Does the Tasting Note Matter?

Language Categories and Their Impact on Professional Ratings and Prices

Clarissa Laura Maria Spiess Bru[1]

Abstract

Particularly in the wine industry, information asymmetry between consumers and wine producers regarding product characteristics leads prospects to consider available information, such as market prices, professional reviews, and ratings, as reliable indicators for product quality and purchase decisions. Nevertheless, few studies reflect wine reviews' textual dimension and content. This study explores the impact of reviews and defined language inventory like articles, verbs, or adjectives and their effects on wine prices and ratings. Using 83,067 reviews from the professional wine critics magazine "The Wine Enthusiast," a seemingly unrelated regression (SUR) estimation, quantile regression (plots), and review text analysis utilizing the content analysis tool LIWC-22 was conducted to examine the simultaneous impact of linguistic categories on wine prices and ratings. The results indicate that the tasting note's increased word count and positive sentiment are significantly positively associated with a higher wine rating. Further, specific categories have a statistically significant positive impact on ratings but a negligible effect on wine prices. Consequently, a subsequent instrumental variables estimation is conducted to control for endogeneity and test for the effect of reviews on wine prices, revealing a significant positive influence. These findings could have practical strategic implications for wine market communication, marketing, and purchasing decisions, as linguistic indicators in reviews could be associated with wine quality by vintners and prospects.

Keywords: Professional Reviews, Information Asymmetry, Text Analysis, Prices and Ratings, Quantile regression, Seemingly Unrelated Regression, Instrumental Variables Estimation

JEL classification: C31, L66, M30, O13, Q13

[1] Corresponding author.
Paderborn University, Department of Management, Warburger Straße 100, 33098 Paderborn, Germany.
E-Mail: clarissa.spiess.bru@uni-paderborn.de

1. Introduction

How does the wine taste, and how can its quality be assessed in pre-purchase? With each new wine bottle on the market, wine connoisseurs, consumers, and enthusiasts face one of the most frequent questions concerning purchase decisions. In this context, information asymmetry (Nelson 1970, Akerlof 1970) is one of the industry-specific characteristics of the wine industry as a market for experience goods. To reduce information asymmetry between producers and consumers, quality-indicating factors such as prices and professional wine evaluations by recognized experts serve as a quality signal and the first indication of the product quality to be expected (e.g., Lockshin and Rhodus 1993, Schnabel and Storchmann 2010, Mastrobuoni et al. 2014). While a moderate, positive correlation can be assumed for wine prices and ratings (Oczkowski and Doucouliagos 2015), previous literature has already highlighted the positive impact of professional ratings on wine prices, demand, and sales (e.g., Dubois and Nauges 2010, Hilger et al. 2011, Friberg and Grönqvist 2012, Thrane 2019, Villas-Boas et al. 2021). Specifically, a large body of literature has examined various determinants of wine prices. These include wine characterizing information such as country of origin, climatic conditions, grape varieties, and the (bottle) age of the wine and expert evaluations (Outreville and Le Fur 2020). Arias-Bolzmann et al. (2003) have examined the influence of wine magazine ratings, country, and variety on wine prices. Consequently, trade journals and specialized online platforms such as "The Wine Enthusiast Magazine" are considered sources of expert evaluations. Here, the professional reviews follow a uniform pattern with the points awarded within a defined value dimension of the rating system on a 100-points-scale, and additional text information with written descriptions of the predefined categories of the respective rating system, such as sensory qualities and product characteristics of the evaluated wine bottle.

In this regard, current research has broadened the perspective in the last decade: While previously focusing on numerically scaled ratings and their impact on wine prices, the perspective has widened to include tasting notes from wine rating platforms as another valuable information indicator of quality (e.g., Ramirez 2010, McCannon 2020, Lam et al. 2019). Accordingly, Chen and McCluskey (2018) analyzed text reviews for red wines from Washington using data from Wine Spectator. They found that some keywords significantly impact wine prices, especially in the high-end segment. Therefore, consumers should devote more time researching wine qualities, especially higher-priced ones. Lam et al. (2019) have utilized the LIWC text analysis tool and observed that the review's word count could be positively associated with the rating for South African wines. McCannon (2020) has shown that

the given information in wine ratings is helpful to consumers when controlling for numerical ratings and wine characteristics such as region and grape variety.

In this study, I shed light on the textual dimension of reviews using professional critics from "The Wine Enthusiast Magazine", one of the seven most influential wine magazines in the U.S. (Storchmann 2012). The research question is to what extent the textual components of the review influence the evaluation and wine prices since reviews convey the critics' sensory impressions and qualitative assessments through their linguistic features and semantic concepts. First, I comprehensively understand the linguistic categories inherent in professional wine reviews. This knowledge enables producers and consumers to obtain more information regarding product quality in future reviews or bottle labels by associating specific linguistic indicators with quality levels. This could indicate that the tasting notes provide consumers and prospects with additional and potentially valuable information for their decision on a purchase. Thus, this study extends the existing literature by establishing new dimensions of analysis aiming to close research gaps: First, a comprehensive database covering the most important wine-producing countries in the world is used. This permits investigating the impact of reviews on prices and ratings on worldwide production instead of specific wine regions. Second, the study contributes to the currently limited research in this field, which examines reviews as a textual component by capturing and describing linguistic levels in a quantitative-qualitative analysis. This approach supports the discovery of functional linguistic inferences and patterns considered characteristic of wine reviews. Also, it accomplishes a subsequent concordance analysis that exposes the domain-specific linguistic inventory used. Initially, wine prices and ratings are considered dependent variables. This approach permits estimating the impact of linguistic categories individually on wine prices and ratings, thus separating the effects.

Specifically, I aim to examine which linguistic categories influence prices and ratings. As López Arroyo and Roberts (2015) have stated for English and Spanish wine reviews, the typical sentence structure array consists of irregular or short sentences next to regular sentences. While previous research has used domain-specific keywords, text length, or predefined analysis categories that provide information about semantic word classification (e.g., Capehart 2021b, Ramirez 2010, Croijmans et al. 2020) as categories for the analysis of linguistic inventory, I am interested in whether and which word classes on the morphological level and which punctuation marks on the syntactic level influence prices and ratings.

Additionally, the specific conditions of the wine tasting are considered. While the wine tastings are performed as blind reviews, the critics are aware of the vintage and variety of the

wine. Therefore, it must be assumed that these known characteristics could influence the final evaluation of the wine critics, whether consciously or over the indexed quality of the wine based on the vintage or grape variety or unconsciously, through the sole knowledge of this crucial information. Boon and Foppiani (2019) have pointed out a potential reviewer bias and that the language of reviews differs in creativity according to specific countries of origin. Therefore, the reviewer and the country of origin need to be considered as additional possible influencing factors on the overall evaluation rating, whose influence must be controlled when analyzing the linguistic components. In conclusion, the following research questions are addressed:

1. Do linguistic categories in tasting notes have a statistically positive effect on wine prices and wine ratings?

2. Which linguistic categories have either a statistically positive or statistically negative impact on wine prices and ratings?

3. How do linguistic categories impact wine prices and ratings, assuming that specific wine characteristics are known in the professional evaluation process?

4. Is the use of specific linguistic categories characteristic of different reputation levels?

The remainder of the study is organized as follows. The next chapter presents the current research and introduces the research hypotheses, while chapter three summarizes the data and the econometric approach. Chapter four presents the three empirical studies and the results, while chapter five summarizes the empirical findings. Chapter six includes a discussion and an outlook into the study's limitations and further research.

2. Literature and Hypotheses

2.1. Wine Ratings, Prices, and the Role of Wine Experts

A large body of studies has studied the relationship between wine prices and wine ratings, mainly identifying a moderate correlation between wine prices and quality ratings (Oczkowski and Doucouliagos 2015), indicating that prices signal product quality (Schnabel and Storchmann 2010), particularly for the unexperienced customer (Mastrobuoni et al. 2014, Chocarro and Cortiñas 2013). Consumers often confide in expert information regarding wine quality (Storchmann 2012). Hilger et al. (2011) used an experimental setting in retailing to show how consumers react to expert opinions to investigate the effect of expert opinion on wine demand. They show a statistically significant positive effect of expert opinions on consumers, in that demand increases for wines rated average or higher, while demand decreases for wines rated low. Thrane (2019) investigated the influence of expert opinions on the demand for red wine using an experiment with Norwegian consumers. According to Thrane (2019), consumers

prefer very well-rated over well-rated wines, while for equally rated wines, consumers prefer recommended over non-recommended products. Horowitz & Lockshin (2002) have shown for Australian wines and eight different grape varieties, that price, winery size and rating, vintage, and region of origin to have the highest correlation with the wine rating. Oczkowski and Pawsey (2019) examined the influence of customer and expert ratings on Australian wine prices. They recommended that winemakers should consider both ratings when evaluating wine prices, and customer ratings seem better suited to explain price variations, while expert ratings have a special status in explaining wine prices.

