé*	84	73.20	121.93
Nonclassified wines	375	31.79	31.00
Total	922		
Right Bank			
Classified wines			
St. Emilion *premier grand cru* (A)	19	659.95	402.17
St. Emilion *premier grand cru* (B)	103	85.51	62.93
St. Emilion *grand cru classé*	191	37.31	26.58
Nonclassified wines	521	82.06	201.37
Total	834		

Table 5
Prices by Vintage

		Prices		
Vintage	*Vintage rating*	*N*	*Mean*	*Standard deviation*
Left Bank				
2004	89	94	33.36	29.84
2005	98	134	56.36	98.28
2006	90	82	58.88	90.67
2007	85	87	57.33	74.38
2008	87	102	40.05	38.86
2009	97	119	94.50	183.26
2010	99	114	116.27	223.24
2011	91	93	82.04	124.28
2012	89	97	60.25	74.69
Total		922		
Right Bank				
2004	88	94	52.43	66.48
2005	97	113	106.04	275.38
2006	89	75	95.49	218.50
2007	86	91	57.47	76.78
2008	88	87	58.93	100.67
2009	96	103	88.03	169.42
2010	98	99	156.87	344.95
2011	91	85	72.39	100.11
2012	90	87	69.51	115.73
Total		834		

in the top tier of the five-level Medoc classification is almost six times that of wines in the second tier. Mean prices decrease monotonically for the other tiers of the classification and for nonclassified wines. The mean price of the classified Graves falls between those of the second and third Medoc tiers and considerably above that of the nonclassified wines. A similarly skewed pattern is seen for Right Bank wines included in the three-tier St. Emilion classification. The fact that the mean price of the nonclassified Right Bank wines is about equal to that of the St. Emilion *premier grand cru classé* (B) wines reflects the influence of wines from Pomerol, which has no official classification system but produces many wines that are highly demanded.

The importance of vintage for pricing is apparent in Table 5. For Left Bank wines, the mean per bottle inflation-adjusted price ranges from 33.36 to 116.27 euros across the nine vintages, and for Right Bank wines from 52.43 to 156.87 euros. Thus, the ratio of highest to lowest mean price over the vintages is 3.5 on the Left Bank and 3.0 on the Right Bank. Even for the three highest-rated vintages (2005, 2009, 2010—all considered "classic" or "great"), the ratio of highest to lowest mean price is 2.1 (1.8) on the Left Bank (Right Bank).

B. Tests of Hypotheses

The first hypothesis maintains that Robert Parker's ratings have a significant impact on prices after controlling for classification status and vintage. Table 6 presents the results of the hedonic pricing models necessary to test H1 (as well as H2–H4).[15] For Left Bank (Right Bank) wines, model 1(5) includes only classification status and vintage as price determinants. Models 2 and 6 add Parker's ratings as an additional variable for Left Bank and Right Bank wines, respectively. Note that the R^2 of model 1 (0.592) is considerably greater than the R^2 of model 5 (0.264), reflecting the greater institutional standing and market relevance of the 1855 Medoc classification on the Left Bank versus that of the St. Emilion classification on the Right Bank.

Comparing the R^2 of model 2 (0.733) with that of model 1 (0.592) confirms the impact of Parker's ratings for Left Bank wines ($F = 481.8$; $P < 0.01$). Likewise, comparing the R^2 of model 6 (0.580) with that of model 5 (0.264) confirms Parker's impact for Right Bank wines ($F = 617.2$; $P < 0.01$). Moreover, in both models 2 and 6, the regression coefficient on the Parker ratings variable is significant at $P < 0.01$. Thus, H1 is supported.

[15] Because vintage and classification status are categorical variables, dummy coding is used to capture their effects on price. For vintage, the base group is 2004; thus, the regression coefficient for each of the other vintages represents the change in price relative to 2004. For classification status, the base group is the nonclassified wines; thus, the regression coefficient for each of the classification categories represents the change in price relative to nonclassified wines. The two base groups do not appear as separate independent variables in the models in Table 6, as their effects on price are included in the intercept terms (Wooldridge, 2003, chap. 7).

Table 6
Hedonic Pricing Results

Left Bank					*Right Bank*				
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*Variable*	*(5)*	*(6)*	*(7)*	*(8)*
2005	0.341***	0.116*	0.287***	0.115**	2005	0.272**	−0.163**	0.081	−0.224***
	(0.074)	(0.061)	(0.065)	(0.056)		(0.106)	(0.082)	(0.095)	(0.076)
2006	0.320***	0.268***	0.263***	0.236***	2006	0.209*	0.057	0.023	−0.041
	(0.083)	(0.067)	(0.073)	(0.062)		(0.118)	(0.090)	(0.105)	(0.083)
2007	0.274***	0.416***	0.364***	0.457***	2007	0.015	0.100	0.009	0.084
	(0.082)	(0.066)	(0.072)	(0.061)		(0.112)	(0.085)	(0.099)	(0.078)
2008	0.080	0.009	0.044	−0.005	2008	−0.075	−0.278***	−0.328***	−0.411***
	(0.079)	(0.064)	(0.069)	(0.058)		(0.113)	(0.086)	(0.101)	(0.080)
2009	0.547***	0.138**	0.442***	0.130**	2009	0.188*	−0.349***	−0.047	−0.424***
	(0.076)	(0.064)	(0.067)	(0.059)		(0.109)	(0.085)	(0.097)	(0.079)
2010	0.719***	0.349***	0.559***	0.297***	2010	0.433***	−0.071	0.255***	−0.114
	(0.077)	(0.064)	(0.068)	(0.059)		(0.110)	(0.085)	(0.097)	(0.079)
2011	0.521***	0.463***	0.508***	0.463***	2011	0.093	−0.069	0.024	−0.090
	(0.080)	(0.065)	(0.070)	(0.059)		(0.114)	(0.087)	(0.101)	(0.080)
2012	0.365***	0.326***	0.271***	0.265***	2012	−0.026	−0.262***	−0.249**	−0.372***
	(0.080)	(0.064)	(0.070)	(0.059)		(0.114)	(0.086)	(0.101)	(0.080)
Medoc first	2.821***	1.926***	2.043***	1.521***	*Premier cru* (A)	2.547***	1.698***	1.876***	1.388***
	(0.089)	(0.082)	(0.091)	(0.081)		(0.178)	(0.139)	(0.163)	(0.131)
Medoc second	1.051***	0.531***	0.798***	0.437***	*Premier cru* (B)	0.485***	0.207***	0.424***	0.207***
	(0.058)	(0.053)	(0.053)	(0.049)		(0.082)	(0.063)	(0.073)	(0.059)
Medoc third	0.645***	0.337***	0.452***	0.251***	*Grand cru classé*	−0.279***	−0.210***	−0.174***	−0.152***
	(0.065)	(0.054)	(0.058)	(0.050)		(0.065)	(0.049)	(0.058)	(0.046)
Medoc fourth	0.404***	0.113**	0.317***	0.099*	Parker		0.162***		0.140***
	(0.069)	(0.057)	(0.060)	(0.052)			(0.007)		(0.006)
Medoc fifth	0.265***	0.142***	0.166***	0.092**	Robinson			0.399***	0.255***
	(0.055)	(0.045)	(0.049)	(0.041)				(0.026)	(0.022)

Graves	0.622***	0.236***	0.492***	0.208***					
	(0.067)	(0.057)	(0.059)	(0.052)					
Parker		0.120***		0.100***					
		(0.005)		(0.005)					
Robinson			0.337***	0.239***					
			(0.020)	(0.018)					
Constant	2.771***	−7.689***	−2.597***	−9.774***	Constant	3.578***	−10.898***	−2.783***	−12.931***
	(0.062)	(0.479)	(0.329)	(0.465)		(0.081)	(0.586)	(0.419)	(0.569)
N	922	922	922	922	N	834	834	834	834
Adjusted R^2	0.592	0.733	0.686	0.777	Adjusted R^2	0.264	0.580	0.428	0.640

Notes: Standard errors in parentheses. ***, $P < 0.01$; **, $P < 0.05$; *, $P < 0.10$.