The scores of wine gurus, wine guides, certifications and medals, and professional online review platforms such as The Wine Enthusiast, which offer two strands of product quality information in the form of professional wine ratings and written product reviews for wines tested, are easily accessible sources of expert information for consumers. In this context, the role of professional wine judges in wine evaluations has been examined in current research to varying extents. On the one hand, these studies refer to the status of the expert as such, who should demonstrate specific acquired expertise and distinct sensory capabilities in wine tasting. Ashton (2017) has outlined what distinguishes experts from novices and has used two critical categories for comparison, the cognitive dimension, which comprises subject-specific knowledge and memory, and the sensory dimension, which includes special skills in tasting and smelling. According to Ashton (2017), wine experts are classified based on specific characteristics; wine writers, winemakers, or individuals with various levels of knowledge ranging from completed courses to professorships are considered professional wine experts.

On the other hand, some studies also shed light on the role of an expert in the context of judges' consistency and reliability (Hodgson 2008, Hodgson 2009, Ashton 2012, Stuen et al. 2015, Marks 2015, Luxen 2018, Frick 2020, Gergaud et al. 2021). Ashton (2013) has shown a grand mean of consensus among prominent wine critics of 0.60. Bodington (2020) has found a solid and positive correlation between ratings, while approximately 10% of judges rate inconsistently. Furthermore, various studies have shown the worth of expert ratings to consumers in the context of experience goods and quality (McCannon 2020) and what impact reviews have on prices (Ramirez 2010; Capehart 2021a). While Robert Parker and Jean-Marc Quarin are considered the most influential critics in the industry (Masset et al. 2015), Ali et al. (2008) have shown a Parker price effect that amounts to 2.80€ per wine bottle using the example of expert ratings for young Bordeaux wines by wine guru Robert Parker. Gibbs et al. (2009) have illustrated the strong relationship between prices and expert ratings, especially for more

expensive wines. Further, they have shown significant changes in wine prices in the case of a change in Parker ratings for the exact wine to account for the effects of reputation on prices. Using the example of Bordeaux wines, Ashton (2016) has shown the high importance of expert ratings concerning prices and demonstrates a statistically significant effect of expert ratings by Robert Parker and Jancis Robinson on wine prices after controlling for other wine price determinants. Summarizing wine rating platforms as a collective intelligence platform, Kwak et al. (2021) have studied the effect of wine ratings on prices and found that platforms such as "The Wine Enthusiast" have the same association level with price as wine ratings from Robert Parker.

Likewise, research remains not only on the tasting notes of wine gurus but also on social media such as blogs, the content and writing style of amateur wine bloggers has reached a growing interest in research as a new platform for wine critics (e.g., Beninger et al. 2014, Lord Ferguson et al. 2019, McMullan (2022)). Common to these studies is a dedicated focus on text content and its analysis through appropriate automated content analysis tools such as LIWC (Tausczik and Pennebaker 2010).

2.2.The Linguistic Analysis of Professional Wine Reviews

A growing research interest is reflected in the increasing number of recent studies regarding wine review information and linguistic analysis (e.g., Klimmek 2013, Buccafusco et al. 2021, Yang et al. 2022). Yang et al. (2022) combined textual reviews and numeric variables using Language Processing Techniques and logistic regression models. They analyzed if reviews are more helpful in assessing wine product quality than numeric variables such as age and price. Based on their findings, Yang et al. (2022:78) have stated:

> "(…) professional wine reviews can be more useful than some common numeric variables such as age and price of wines in wine data analysis." (…)

However, textual expert evaluations are not only a quality signal for consumers but also contain information and values for producers that can affect wine prices and pricing strategies. For instance, Ramirez (2010) has examined the impact of tasting notes on wine prices. Using the example of ratings from "Wine Spectator" for wines of the variety Cabernet Sauvignon, it has been outlined that the length of the reviews positively impacts wine price. Further, an increase of 10% in the number of letters in the review text increases wine prices by two to four dollars. Thus, the first hypothesis is formulated as follows:

$H_{1:}$ *The text length of the wine review positively impacts wine prices and ratings.*

The relationship between reviews and prices was also investigated to determine whether the price of the wine can be inferred based on specific vocabulary used in reviews. Capehart (2021b) has demonstrated that price indications can be derived based on "expensive" or "cheap" wine words used in wine reviews. Chen and McCluskey (2018) have examined the extent to which expert information influences wine prices. They have shown that specific keywords used in reviews significantly affect prices. These effects diverge in the different price categories, with the most significant impact on higher-priced premium wines. Following Otheguy et al. (2021), wine experts share a common ground in mental representations of wine, based, for example, on the wine's associated growing region. What is discussed in this context is the existence of a specific vocabulary of wine experts (e.g., Herdenstam et al. 2009, Gawel 1997, Croijmans and Majid 2016, Brochet and Dubourdieu 2001, Paradis and Eeg-Olofsson 2013, Arroyo and Roberts 2015). Wine critics seem to have domain-specific language that tries to capture sensory impressions in an analytical or subjective inventory of words (Croijmans et al. 2020). Boon & Foppiani (2019) have analyzed the difference in language used in reviews of Old World and New World wines, noting the potential impact of language on consumers' wine perceptions and purchase decisions. Using reviews from "The Wine Enthusiast Magazine", they have identified potential reviewer bias based on their interest and/or knowledge of specific wine-producing countries. Further, they have highlighted wines from France, Italy, and the U.S. tend to be described in more creative language than wines from other producing countries. Moreover, the categories referred to in the reviews also vary as wines from these countries, as the vineyard and the production process are thematized, while for other wines, the taste experience is described (Boon and Foppiani 2019).

Thus, the second hypothesis is formulated:

$H_{2:}$ *Linguistic categories in professional wine reviews have a significant positive impact on wine prices and ratings after controlling for vintage, variety, country, and reviewer.*

Various text analysis methods have been utilized to gain insights into the textual dimension of reviews and their impact on demand and prices. Among the most common methods to extract the inherent contextual information are (computational) linguistic methods, such as Natural Language Processing and the tool LIWC (e.g., Chung and Pennebaker 2012). In one of the most recent studies, McCannon (2020) investigated whether text information in professional ratings is helpful for consumers regarding product quality and therefore impacts wine demand and prices. Using the computational linguistic algorithm LDA and a hedonic price

regression for wines produced in the US, McCannon (2020) has found that information is valuable for consumers when numerical ratings, varietals, and regions are controlled. Lam et al. (2019) have shed light on the nature of language in wine reviews of South African wines in the wine guide "Platter's Guide", focusing on wines awarded 1-star, 3-star, and 5-star ratings. Using the text analysis tool LIWC and analyses of variances, they have demonstrated no existing difference in the tool vocabulary category "Authenticity", which indicates that reviewers evaluate all wines with the same honesty. Furthermore, they have outlined that the category "Tone", mapping positive and negative sentiments, is the highest in the best-awarded wines, while the high-rated wines have longer review texts compared to the average and low-rated wines.

Thus, I formulate the third hypothesis:

$H_{3:}$ *Specific vocabulary categories, including positive sentiments, have a significant positive impact on ratings and prices, while negative sentiments have a negative impact on ratings and prices.*

3. Data & Model

This study uses professional wine critics from one of the seven most influential wine magazines in the United States, the "Wine Enthusiast Magazine" (Storchmann 2012). The magazine provides professional evaluations of wines by experts who rate them according to a fixed-point system. According to its website, the magazine looks back on a tradition of over 30 years and has around four million readers. Moreover, the review process always ensues as blind tastings based on various samples. The reviewer obtains general information such as the vintage or variety, but the wine's producer and price per bottle remain unknown. In this study, I focus on these wine reviews consisting of text and rating points. These evaluations are created by a network of professional wine critics locally assigned by their country-specific expertise on wines and their growing areas and regions. The ratings are generated based on a defined point scale ranging from the lowest rating of 80 points to the highest rating of 100 points. The dataset includes tasting notes and numerical ratings in 83,067 wine reviews. Table 1 summarizes the descriptive statistics and variables used in the model.