It is clear that adding Parker's ratings increases the R^2 of the baseline model more for Right Bank wines (0.580 – 0.264 = 0.316) than for Left Bank wines (0.733 – 0.592 = 0.141). H2 maintains that Parker's incremental impact on prices is significantly greater for Right Bank wines. A test of differences indicates that H2 is supported ($t = 4.30$; $P < 0.01$).

H3 maintains that Parker's ratings have a significantly greater impact on prices than Robinson's ratings. This hypothesis is uncontroversial if the widely held view that Parker is the world's most influential wine critic is correct. Indeed, the hypothesis is supported. For Left Bank wines, model 2, which includes Parker's ratings, produces a greater R^2 (0.733) than model 3, which includes Robinson's ratings (0.686), a significant difference ($z = 3.30$; $P < 0.01$).[16] For Right Bank wines, model 6 produces a greater R^2 (0.580) than model 7 (0.428), also a significant difference ($z = 5.30$; $P < 0.01$). Moreover, the incremental effect of Parker vis-à-vis Robinson is substantially larger for Right Bank wines, consistent with the test of H2, which shows Parker's impact to be greater in general for Right Bank wines.

Although H3 is supported, the more interesting result, as suggested earlier, may be documenting the impact that Robinson's ratings actually have on Bordeaux futures prices. For Left Bank wines, the R^2 of model 3, which includes Robinson's ratings, exceeds that of the baseline model by 0.094 ($F = 273.5$; $P < 0.01$), and for Right Bank wines the R^2 of model 7 exceeds that of the baseline model by 0.164 ($F = 236.8$; $P < 0.01$). Thus, although Robinson's impact on Bordeaux futures prices is less than that of Parker, her impact is (perhaps surprisingly) highly significant.

Even though Parker's ratings have a significantly greater impact on prices than Robinson's ratings, as shown in the test of H3, the final hypothesis maintains that combining the two experts' ratings has a greater impact on prices than Parker's ratings alone. The reason is that the opinions of these two experts tend to disagree, raising the possibility that Robinson's ratings have some relevance for prices that is not captured by Parker's ratings. The results support this possibility. For Left Bank wines, model 4, which includes both experts' ratings, produces a greater R^2 (0.777) than does model 2, which includes only Parker's ratings (0.733), a significant difference ($F = 178.0$; $P < 0.01$). Similarly, for Right Bank wines, the R^2 of model 8 (0.640) is greater than that of model 6 (0.580), also a significant difference ($F = 139.1$; $P < 0.01$). Thus, "two heads are better than one," and H4 is supported. To summarize, the tests of H1–H4 indicate that all of the hypothesized effects are supported at strong levels of statistical significance.

[16] Unlike the tests of H1, H2, and H4, in which nested models are compared, the test of H3 involves nonnested models. Thus, Vuong's test is employed and the resulting z-statistics are reported (Vuong, 1989).

C. Magnitude of Effects

Although I offer no hypotheses concerning the absolute magnitude of these effects, it is nevertheless of interest to consider this issue. Because the dependent variable (price) is in logarithmic form, the regression coefficients on the Parker and Robinson ratings variables in Table 6 show the percentage change in price associated with a one-unit change in rating, after controlling for the effects of classification status and vintage (Wooldridge, 2003). Therefore, for Left Bank wines the coefficient for Parker of 0.120 in model 2 indicates that an increase of 1-point on his rating scale is associated with a 12% increase in price; for Robinson, the coefficient of 0.337 in model 3 indicates that an increase of 1-point on her rating scale is associated with a 33.7% increase in price. For Right Bank wines, the effects are larger—16.2% and 39.9% for Parker and Robinson, respectively, per models 6 and 7.