[Table 1]

The product characteristics associated with the wine, such as wine title, country of origin, wine vintage, variety, market price, rating given in points, and reviewer, are included as variables. The dataset contains wine bottles from over 43 countries. It covers wine-producing

countries such as France, Italy, Spain, Portugal, Austria, and Germany, the USA, Argentina, Australia, Chile, New Zealand, and South Africa, with over 698 different grape varieties, including the twelve most popular varieties such as Chardonnay, Cabernet Sauvignon, and Bordeaux wines according to the "Wine Enthusiast Magazine". Furthermore, the respective vintages and market prices of the wine bottles are included in the dataset. The oldest wine vintage is dated 1904, while the youngest is from 2017. The market prices vary from a minimum of U.S. $4 to U.S. $3,300 per wine bottle. In addition, the individual reviewers who rated each wine bottle and the rating points given on a scale of 80 to 100 points are contained in the dataset. The two variables, points and prices, are variables of main interest. I conduct a stepwise model approach by first adding only the linguistic categories (Model I), then including the punctuation category (Model II), followed by word counts (Model III), sentiment (Model IV), and language categories (Model V). In all five models, vintage and variety are controlled as dummies. The kernel density was estimated and compared to the normal density distribution to test whether the observations are normally distributed in terms of both points and prices. Figure 1 illustrates an acceptable normal distribution. Figure 2 reveals a left-skewed distribution of prices. The logarithm of prices is used to obtain a normal distribution of market prices (see figure 2).

[Figure 1]

[Figure 2]

In addition, the dataset contains information on the individual ratings, composed of rating text and numerical ratings, followed by the name of the respective reviewer. The set of variables is enhanced by language variables of interest provided by the content analysis tool Linguistic Inquiry and Word Count (LIWC-22) in its current version (Boyd et al. 2022). The tool LIWC-22 labels existing words into specific categories, including linguistic and psychological classes, based on the existing word inventory (Boyd et al. 2022). I focus on the linguistic categories that consist of certain word classes. According to Rijkhoff (2007), ten word classes can be distinguished. These include verbs, nouns, adjectives, adverbs, prepositions, numerals, articles, pronouns, conjunctions, and interjections. While the last word class is neglected, word types except nouns are available as linguistic categories through LIWC analysis. To consider the linguistic categories according to the word classes, the corresponding available variables in LIWC were considered, such as the word classes verbs, adjectives, quantifiers, and function words. The category of function words contains word classes such as pronouns (personal and indefinite), articles, conjunctions, prepositions, adverbs, and auxiliary verbs, which perform certain grammatical functions in a sentence.

I also consider punctuation marks such as commas and periods due to their properties linking individual parts of sentences or marking sentence endings. Thus, these punctuation marks are closely related to the summary variables word count and words per sentence. These variables are measured as the percentage of total words or punctuation in the review, contributing to a particular category, while the variable word count calculates the number of words in a review, and the variable words per sentence score the written words in a single sentence (Boyd et al. 2022). The word count ranges from a minimum of three words in a review to a maximum of 127 words. The minimum number of words per sentence is three words, while the maximum number is 64. This means that a maximum of 64 words can be found in one sentence. The variable word count has also been used as an explanatory variable for wine prices in previous studies (e.g., Ramirez 2010).

Further, many studies examining reviews and prices have captured and analyzed sentiment as a feature of reviews (e.g., Ludwig et al. 2013). I regard the link of sentiment with prices and reviews and consider both positive and negative sentiments in the reviews, included as positive and negative tones. Furthermore, following Delmas et al. (2016), the word counts, including positive and negative words, can be utilized to control for product quality.

While LIWC-22 does not list nouns as a single linguistic category, they form part of the summary language variable Analytic, Clout, Authentic, and Tone that correspond to the level of analytical thinking, the language of status, authenticity, and honesty, and the level of emotion on a scale of 0-100 (Boyd et al. 2022).

For an adequate selection of the independent variables set, the variables were tested for correlation at the 5% significance level.

[Table 2]

Table 2 shows a modest correlation for the dependent variables and a correlation coefficient of 0.4 with significance at the 5% level. However, it can be assumed that prices and rating points are not correlated for the specific wine evaluation process since they are unknown to the reviewer at the time of blind tasting. Therefore, both variables are considered independent variables (e.g., Combris et al. 1997). Nevertheless, the market price serves as an indicator of the quality of the wine and, therefore, could influence the reviewer's overall evaluation of its sensory qualities. I capture this component by adding control variables. So far, the reviewers know details such as the wine's vintage and/or grape variety at the time of evaluation, which results in applying vintage and variety as control variables. Following Horowitz and Lockshin

(2002), these variables also serve as indicators of product quality. Moreover, the control variable vintage is utilized to control for effects over time. Thus, ratings and prices are dependent variables potentially impacted by the same independent variables.

4. Empirical Analyses

4.1. Empirical Study I: Seemingly Unrelated Regression (SUR)

At the same time, it is assumed that the independent variables are only weakly correlated, but the error terms of the respective functions may be strongly correlated. Therefore, a linear estimation such as Ordinary Least Square estimation (OLS) is neglected, as the estimated coefficients would be biased. The approach of Zellner (1962) implicates a seemingly unrelated regression (SUR), which is promising for the basic conceptions of this model. Zellner (1962) stated that this estimator is more efficient than single-equation least-squares estimators when the independent variables are weakly correlated, and the error terms of both functions are highly correlated. For this study, a seemingly unrelated regression (SUR) (Fiebig 2001) is conducted to examine the possible effects of linguistic categories on ratings and wine prices. At the same time, the assumptions for linear ordinary least-square models hold. The seemingly unrelated regression (SUR) Equation 1 categorizes the rating points as a function, including language and linguistic categories, punctuation, word counts, both positive and negative sentiments, and the variables variety and vintage as dummy control variables for wine quality over time:

$$\begin{aligned} Rating\ points_i = {} & \beta_0 + \beta_1\,(linguistic\ categories)_i + \beta_2\,(punctuation)_i \\ & + \beta_3\,(word\ counts)_i + \beta_4\,(sentiments)_i + \beta_5\,(language\ categories)_i \\ & + \beta_6\,(variety)_i + \beta_7\,(vintage)_i + \beta_8\,(reviewer)_i + \beta_9\,(country)_i \\ & + u_1 \end{aligned} \tag{1}$$

Where *rating points* reflect the given evaluation points for wine *i* by reviewer *g* on a scale from 80-100 points, followed by the vector variables *linguistic categories*, *punctuation*, *word counts*, *sentiment*, and *language categories*. The vector variable *linguistic categories* involve linguistic entities, including the word categories function words, verbs, adjectives, and quantities. The vector variable *punctuation* includes periods and commas, while the vector variable *word counts* comprise word count as the total number of words per review and words per sentence. *Sentiment* consists of a positive and negative tone. However, *language categories* cover Analytical, Clout, Authentic, and Tone summary variables, representing each tasting note's measured analytical thinking, status, authenticity, and tone. The variable *vintage* indicates the bottling year of each wine *i*, while *variety* illustrates the grape for each wine bottle *i*. Both

variables control for the rating points as an indicator of quality. Comprising, Equation 1 is used to model the impact of the above independent variables on rating points, including robustness checks (Models VI and VII).

Similarly, Equation 2 employs Log (price) as the dependent variable. The logarithm of *price* is used, categorizing it as a function of including language and linguistic categories, punctuation, word counts, both positive and negative sentiments, and the variables vintage and variety as control variables for wine quality with the same qualities of the independent variables as in Equation 1.

$$\begin{aligned} Log\ (price)_i = {} & \gamma_0 + \gamma_1\ (linguistic\ categories)_i + \gamma_2\ (punctuation)_i \\ & + \gamma_3\ (word\ counts)_i + \gamma_4\ (sentiments)_i + \gamma_5\ (language\ categories)_i \\ & + \gamma_6\ (variety)_i + \gamma_7\ (vintage)_i + \gamma_8\ (reviewer)_i + \gamma_9\ (country)_i \\ & + u_2 \end{aligned} \tag{2}$$

Where Log (price) displays the logarithm of the market price of each bottle of wine *i*, followed by the vector variables *linguistic categories*, *punctuation*, *word counts*, *sentiment*, and *language categories*. The variables *vintage* and *variety* serve as control variables and indicators of product quality. The variable *vintage* reveals the bottling year of each bottle of wine *i*, while *variety* illustrates the specific type of grape for each wine bottle *i*. Table 3 displays the regression results.

[Table 3]

A stepwise, seemingly unrelated regression model was estimated to test hypotheses H_1, H_2, and H_3. This approach allows testing for the impact of linguistic and language categories on wine prices and ratings by estimating the effects separately. The results demonstrate robust coefficients across all estimated models. The estimated coefficients are highly significant on the 99% level with few exceptions. The explanatory power of the models amounts to an increasing r-squared, rising from a minimum of 14.3 percent (Model I, dependent variable points) to as high as 42.6 percent (Model V, dependent variable points). The first two models have a higher r-squared concerning the dependent variable price than the dependent variable points. The effect is vanished from the third model on, as control variables word counts are included and affect the highest increase in r-squared within the five models.

Linguistic Categories. Following the results for both dependent variables, the word type quantity shows positive signs and a highly significant coefficient of 0.011 Log (price) and 0.058 (points) compared to other word classes included in the linguistic categories, namely function word, verb, and adjective. This means that if we change the quantities by the proportion of 1% in the review, we expect the Log (price) to change by 1.1 percentage points. At the same time, if we change quantities by 1%, we expect the rating points to change by 0.058. Subsequently, randomized reviews are provided to exemplify the linguistic categories, marked in bold.