Note that the regression coefficients for Parker and Robinson in Table 6 cannot be directly compared because Parker and Robinson use different rating scales. For Left Bank wines, Parker effectively used a 26-point scale, as his ratings range from 75 to 100 inclusive, whereas Robinson effectively used a 6.5-point scale (range = 14 to 19.5).[17] Although an increase of one unit on Robinson's scale has a larger impact on price than an increase of one unit on Parker's scale, the latter scale has four times the number of units as the former.

The regression coefficients on the Parker and Robinson ratings variables were made comparable by normalizing their ratings to a common scale using the *z*-score transformation (i.e., each expert's mean rating was subtracted from their rating for each wine, and the result was divided by the standard deviation of their ratings). Left Bank and Right Bank ratings were normalized separately as the means and standard deviations differ slightly between the two subsamples.

The normalized ratings were substituted for the original ratings in models 2, 3, 6, and 7. The regression coefficients on the vintage and classification status variables, as well as the overall R^2 values, remain unchanged from those in Table 6 as no new information is being added to the models. After normalization, however, the regression coefficient for Parker in model 2 is 0.428 and that for Robinson in model 3 is 0.318. Thus, for Left Bank wines, an increase of one standard deviation in Parker's (Robinson's) rating is associated with a 42.8% (31.8%) increase in price. For Right Bank wines, an increase of one standard deviation in Parker's (Robinson's) rating is associated with a 56.0% (38.7%) increase in price. Thus, the quality ratings of both experts result in price effects of substantial magnitude.

[17] The comparable numbers for Right Bank wines are a 26-point scale for Parker (range = 75 to 100) and an 8-point scale for Robinson (range = 12 to 19).

D. Additional Analyses

Several additional analyses were conducted. First, to investigate the notion that increases in higher ratings (e.g., from 93 to 94) are more valuable for pricing than increases in lower ratings (e.g., from 83 to 84), the square of Parker's and Robinson's ratings was used instead of the ratings themselves.[18] The results are virtually identical to those reported in Table 6. For example, the largest increase in R^2 is only 1% (from 0.64 to 0.65 in model 8); more importantly, all four hypotheses are supported at the 0.01 level with this assumed nonlinear form of the relationship between ratings and prices.

Four other analyses that test the robustness of the results in Table 6 to alternative sample definitions and the inclusion of additional control variables were conducted. These four tests had been employed in prior studies of Parker's influence on Bordeaux futures prices: (1) Dummy variables that represent vintage effects were replaced by vintage ratings. (2) The sample was restricted to only Medoc wines on the Left Bank and St. Emilion wines on the Right Bank because both of these regions have strong and well-accepted classification systems. (3) The average of each expert's ratings of the previous three vintages of each wine was added as a control variable. (4) The price of each wine in the previous vintage was added as a control variable. The objective of these analyses was to determine whether the support for H1–H4 is sensitive to any of the alternative specifications employed in prior studies. The results indicate only small changes in the overall R^2 values of the eight models in Table 6, and the pattern of R^2 values across the models is the same. More importantly, the regression coefficients on the Parker and Robinson ratings variables retain significance at the 0.01 level, and all four hypotheses are strongly supported with the new specifications.[19]

VII. Discussion and Conclusion

This study analyzes the value of expert opinion for the pricing of red wines in the Bordeaux futures market. The expert opinions examined are the publicly disseminated quality ratings for more than 1,700 wines provided by two of the world's foremost wine experts before futures prices are set by wine producers. Results show that the opinions of both experts are valuable for futures pricing, that the opinions of Robert Parker are more valuable than those of Jancis Robinson, and that the combination of the two experts' opinions is more valuable than either alone. The results further show that expert opinion is more valuable for the pricing of Right Bank wines, where a major alternative quality signal (the official classification system) is weaker.

[18] I wish to thank the reviewer for suggesting this analysis.
[19] Detailed results from the robustness tests are available from the author.