> "Not as fleshy as **many** examples of this southern Rhône blend, this shows thin, generic fruit with no particular focus."
> (The Wine Enthusiast Magazine, 82 points, 21 U$)

> "This Grenache-based wine includes 10% Tempranillo, 4% Malbec, and 2% Syrah in the sophisticated blend. Recently bottled, it's still tight, tannic, and hiding **much** of its fruit. The aromas give an indication of what's to come, cranberry fruit and lemony acidity, with **some** firm tannins."
> (The Wine Enthusiast Magazine, 87 points, 22 U$)

Words in this word class seem to be typically used in this context to compare with other varieties, consumer taste preferences, wine characteristics, and sensory qualities. They are probably used for illustration, referring to the collective knowledge of the wine community. This community is thus also constituted linguistically, while the knowledge of the dimensions of wine description is assumed to be known. At the same time, the reference to quantifiable comparisons with different entities strengthens the assessment as an expert. Remarkably, the other word classes, such as function words, adjectives, and verbs, have coefficients with negative signs in all estimated models, changing the dependent variables by the respective negative coefficient value. This seems plausible concerning function words such as articles, pronouns, and conjunctions since this word class takes on grammatical functions in a sentence but loses semantic meaning (Rijkhoff 2007). The appropriate examples for word class verbs and adjectives were determined using a concordance analysis of the most frequently occurring linguistic units, called n-grams. The word frequency analysis with LIWC-22 is based on the categories of n-grams consisting of N=2 units and occurring with a frequency above 20 in the text corpus. Furthermore, based on the minimum value of the variable word count, a minimum of 3 words per review was set. Table 4 displays the thirty most frequented n-grams.

[Table 4]

Verbs that can be considered typical of wine consumption and sensory impressions are utilized as examples, such as "finish"[2] and "drink," marked in bold:

> "This has overripe tropical-fruit aromas on the nose. Wheaty, oxidized flavors **finish** with a note of mushy fruit." (The Wine Enthusiast Magazine, 80 points, 7 U$)

> "Short and slightly sweet, there's nutty overtones, a creamy texture and good acidity but a buttery note overwhelms the fruit. **Drink** up." (The Wine Enthusiast Magazine, 81 points, 10 U$)

> "A superspicy Zin, marked by a blast of black pepper, clove and anise. The flavors are extracted and sweet to the point of appearing overripe, with blackberries and prunes leading to a tannic, bitter finish. **Drink** now." (The Wine Enthusiast Magazine, 82 points, 32 U$)

The short sentence construction in which the verb "drink" is located is particularly noteworthy. Placed at the of the review as a request or recommendation for time-dimensioned wine consumption, it appears as an almost characteristic sentence structure set with regular and short sentences (López Arroyo and Roberts 2015). If the proportion of adjectives in a tasting note is increased by 1%, we expect the Log (price) to change by -1.1 percentage points and the rating by -0.026 (see Model (II)).

> "This *big* and *brooding* wine offers *intense* aromas of **black** fruits, raisins, vanilla and toast. The palate presents **ripe** blackberry, *white* pepper, prune and licorice flavors. Pair it with *seasoned* cheeses or mushroom risotto. (The Wine Enthusiast Magazine, 88 points, 24 U$)

Further, the concordance analysis shows that the adjectives *ripe*, *black*, *red*, *rich*, *fresh*, *oak*, *light*, *white*, *soft*, and *dark* were used most frequently in the text corpus to describe wine experiences and wine evaluations. These can be identified as rater-specific used vocabulary in terms of adjectives for the present data selection.

Punctuation and Word Counts. The second model contains new control variables, including punctuation marks periods and commas. Commas are used to connect individual parts of sentences logically and grammatically. The comma demonstrates a highly significant positive coefficient of 0.051 at the 99% significance level. Logically and statistically related to these control variables are the following summary control variables in Model (III), word counts, which captures the words of the entire tasting note, and words per sentence, which counts words per sentence. The correlation matrix shows a negative period and words per sentence correlation of -0.909 at the 95% significance level. The comma has a higher coefficient of 0.070 in Model (III) when controlling for punctuation. At the same time, word count is associated with a higher

[2] When interpreting "finish", it must be noted, that the word is a homonym, which can thus also be classified as a noun. With the concordance analysis only the occurrence of the word was documented numerically, a classification into the word class was not made. Therefore, I focus on the verb form in the illustration.

score; a change of one word in the review increases rating points by 0.151. A similar effect can be recorded for the dependent variable Log (price). With a positive, highly significant coefficient of 0.018, the change of one word in the tasting note increases Log (price) by 1.8%. However, the effect is weaker compared to the other dependent variable points. Another striking feature is the increase in r-squared to 39.3% (points) and 32% (Log (price)). Thus, the variable word count can be associated with a higher rating. The variable words per sentence shows a negative, highly significant coefficient of -0.041 on points. This means that if the sentence is changed by one word, the rating score decreases by 0.041. The coefficient remains statistically insignificant for up to Model (V), with a value of -0.001. The variable word count also shows robust values up to Model (V), even when including the control variable sentiment.

Sentiment. The positive sentiment shows highly significant coefficients at the 99% significance level in Model (IV) for the dependent variable points. When the proportion of positive sentiment in the review is changed by 1%, the rating changes by 0.120. Negative tones negatively affect the rating by decreasing the score by 0.224 when changed by 1%. If also controlled for the language categories (Model V), the effect decreases to -0.134. In summary, positive and negative sentiment appears to have only a statistically relevant effect on ratings but not wine prices.

Language Categories. The language categories analytic, clout, authentic, and tone all show highly significant values, with only analytic showing a negative coefficient of -0.007. Words counted in the clout category and convey status language change the rating by 0.019 when changed by 1% (tone by 0.009 and authentic by 0.004). No, or only small insignificant values can be shown for prices. All five models contain the dummy control variables vintage and varieties to control over time and for product quality.

In summary, the results illustrate that, except for the word class quantity, the word types of function word, verb, and adjective significantly negatively impact prices and ratings. These findings need to be explored further with subsequent regression models.

I intentionally excluded the control variables country and reviewer from the five models to account for potential country and reviewer biases concerning the impact of linguistic categories on ratings and prices. Following Boon & Foppiani (2019), I test whether the effects of the linguistic and language categories on prices and ratings are due to possible biases of the reviewers allocated to specific wine regions and biases concerning the wine country (see Table 5). Therefore, the control variables reviewer and country were estimated in successive models

to separate the effects and test for the robustness of the results by comparing different terms of the econometric model.

[Table 5]

Estimated Models (VI) and (VII) demonstrate robust results in estimated coefficients, signs, and significance levels at 99%. This suggests that the variables that explain the impact on ratings and prices are robust. The explanatory power measured by the r-squared increases from 42.6% (Model V, points) to 49.8% (Model VI, points) to 50.9% (Model VII, points).

Linguistic categories. Within the linguistic categories, we notice an increase in function words' statistically significant coefficient from -0.054 (Model V) to -0.085 in Model (VI) and Model (VII). The coefficients regressed on price also increased from -0.006 (Model V) to -0.011 in Model (VI) and Model (VII). The coefficients of the variable adjectives remain almost unchanged. In contrast, the coefficients of the word type quantity almost halve in Models (VI) and (VII) and show the lowest value in the seven models when controlling for reviewer and country. The coefficients regressed on Log (price) remain almost unchanged.

Punctuation and Word Counts. When punctuation is considered, the estimates of the variable period in Models (VI) and (VII) show a highly significant negative coefficient of -0.014, respectively -0.013 for the dependent variable Log (price). The estimators were insignificant and close to 0 from Model (III) to Model (VI). At the same time, we have almost a threefold increase of the effect size in Models (VI) and (VII), compared to Model (V), when the category period is regressed on the rating points. The coefficient increases from -0.026 to -0.086 and -0.083, respectively. When examining the variable word count and words per sentence, it is noticeable that the coefficients of the variable word count regressed on points and Log (price), respectively, remain stable.

Regarding the dependent variable Log (price), the coefficients increase from 0.018 (Model I) to 0.021 (Model VII). The coefficients also remain highly significant at the 99% significance level. The factors of the estimates increase slightly from 0.151 in Model (III) to 0.161 in Model (VII), also at the 99% significance level.

Sentiment. The coefficients of the sentiment variables positive tone and negative tone decrease both regressed on points and Log (Price).

Language Categories. At the same time, the language categories analytic, clout and authentic factors persist almost the same. However, the category tone shows highly significant coefficients regarding points and Log (price) when including all control variables.

Finally, the results of the estimations of Model (I) to Model (V) can be confirmed. The impact of the linguistic entities, which include linguistic categories such as word types, punctuation marks, word counts, and sentiments, on prices and ratings have been estimated separately and confirmed by the later addition of the control variables and reviewers. At the same time, the results of Models (VI) and (VII) raise new insights. The apparent change in the coefficients of the variables period and words per sentence, as well as the moderate, positive change in the category word count, suggests that the reviews may be explained in their written representation by the specific writing style of the reviewers, which may hold preferences for coordinating sentence parts. Also, their allocated countries and possible quality differences to assigned wines could explain the increase in coefficients. Thus, allocating countries may condition that certain reviewers are assigned to countries with different wine quality profiles. In parallel, differences in ratings could also be explained by taster preferences and a possible reviewer bias based on individual tasting behavior. The consistency of professional evaluations is already investigated in current research (e.g., Cardebat and Livat 2016, Bodington and Malfeito-Ferreira 2018, Bodington 2020, Frick 2020).

4.2.Empirical Study II: Quantile Regression and Plots

In particular, the negative effect of adjectives needs to be investigated more closely. Intuitively, it was assumed that a higher frequency of adjectives in the review positively affects prices and ratings. The assumption is based on the idea that if the number of words is higher and the sensory wine experience is described more accurately by appropriate adjectives, the rating score will be positively increased. The sentiments, which are expressed by the respective adjectives, are to be considered thereby. Thus, it is possible that domain-specific adjectives, such as the adjectives determined by the concordance analysis, are classified with a negative sentiment since the occurrence measured against the reference corpus of LIWC-22 was classified there. Another explanation seems plausible if the word count is included. Better reviews tend to contain a higher number of words in the review. One reasonable explication is in lower-rated and thus shorter reviews; other word types than adjectives are used. The gustatory impression is described less, and thus fewer adjectives are used:

> "The aromas of barrel spice, pear and melon are light and deft. The flavors display elegance, restraint and nuance." (The Wine Enthusiast Magazine, 88 points, 18 U$)

> "This gorgeous, fragrant wine opens with classic Sangiovese scents of violet, rose, perfumed red berry, new leather and a whiff of baking spice. The elegant, radiant palate delivers crushed Marasca cherry, ripe strawberry, cinnamon, black tea and a hint of pipe tobacco. Firm, ultrafine tannins and bright acidity offer an age-worthy structure and impeccable balance. It's already stunning but will evolve for decades. Drink 2020–2050." (The Wine Enthusiast Magazine, 100 points, 550 U$)

The review examples illustrate, with the average mean of rating points, that the randomly selected text example has fewer adjectives and shorter text length than the review rated with one hundred points. Nevertheless, the results of the seemingly unrelated regression Models (I) to (VII) demonstrate that increasing the number of adjectives by one percent in the reviews generally leads to a lower rating. However, based on the review example, we can discover more used adjectives in the best possible rating score.

A quantile regression is conducted for the dependent variables points and Log (price), respectively (Koenker and Bassett 1978). The aim is to investigate how adjectives behave in the different rating and price levels to check for robustness of the results of the previous model. Quantile regressions can extend classical least squares estimation of conditional mean models (Koenker and Hallock 2001). At the same time, I follow a second purpose: In Equations 3 and 4, the linguistic categories are considered without control variables to separate the effects and check the previous results for consistency, validity, and significance.

$$Rating\ Points_i = \beta_0 + \beta_1\,(linguistic\ categories)_i + \beta_2\,(punctuation)_i + \beta_3\,(word\ counts)_i + \beta_4\,(sentiments)_i + \beta_5\,(language\ categories)_i + \varepsilon_i. \quad (3)$$

$$Log\,(price)_i = \gamma_0 + \gamma_1\,(linguistic\ categories)_i + \gamma_2\,(punctuation)_i + \gamma_3\,(word\ counts)_i + \gamma_4\,(sentiments)_i + \gamma_5\,(language\ categories)_i + \epsilon_i. \quad (4)$$

In the following, the coefficients resulting from the quantile regressions from the 25th to the 75th quartile, including the 50th quartile, are plotted.

[Figure 4]

[Figure 5]

The figures with the plotted coefficients illustrate that the result of our previous estimations represents the 50th quartile. Here, the variable adjective shows the comparatively lowest value within the quartiles concerning the dependent variable points and Log (price). Thus, the original assumption can be confirmed that the share of adjectives increases with increasing price and point score, more precisely from the 60th quartile, indicating an u-shaped curve in the plotted quantiles.

The comma and word count variables show a positive linear trend in the quantiles, suggesting that as the rating and price increase, the length of the reviews tends to get longer. The category offers two possible interpretations: The reviews are syntactically formulated by a stringing linguistic style, which can be syntactically expressed by enumerations using commas, or they generally become longer by increasing the word count. Here, the variable words per sentence is considered for further explanation. As the plotted coefficients across the quantiles illustrate, sentences tend to get shorter as the points rating and price increase. Consequently, the first interpretation regarding a stringing linguistic style, presumably to semantically support gustatory impressions or wine qualities, seems more plausible for the genre of wine reviews.

Furthermore, the plotted coefficients generate insights at the sentiment level. The share of the negative tone increases with increasing rating and price. Regarding reviewer bias or taste preferences, the research question arises whether reviewers become more critical with increasing quality levels or market prices. The graph shows a positive linear trend for the dependent variable points. A similar effect can be observed for the positive tone. While there is a similar trend for the dependent variable points, with the first quantile (.25) and the last quartile (.75) demonstrating similar values, the graph for the dependent variable Log (price) shows a linear, negative pattern. This also implies that the reviewers tend to be more critical when the market price increases. In summary, the quantile plots suggest divergence in linguistic features for different reputation levels of rated wines by revealing varying linguistic attributes for various levels of ratings and prices.

4.3.Empirical Study III: Instrumental Variables (IV) Estimation

Previous studies have demonstrated the interrelationship between ratings and prices (e.g., Cardebat et al. 2014). Thus, a possible endogeneity problem occurs when considering both as dependent variables. The previous estimations have shown that specific linguistic categories have a negligible effect on wine prices. Following Landon and Smith (1998), I test for the impact of reviews on wine prices using a two-stage least squares (2SLS) approach. As the

ratings might be correlated with the error term, I conduct an instrumental variables estimation (Stock and Watson 2012) to test for the causal effect of reviews on wine prices by using the linguistic categories as instruments for rating scores. This approach promises new insights into the causal relationship between reviews and prices. The consideration precedes this research design that the linguistic categories are strongly related to the rating points as a written reflection of the gustatory and sensory experiences and, thus, the quality of the product in the wine tasting, which is expressed with conventionalized linguistic concepts. Using the individual linguistic categories as an instrument for rating points, the effect of linguistic content can be separated, and a relationship on the effect of prices can be identified. As vintners tend to set their product prices based on their reputation (e.g., Ali and Nauges 2007), this instrument seems appropriate to generate causal relationships. However, the content of text reviews is assumed to be strongly correlated to the overall (numeric) rating.

Following Stock and Watson (2012), a two-stage least squares regression is estimated, where the regressor *rating points* is decomposed in the first stage (Equation 5) before regressed on Log (price) (Equation 6). Table 6 displays the regression results.

First Stage

$$Rating\ Points_i = a_0 + a_1\,(linguistic\ categories)_i + a_2\,(punctuation)_i + a_3\,(word\ counts)_i + a_4\,(sentiments)_i + a_5\,(language\ categories)_i + u_i \quad (5)$$

Second Stage

$$Log\,(price) = \beta_0 + \beta_1\,(\widehat{rating\ points})_\iota + u_\iota \quad (6)$$

[Table 6]

The selected linguistic variables are considered suitable instruments based on the determined F-statistic (>10) testing for weak instruments by the "rule of thumb" (Stock and Watson 2012, p. 507). The regression results reveal highly significant coefficients (Model I), confirming the results of the previous seemingly unrelated regression (Table 5). Estimating the instrumental variables demonstrates reviews' positive and highly significant causal effect on wine prices. An increase of one unit in rating points increases the wine price by 13,1%. Based on these results, the findings of the previous quantile plots can also be interpreted in more detail. With this knowledge, the linguistic representations for low, medium, and high-reputation wines identified in the quantile plots (Figures 3 and 4) can be considered linguistic characteristics for specific quality levels. In summary, consumers and producers could reduce information

asymmetries through knowledge of linguistic characteristics, indicating distinct reputation levels. From this perspective, linguistic features in reviews serve as value indicators that consumers may appreciate as quality signals.

5. Summary of Results

The empirical studies identified text length's statistically significant, positive effect on wine ratings. The quantile regression demonstrates the positive increasing linear progression across the quantiles, suggesting that the review's text length increases with increasing price and rating. Based on both empirical studies, I can highlight that review text length can be associated with a higher price and rating, confirming prior findings (e.g., Ramirez 2010, Lam et al. 2019). In detail, after an average score of 88 points and the average market price represented at the 50th quantile, sentence length appears to decrease, and review sentences become shorter, as measured by decreasing words per sentence. The decreasing number of words per sentence, starting at the 50th quantile, confirms this finding for market prices. The explanatory power increases in the empirical study I, Model (III) by adding the word count variables up to 39.3%. In conclusion, these variables tend to drive linguistic categories' effect on rating points and prices. Thus, hypothesis H_1 can be confirmed.