The results support the claim that Bordeaux wine producers are influenced by the expert opinions of Robert Parker when setting futures prices, and they show that his opinions are valuable for that purpose after controlling for classification status and vintage. The results further indicate that Parker's ratings remain valuable for pricing after also controlling for both his ratings of previous vintages of the same wine and the price of the wine in the preceding year. The results suggest that all of these effects can also be ascribed to the expert opinions provided by Jancis Robinson, although to a lesser extent than for Parker. Finally, the results show that incorporating the opinions of both experts provides additional value for pricing.

Of course, the fact that expert opinions are valuable for Bordeaux futures pricing does not mean those opinions are "valid." As observed earlier, standard notions of the validity or "correctness" of expert opinion are less applicable in sensory domains because of personal preferences and the inherent subjectivity involved. Instead, the present results are perhaps better interpreted in the context of a social-psychological view of expertise, which maintains that expertise is socially conferred by constituencies that rely on the analyses and opinions provided by the deemed experts. The results suggest that Bordeaux wine producers have conferred on Robert Parker and Jancis Robinson the status of experts whose opinions they find valuable for *en primeur* pricing. Those opinions are sought by many wine consumers who rely on them. This shared appreciation for expert opinions about wine quality means those opinions are valuable for one constituency, wine consumers, and it also confers value to another constituency, wine producers, enabling the latter to benefit by setting higher prices for wines the experts rate more highly.

References

Abadie, A. (2005). Semiparametric difference-in-differences estimators. *Review of Economic Studies*, 72(1), 1–19.

Agnew, N.M., Ford, K.M., and Hayes, P.J. (1997). Expertise in context: Personally constructed, socially selected and reality-relevant? In Feltovich, P.J., Ford, K.M., and Hoffman, R.R. (Eds.), *Expertise in Context: Human and Machine*. Cambridge, MA: MIT Press, 219–244.

Allen, F. (1984). Reputation and product quality. *Rand Journal of Economics*, 15(3), 311–327.

Ashenfelter, O. (2008). Predicting the quality and prices of Bordeaux wine. *Economic Journal*, 118(529), F174–F184.

Ashenfelter, O., and Jones, G.V. (2013). The demand for expert opinion: Bordeaux wine. *Journal of Wine Economics*, 8(3), 285–293.

Ashton, R.H. (2011). Improving experts' wine quality judgments: Two heads are better than one. *Journal of Wine Economics*, 6(2), 160–178.

Ashton, R.H. (2012). Reliability and consensus of experienced wine judges: Expertise within and between? *Journal of Wine Economics*, 7(1), 70–87.

Ashton, R.H. (2013). Is there consensus among wine quality ratings of prominent critics? An empirical analysis of red Bordeaux, 2004–2010. *Journal of Wine Economics*, 8(2), 225–234.

Booth, R. (2010). Bordeaux vintners raise their glasses to China's wine buffs. *Guardian*, April 2.

Cardebat, J.-M., Figuet, J.-M., and Paroissien, E. (2014). Expert opinion and Bordeaux wine prices: An attempt to correct biases in subjective judgments. *Journal of Wine Economics*, 9(3), 282–303.

Cardebat, J.-M., and Paroissien, E. (2015). Standardizing expert wine scores: An application for Bordeaux *en primeur*. *Journal of Wine Economics*, 10(3), 329–348.

Coates, C. (2004). *The Wines of Bordeaux*. Berkeley: University of California Press.

Cocks, C. and Feret, E. (1883). *Bordeaux and Its Wines*, 2nd rev. English ed. Paris: G. Masson; Bordeaux: Féret & Fils.

Colman, T. (2008). *Wine Politics: How Governments, Environmentalists, Mobsters, and Critics Influence the Wines We Drink*. Berkeley: University of California Press.

Costanigro, M., and McCluskey, J.J. (2011). Hedonic price analysis in food markets. In Lusk, J.L., Roosen, J., and Shogren, J.F. (Eds.), *The Oxford Handbook of the Economics of Food Consumption and Policy*. New York: Oxford University Press, 152–180.

Dimson, E., Rousseau, P.L., and Spaenjers, C. (2015). The price of wine. *Journal of Financial Economics*, 118(2), 431–449.