Regarding the dependent variable rating points, the linguistic categories significantly impact product prices and ratings. The partially negative coefficients were examined in more detail with quantile regression and identified trends for the focused variables *Adjective*, *Period*, *Comma*, and *word counts*. The categories *Period*, and *Words per sentence* show insignificant coefficients for the dependent variable Log (Price). Therefore, hypothesis H_2 can only be partially confirmed.

Hypothesis H_3 includes the analysis of positive and negative sentiments and the categories Analytic, Clout, Authentic, and Tone. The positive sentiments and the category *Tone* show insignificant coefficients regressed on Log (price) in Models (IV) and (V) of the seemingly unrelated regression. At the same time, the other variables examined have a highly significant impact. Here, negative sentiment has a negative effect, and positive sentiment positively affects the rating. In this regard, hypothesis H_3 can be confirmed. The plotted quantiles show that reviewers are more critical with increasing price and rating from the 50th quantile on, as indicated by the decreasing course of the variable *Positive tone*, while the reviewers seem to become more *authentic* simultaneously. Thus, the strongly linear increasing slopes regarding rating points and prices indicate a trend. At the same time, the plotted coefficients of the

Analytic variable are at similar levels across the quantiles. One explanation could be that wine language is based on prototypes rather than analytical descriptions, as Brochet and Dubourdieu (2001) have examined. The minor effect on prices is in line with the results of Cardebat et al. (2014) and Combris et al. (1997). Nevertheless, as ratings and prices could cause endogeneity when considering both simultaneously, the instrumental variables approach revealed the influence of reviews on wine prices.

6. Discussion

The present study investigates the impact of linguistic categories on wine prices and ratings and thus provides insights into the textual dimension of reviews. A comprehensive database containing rated wines from the world's major wine-producing countries and market prices for wine is presented, further representing the wine characteristics known to the reviewers during the evaluation process. I applied the content analysis tool LIWC-22 to identify linguistic units that affect market prices and ratings. At the same time, a word frequency analysis was applied to generate the 30 most frequent words on a text corpus basis. Thus, further insights were gained into the typical word inventory of professional wine assessments. Using robustness checks, the first empirical study determined that individual reviewers and their assignment to specific countries of origin also impact ratings and prices. Linguistic phenomena that could not be unambiguously identified, such as the negative influence of adjectives on overall ratings and market prices, were statistically elucidated using an econometric approach involving quantile regression. The quantile regression could outline trends, such as an u-shaped curve of adjectives across quantiles. Thus, insights into how linguistic units behave across different quantile and reputation levels regarding rating and prices were generated. That is, for below-average, average, and above-average price levels and rating levels, the occurrence of linguistic units has been outlined. The instrumental variables estimation was conducted to shed light on the relationship between ratings and prices, confirming the positive impact of reviews on wine prices.

Nevertheless, one limitation of the study is considering a single source of information for professional reviews. Additional studies are needed to obtain more information on the effect of linguistic categories on prices using different sources for expert reviews. At the same time, the present study makes a valuable contribution to the literature by providing a detailed perspective into the linguistic design of reviews, thus allowing to identify quality-indicating signals in the context of a purchase decision by understanding the linguistic features of reviews.

This knowledge allows market participants and prospects to gain more product understanding regarding product quality before purchase decisions.

6.1. Strategic Implications and Future Research

Future studies could shed light on other textual formats of wine and market communication regarding their linguistic inventory in professional reviews. Additional studies could focus on experimental settings to investigate whether consumers can recognize the wine's underlying quality levels based on the linguistic patterns used when evaluating wine reviews. At the same time, associations of quality levels could create a spillover effect on reputation, which has strategic implications for winemakers who base their pricing strategies primarily on reputation (e.g., Ali and Nauges 2007). Furthermore, future research could extend the analysis of word frequencies in wine reviews based on large text corpora to gain further insight into domain-specific vocabulary, their textual functions, and their impact on ratings, wine marketing, and sales.

Since professional reviewers can apply linguistic inventory according to their preferences, future studies could address reviewer behavior in more detail. While Castriota et al. (2013) have shown for Italian wines that generosity and individual preferences for specific wine characteristics impact professional wine evaluations, reviewer-typical behavior could also be studied regarding gender to highlight potential differences. According to Newman et al. (2008), women and men tend to vary in their use of language. This could affect the wine evaluations of male and female judges and their specific linguistic categories, indicating that judges rate differently. Thus, further research could shed light on the gender-specific behavior of wine judges (Bodington and Malfeito-Ferreira 2018), considering that women and men react differently to wine-attributing information (Almenberg and Dreber 2011).

Currently, the wine industry is experiencing an expansion of its product range through ecologically beneficial and sustainable cultivation methods, eco-labels, and certifications, while current studies have focused on organic wines and their price and quality structures (e.g., Abraben et al. 2017, Fanasch and Frick 2020, Delmas and Gergaud 2021). The present study shows that linguistic structures can indicate specific reputation levels, including rating and price dimensions. The knowledge of these linguistic structures used in wine reviews may be able to reduce information asymmetries, so that consumers may also gain a better understanding of the expected product quality and impact on wine prices (e.g., Delmas and Grant 2014), as eco-labels may also be perceived as an indicator of lower product quality (Delmas and Lessem

2017). Since linguistic content can provide information on expected product quality, vintners would be well advised to pay particular attention to linguistic inventory when designing customer communications to describe their products adequately.

7. References

Abraben, L. A., Grogan, K. A., & Gao, Z. (2017). Organic price premium or penalty? A comparative market analysis of organic wines from Tuscany. *Food Policy*, 69, 154-165.

Akerlof, George A. (1970). The Market for "Lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488-500.

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

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

Almenberg, J., & Dreber, A. (2011). When does the price affect the taste? Results from a wine experiment. *Journal of Wine Economics*, 6(1), 111-121.

Arias-Bolzmann, L., Sak, O., Musalem, A., Lodish, L., Báez K, R., & José De Sousa, L. (2003). Wine pricing: The influence of country of origin, variety, and wine magazine ratings. *International Journal of Wine Marketing*, 15(2), 47-57.

Arroyo, B. L., & Roberts, R. P. (2015). How specific wine tasting descriptors are?. *Procedia-Social and Behavioral Sciences*, 198, 287-299.

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.

Ashton, R. H. (2016). The value of expert opinion in the pricing of Bordeaux wine futures. *Journal of Wine Economics*, 11(2), 261-288.

Ashton, R. H. (2017). Dimensions of expertise in wine evaluation. *Journal of Wine Economics*, 12(1), 59-83.

Beninger, S., Parent, M., Pitt, L., & Chan, A. (2014). A content analysis of influential wine blogs. *International Journal of Wine Business Research*, 26(3), 168-187.

Bodington, J. (2020). Rate the raters: A note on wine judge consistency. *Journal of Wine Economics*, 15(4), 363-369.

Bodington, J., & Malfeito-Ferreira, M. (2018). Do female and male judges assign the same ratings to the same wines? Large sample results. *Journal of Wine Economics*, 13(4), 403-408.

Boon, E., & Foppiani, O. (2019). An exploratory analysis of cross-country biases in expert wine reviews. *Journal of Wine Research*, 30(2), 144-156.

Boyd, R. L., Ashokkumar, A., Seraj, S., & Pennebaker, J. W. (2022). The development and psychometric properties of LIWC-22. The University of Texas at Austin. https://www.liwc.app

Brochet, F., & Dubourdieu, D. (2001). Wine descriptive language supports cognitive specificity of chemical senses. *Brain and Language*, 77(2), 187-196.

Buccafusco, C., Masur, J. S., & Whalen, R. (2021). How many Latours is too many? Measuring brand name congestion in Bordeaux wine. *Journal of Wine Economics*, 16(4), 419-428.

Capehart, K. W. (2021a). Willingness to pay for wine bullshit: Some new estimates. *Journal of Wine Economics*, 16(3), 260-282.

Capehart, K. W. (2021b). Expensive and cheap wine words revisited. *Journal of Wine Economics*, 16(4), 411-418.

Cardebat, J. M., & Livat, F. (2016). Wine experts' rating: A matter of taste?. *International Journal of Wine Business Research*, 28(1), 43-58.

Cardebat, J. M., Figuet, J. M., & 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.

Castriota, S., Curzi, D. & Delmastro, M. (2013). Tasters' bias in wine guides' quality evaluations. *Applied Economics Letters*, 20(12), 1174-1177.