Di Vittorio, A., and Ginsburgh, V. (1996). Pricing red wines of Médoc vintages from 1949 to 1989 at Christie's auctions. *Journal de la Société de Statistique de Paris*, 137, 19–49.

Dubois, P., and Nauges, C. (2010). Identifying the effect of unobserved quality and expert reviews in the pricing of experience goods: Empirical application on Bordeaux wine. *International Journal of Industrial Organization*, 28(3), 205–212.

Flannery, R. (2011). 2011 China investment guide: What will be the next Lafite? *Forbes*, February 8.

Friberg, R., and Grönqvist, E. (2012). Do expert reviews affect the demand for wine? *American Economic Journal: Applied Economics*, 4(1), 193–211.

Gibbs, M., Tapia, M., and Warzynski, F. (2009). Globalization, superstars, and reputation: Theory & evidence from the wine industry. *Journal of Wine Economics*, 4(1), 46–61.

Hadj Ali, H., Lecocq, S., and Visser, M. (2008). The impact of gurus: Parker grades and *en primeur* wine prices. *Economic Journal*, 118(529), F158–F173.

Hadj Ali, H., and Nauges, C. (2007). The pricing of experience goods: The example of *en primeur* wine. *American Journal of Agricultural Economics*, 89(1), 91–103.

Haushalter, G. (2010). Bordeaux wines: Production and economics. Keynote speech presented at Masters of Wine Symposium, Le Conseil Interprofessionel du Vin de Bordeaux, June 25.

Hay, C. (2007). Globalisation and the institutional re-embedding of markets: The political economy of price formation in the Bordeaux *en primeur* market. *New Political Economy*, 12(2), 185–209.

Hay, C. (2008). When points mean prices. *Decanter*, August 21.

Hay, C. (2010). The political economy of price and status formation in the Bordeaux *en primeur* market: The role of wine critics as rating agencies. *Socio-Economic Review*, 8(4), 685–707.

Hilger, J., Rafert, G., and Villas-Boas, S. (2011). Expert opinion and the demand for experience goods: An experimental approach in the retail wine market. *Review of Economics and Statistics*, 93(4), 1289–1296.

Hodgson, R.T. (2008). An examination of judge reliability at a major U.S. wine competition. *Journal of Wine Economics*, 3(2), 105–113.

Hodgson, R.T. (2009a). An analysis of the concordance among 13 U.S. wine competitions. *Journal of Wine Economics*, 4(1), 1–9.

Hodgson, R.T. (2009b). How expert are "expert" wine judges? *Journal of Wine Economics*, 4(2), 233–241.