Chen, K. J., & McCluskey, J. J. (2018). Impacts of expert information on prices for an experience good across product segments. *Journal of Agricultural and Resource Economics*, 43(3), 388-402.

Chocarro, R. & Cortiñas, M. (2013). The impact of expert opinion in consumer perception of wines. *International Journal of Wine Business Research*, 25(3), 227-248.

Chung, C. K., & Pennebaker, J. W. (2012). Linguistic inquiry and word count (LIWC): pronounced "Luke,"... and other useful facts. In *Applied Natural Language Processing: Identification, Investigation and Resolution*, 206-229. IGI Global.

Combris, P., Lecocq, S., & Visser, M. (1997). Estimation of a hedonic price equation for Bordeaux wine: does quality matter?. *The Economic Journal*, 107(441), 390-402.

Croijmans, I., & Majid, A. (2016). Not all flavor expertise is equal: The language of wine and coffee experts. *PLoS One*, 11(6), e0155845.

Croijmans, I., Hendrickx, I., Lefever, E., Majid, A., & Van Den Bosch, A. (2020). Uncovering the language of wine experts. *Natural Language Engineering*, 26(5), 511-530.

Delmas, M. A., Gergaud, O., & Lim, J. (2016). Does organic wine taste better? An analysis of experts' ratings. *Journal of Wine Economics*, 11(3), 329-354.

Delmas, M. A., & Gergaud, O. (2021). Sustainable practices and product quality: Is there value in eco-label certification? The case of wine. *Ecological Economics*, 183, 106953.

Delmas, M. A., & Grant, L. E. (2014). Eco-labeling strategies and price-premium: The wine industry puzzle. *Business & Society*, 53(1), 6-44.

Delmas, M. A., & Lessem, N. (2017). Eco-premium or eco-penalty? Eco-labels and quality in the organic wine market. *Business & Society*, 56(2), 318-356.

Dubois, P., 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.

Fanasch, P., & Frick, B. (2020). The value of signals: Do self-declaration and certification generate price premiums for organic and biodynamic wines?. *Journal of Cleaner Production*, 249, 119415.

Fiebig, D. G. (2001). Seemingly unrelated regression. In *A Companion to Theoretical Econometrics*, B.H. Baltagi (Ed.), 101-121.

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

Frick, B. (2020). The legacy of gurus: The impact of Armin Diel and Joel Payne on winery ratings in Germany. *Journal of Wine Economics*, 15(4), 370-377.

Gawel, R. (1997). The use of language by trained and untrained experienced wine tasters. *Journal of Sensory Studies*, 12(4), 267-284.

Gergaud, O., Ginsburgh, V., & Moreno-Ternero, J. (2021). Wine ratings: Seeking a consensus among tasters via normalization, approval, and aggregation. *Journal of Wine Economics*, 16(3), 321-342.

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

Herdenstam, A. P., Hammarén, M., Ahlström, R., & Wiktorsson, P. A. (2009). The professional language of wine: Perception, training and dialogue. *Journal of Wine Research*, 20(1), 53-84.

Hilger, J., Rafert, G., & 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. (2008). An examination of judge reliability at a major U.S. wine competition. *Journal of Wine Economics*, 3(2), 105-113.

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

Horowitz, I. & Lockshin, L. (2002). What price quality? An investigation into the prediction of wine-quality ratings. *Journal of Wine Research*, 13(1), 7-22.

Klimmek, M. (2013). On the information content of wine notes: Some new algorithms?. *Journal of Wine Economics*, 8(3), 318-334.

Koenker, R., & Bassett Jr, G. (1978). Regression quantiles. *Econometrica: Journal of the Econometric Society*, 46(1), 33-50.

Koenker, R., & Hallock, K. F. (2001). Quantile regression. *Journal of Economic Perspectives*, 15(4), 143-156.

Kwak, Y. S., Nam, Y. J., & Hong, J. W. (2021). Effect of online collective intelligence in wine industry: Focus on Correlation between wine quality ratings and on-premise prices. *Sustainability*, 13(14), 8001.

Lam, J., Lambrechts, M., Pitt, C., & Afsharipour, A. (2019). When writing about wine: How ratings impact reviews. *Journal of Wine Research*, 30(4), 335-345.

Landon, S., & Smith, C. E. (1998). Quality expectations, reputation, and price. *Southern Economic Journal*, 64(3), 628-647.

Lockshin, L. S., & Rhodus, W. T. (1993). The effect of price and oak flavor on perceived wine quality. *International Journal of Wine Marketing*, 5(2/3), 13-25.

López Arroyo, B., & Roberts, R. P. (2015). Unusual sentence structure in wine tasting notes: A contrastive corpus-based study. *Languages in Contrast*, 15(2), 162-180.

Lord Ferguson, S., Ewing, L., Bigi, A., & Diba, H. (2019). Clustering of influential wine bloggers using automated content analysis techniques. *Journal of Wine Research*, 30(2), 157-165.

Ludwig, S., de Ruyter, K., Friedman, M., Brüggen, E. C., Wetzels, M., & Pfann, G. (2013). More than words: The influence of affective content and linguistic style matches in online reviews on conversion rates. *Journal of Marketing*, 77(1), 87–103.

Luxen, M. F. (2018). Consensus between ratings of red Bordeaux wines by prominent critics and correlation with prices 2004–2010 and 2011–2016: Ashton revisited and expanded. *Journal of Wine Economics*, 13(1), 83–91.

Marks, D. (2015). Seeking the veritas about the vino: Fine wine ratings as wine knowledge. *Journal of Wine Research*, 26(4), 319-335.

Masset, P., Weisskopf, J. P., & Cossutta, M. (2015). Wine tasters, ratings, and en primeur prices. *Journal of Wine Economics*, 10(1), 75-107.

Mastrobuoni, G., Peracchi, F., & Tetenov, A. (2014). Price as a signal of product quality: Some experimental evidence. *Journal of Wine Economics*, 9(2), 135-152.

McCannon, B. C. (2020). Wine descriptions provide information: A text analysis. *Journal of Wine Economics*, 15(1), 71-94.

McMullan, K., Feng, C. M., & Chan, A. (2022). How do wine bloggers increase Twitter engagement? Through simple changes to their writing style. *Journal of Wine Research*, 33(2), 57-65.

Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy*, 78(2), 311-329.

Newman, M. L., Groom, C. J., Handelman, L. D., & Pennebaker, J. W. (2008). Gender differences in language use: An analysis of 14,000 text samples. *Discourse Processes,* 45(3), 211-236.

Oczkowski, E., & Doucouliagos, H. (2015). Wine prices and quality ratings: A meta-regression analysis. *American Journal of Agricultural Economics*, 97(1), 103-121.

Oczkowski, E., & Pawsey, N. (2019). Community and expert wine ratings and prices. *Economic Papers: A Journal of Applied Economics and Policy*, 38(1), 27-40.

Otheguy, M., Honoré-Chedozeau, C., & Valentin, D. (2021). Do wine experts share the same mental representation? A drawing elicitation study with wine makers, sellers, and critics. *Food Quality and Preference*, 94, 104302.

Outreville, J. F., & Le Fur, E. (2020). Hedonic price functions and wine price determinants: A review of empirical research. *Journal of Agricultural & Food Industrial Organization*, 18(2), 1-27.

Paradis, C., & Eeg-Olofsson, M. (2013). Describing sensory experience: The genre of wine reviews. *Metaphor and Symbol*, 28(1), 22-40.

Ramirez, C. D. (2010). Do tasting notes add value? Evidence from Napa wines. *Journal of Wine Economics*, 5(1), 143-163.

Rijkhoff, J. (2007). Word classes. *Language and Linguistics Compass*, 1(6), 709-726.

Schnabel, H., & Storchmann, K. (2010). Prices as quality signals: Evidence from the wine market. *Journal of Agricultural & Food Industrial Organization*, 8(1), 1-23.

Stock, J. H., & Watson, M. W. (2012). *Introduction to Econometrics*, Global edition. Pearson Education.

Storchmann, K. (2012). Wine economics. *Journal of Wine Economics*, 7(1), 1–33.

Stuen, E., Miller, J., & Stone, R. (2015). An analysis of wine critic consensus: A study of Washington and California wines. *Journal of Wine Economics*, 10(1), 47-61.

Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology*, 29(1), 24-54.

Thrane, C. (2019). Expert reviews, peer recommendations and buying red wine: Experimental evidence. *Journal of Wine Research*, 30(2), 166-177.

Villas-Boas, S. B., Bonnet, C., & Hilger, J. (2021). Random utility models, wine and experts. *American Journal of Agricultural Economics*, 103(2), 663-681.

Yang, C., Barth, J., Katumullage, D., & Cao, J. (2022). Wine review descriptors as quality predictors: Evidence from Language Processing Techniques. *Journal of Wine Economics*, 17(1), 64-80.