Johnson, H., and Robinson, J. (2013). *The World Atlas of Wine*, 7th ed. London: Mitchell Beazley.
Jones, G.V., and Storchmann, K.-H. (2001). Wine market prices and investment under uncertainty: An econometric model for Bordeaux Crus Classés. *Agricultural Economics*, 26(2), 115–133.
Lancaster, K.J. (1966). A new approach to consumer theory. *Journal of Political Economy*, 74(2), 132–157.
Langewiesche, W. (2000). The million-dollar nose. *Atlantic Monthly*, 286, 42–70.
Lecocq, S., and Visser, M. (2006). Spatial variations in weather conditions and wine prices in Bordeaux. *Journal of Wine Economics*, 1(2), 114–124.
Lewin, B. (2009). *What Price Bordeaux?* Dover, UK: Vendange Press.
Mahenc, P., and Meunier, V. (2003). Forward markets and signals of quality. *Rand Journal of Economics*, 34(3), 478–494.
Malter, D. (2011). On the causality, cause, and consequence of returns to organizational status: Evidence from the *grands crus classés* of the Médoc. Robert H. Smith School Research Paper Series. College Park: University of Maryland.
Malter, D. (2014). On the causality and cause of returns to organizational status: Evidence from the *grands crus classés* of the Médoc. *Administrative Science Quarterly*, 59, 271–300.
Markham, D. (1998). *1855: A History of the Bordeaux Classification*. New York: Wiley.
Masset, P., Weisskopf, J.-P., and Cossutta, M. (2015). Wine tasters, ratings, and *en primeur* prices. *Journal of Wine Economics*, 10(1), 75–107.
McCoy, E. (2005). *The Emperor of Wine. The Rise of Robert M. Parker, Jr. and the Reign of American Taste*. New York: Ecco.
Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy*, 78(2), 311–329.
Nelson, P. (1974). Advertising as information. *Journal of Political Economy*, 82(4), 729–754.
Nossiter, J. (2009). *Liquid Memory: Why Wine Matters*. New York: Farrah, Straus and Giroux.
Parker, R.M., Jr. (2003). *Bordeaux: A Consumer's Guide to the World's Finest Wines*, 4th ed. New York: Simon & Schuster.
Peterson, K., and Chow, J. (2010). New whine: China pushes Bordeaux prices higher. *Wall Street Journal*, September 15.
Playing the rating game. (1999). *Economist*, September 18.
Quandt, R.E. (2007). On wine bullshit: Some new software? *Journal of Wine Economics*, 2(2), 129–135.
Ramirez, C.D. (2010). Do tasting notes add value? Evidence from Napa wines. *Journal of Wine Economics*, 5(1), 143–163.
Reuter, J. (2009). Does advertising bias product reviews? An analysis of wine ratings. *Journal of Wine Economics*, 4(2), 125–151.
Riordan, M.H. (1986). Monopolistic competition with experience goods. *Quarterly Journal of Economics*, 101(2), 265–280.
Robinson, J. (2006). *The Oxford Companion to Wine*, 3rd ed. New York: Oxford University Press.
Rosen, S. (1974). Hedonic prices and implicit markets: Product differentiation in pure competition. *Journal of Political Economy*, 82(1), 34–55.
Schnabel, H., and Storchmann, K. (2010). Prices as quality signals: Evidence from the wine market. *Journal of Agricultural & Food Industrial Organization*, 8(1), 1–21.
Shanteau, J. (1987). Psychological characteristics of expert decision makers. In Mumpower, J. L., Phillips, L.D., Renn, O., and Uppuluri, V.R.R. (Eds.), *Expert Judgment and Expert Systems*. Berlin: Springer-Verlag, 289–304.

Shanteau, J. (1992). The psychology of experts: An alternative view. In Wright, G., and Bolger, F. (Eds.), *Expertise and Decision Support*. New York: Plenum, 11–23.
Shapin, S. (2005). Hedonistic fruit bombs. *London Review of Books*, February 3.
Shapiro, C. (1983). Premiums for high quality products as returns to reputations. *Quarterly Journal of Economics*, 98(4), 659–679.
Storchmann, K. (2012). Wine economics. *Journal of Wine Economics*, 7(1), 1–33.
Storchmann, K., Mitterling, A., and Lee, A. (2012). The detrimental effect of expert opinion on price-quality dispersion: Evidence from the wine market. AAWE Working Paper No. 118.
Taber, G.M. (2011). *A Toast to Bargain Wines: How Innovators, Iconoclasts, and Winemaking Revolutionaries Are Changing the Way the World Drinks*. New York: Scribner.
Vuong, Q.H. (1989). Likelihood ratio tests for model selection and non-nested hypotheses. *Econometrica*, 57(2), 307–333.
Weiss, D.J., and Shanteau, J. (2004). The vice of consensus and the virtue of consistency. In Smith, K., Shanteau, J., and Johnson, P. (Eds.), *Psychological Investigations of Competence in Decision Making*. Cambridge, UK: Cambridge University Press, 226–240.
Wooldridge, J.M. (2003). *Introductory Econometrics: A Modern Approach*, 2nd ed. Mason, OH: Thomson/South-Western.
Zhao, W. (2008). Social categories, classification systems, and determinants of wine price in the California and French wine industries. *Sociological Perspectives*, 51(1), 163–199.