Zellner, A. (1962). An efficient method of estimating Seemingly Unrelated Regressions and tests for aggregation bias. *Journal of the American Statistical Association*, 57(298), 348–368.

Website: https://www.kaggle.com/datasets/zynicide/wine-reviews, last download: March 2021.

8. Tables and Figures

Table 1: Descriptive Statistics

VARIABLES	Description	N	Mean	SD	Minimum	Maximum
Price	The market price for each wine bottle *i*, in U.S. $.	83,067	35.22	44.46	4	3,300
Points	The rating points for each wine bottle *i*, on a scale from 80-100.	83,067	88.6	3.002	80	100
Function words	Percentage of words in the review that contributes to the word class function words	83,067	40.58	7.296	10.34	71.43
Verb	Percentage of words in the review that contributes to the word class verb.	83,067	6.843	3.707	0	31.03
Adjective	Percentage of words in the review that contributes to the word class adjective.	83,067	10.17	4.797	0	44.44
Quantity	Percentage of words in the review that contributes to the word class quantities.	83,067	2.946	3.068	0	28.85
Period	Percentage of words in the review that contributes to the punctuation category period.	83,067	6.869	1.921	0	33.33
Comma	Percentage of words in the review that contributes to the punctuation category comma.	83,067	8.224	3.993	0	44.44
Word count	The total number of words written in each review.	83,067	41.05	10.81	3	127
Words per sentence	The total number of written words in each sentence of the review.	83,067	15.77	4.622	3	64
Positive tone	Percentage of words in the review with positive sentiment.	83,067	4.286	3.559	0	32
Negative Tone	Percentage of words in the review with negative sentiment.	83,067	0.375	1.081	0	22.73
Analytic	Language summary variable indicating the analytical thinking in each review on a scale of 0-100.	83,067	82.59	17.96	1	99
Clout	Language summary variable specifying the language of status in each review on a scale of 0-100.	83,067	33.49	12.52	1	99
Authentic	Language summary variable indicating the honesty in each review, on a scale of 0-100.	83,067	15.67	20.26	1	99
Tone	Language summary variable specifying the emotional tone in each review on a scale of 0-100.	83,067	65.28	32.16	1	99
Variety	The grape variety of each wine bottle *i*.	83,067	353.6	190.8	1	698
Vintage	The wine vintage for each wine bottle *i*, given in years.	83,067	2012	3.312	1904	2017
Country	The country of wine origin of wine bottle *i*.	83,067	27.93	13.56	1	43
Reviewer	The name of the reviewer *k* for a corresponding wine bottle *i*.	83,067	12.91	4.472	1	19

Table 2: Pairwise Correlations

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Price	1.000																			
(2) Points	0.401*	1.000																		
(3) Function words	-0.011*	-0.079*	1.000																	
(4) Verb	-0.027*	-0.121*	0.478*	1.000																
(5) Adjective	-0.042*	-0.068*	-0.039*	0.012*	1.000															
(6) Quantity	0.036*	0.028*	0.280*	0.105*	0.094*	1.000														
(7) Period	-0.065*	-0.178*	-0.011*	0.203*	0.153*	-0.060*	1.000													
(8) Comma	0.056*	0.088*	-0.314*	-0.185*	0.075*	-0.034*	-0.124*	1.000												
(9) Word count	0.207*	0.502*	0.180*	0.036*	-0.133*	0.135*	-0.339*	-0.034*	1.000											
(10) Words per sentence	0.055*	0.154*	0.011*	-0.208*	-0.138*	0.058*	-0.909*	0.120*	0.304*	1.000										
(11) Positive tone	-0.029*	0.104*	0.040*	0.031*	0.351*	-0.057*	0.078*	-0.019*	-0.065*	-0.072*	1.000									
(12) Negative tone	-0.013*	-0.138*	0.042*	0.042*	0.026*	0.032*	0.007	-0.012*	-0.034*	-0.002	-0.104*	1.000								
(13) Analytic	0.030*	0.103*	-0.262*	-0.405*	-0.160*	-0.027*	-0.222*	0.022*	0.130*	0.209*	-0.138*	-0.030*	1.000							
(14) Clout	0.013*	0.100*	-0.192*	-0.102*	-0.033*	-0.177*	0.018*	0.016*	-0.048*	-0.011*	0.037*	-0.073*	0.208*	1.000						
(15) Authentic	0.028*	-0.018*	0.209*	0.176*	0.012*	0.194*	0.002	-0.055*	0.073*	-0.013*	-0.094*	0.046*	-0.061*	-0.311*	1.000					
(16) Tone	-0.009*	0.180*	0.054*	0.022*	0.269*	-0.035*	0.035*	-0.037*	0.028*	-0.037*	0.834*	-0.378*	-0.090*	0.044*	-0.082*	1.000				
(17) Variety	-0.050*	0.002	-0.076*	-0.066*	0.006	-0.031*	-0.041*	0.042*	0.015*	0.035*	-0.004	-0.004	0.022*	-0.001	-0.017*	-0.007*	1.000			
(18) Vintage	-0.098*	0.048*	-0.098*	-0.021*	-0.038*	-0.136*	0.014*	-0.162*	-0.110*	-0.012*	0.008*	-0.027*	0.026*	0.106*	-0.102*	0.014*	0.005	1.000		
(19) Country	0.013*	0.075*	-0.061*	-0.117*	-0.111*	0.036*	-0.309*	0.055*	0.031*	0.320*	-0.023*	0.006	0.097*	-0.004	-0.029*	-0.011*	0.111*	0.073*	1.000	
(20) Reviewer	0.059*	-0.016*	0.215*	0.152*	0.013*	0.109*	0.030*	0.063*	-0.090*	0.008*	-0.075*	0.026*	-0.019*	0.012*	0.076*	-0.064*	-0.141*	-0.063*	0.211*	1.000

** $p<0.05$*

Table 3: Regression Results | Seemingly Unrelated Regression (SUR) I

	(I)		(II)		(III)		(IV)		(V)	
VARIABLES	Log (price)	Points	Log (price)	Points	Log (price)	Points	Log (price)	Points	Log (price)	Points
Linguistic Categories										
Function words	-0.002***	-0.019***	-0.001***	-0.019***	-0.006***	-0.055***	-0.006***	-0.055***	-0.006***	-0.054***
	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.001)	(0.000)	(0.002)
Verb	-0.007***	-0.075***	-0.004***	-0.048***	-0.005***	-0.059***	-0.005***	-0.058***	-0.007***	-0.070***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Adjective	-0.012***	-0.032***	-0.011***	-0.026***	-0.008***	-0.004**	-0.008***	-0.033***	-0.008***	-0.034***
	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)
Quantity	0.011***	0.058***	0.010***	0.051***	0.006***	0.012***	0.006***	0.028***	0.006***	0.034***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Punctuation										
Period			-0.031***	-0.214***	0.001	-0.025**	0.000	-0.019*	-0.000	-0.026**
			(0.001)	(0.005)	(0.002)	(0.010)	(0.002)	(0.010)	(0.002)	(0.010)
Comma			0.008***	0.051***	0.010***	0.070***	0.010***	0.070***	0.010***	0.069***
			(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Word Counts										
Word Count					0.018***	0.151***	0.018***	0.149***	0.018***	0.148***
					(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Words per Sentence					-0.001	-0.041***	-0.001	-0.036***	-0.001	-0.036***
					(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)
Sentiment										
Positive Tone							-0.000	0.120***	-0.000	0.049***
							(0.001)	(0.003)	(0.001)	(0.005)
Negative Tone							-0.000	-0.224***	0.001	-0.134***
							(0.002)	(0.007)	(0.002)	(0.009)
Language Categories										
Analytic									-0.001***	-0.007***
									(0.000)	(0.001)
Clout									0.002***	0.019***
									(0.000)	(0.001)
Authentic									0.001***	0.004***
									(0.000)	(0.000)
Tone									-0.000	0.009***
									(0.000)	(0.001)
Controls										
Vintage (Dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Variety (Dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.984***	91.795***	3.249***	93.682***	2.236***	86.187***	2.237***	85.679***	2.306***	85.934***
	(0.703)	(3.406)	(0.699)	(3.364)	(0.668)	(2.870)	(0.668)	(2.811)	(0.667)	(2.793)
Observations	83,067	83,067	83,067	83,067	83,067	83,067	83,067	83,067	83,067	83,067
R-squared	0.244	0.143	0.254	0.165	0.320	0.393	0.320	0.418	0.323	0.426

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Word Frequencies Analysis with LIWC-22, n=83,067 Observations

Word	Frequency	Rows with Word	Percentage of Rows with Word
wine	49164	39480	47.53
flavors	39965	37638	45.31
palate	29674	29049	34.97
fruit	29615	26562	31.98
aromas	28788	28464	34.27
finish	25582	25385	30.56
acidity	22238	21670	26.09
tannins	20416	19803	23.84
drink	20094	19876	23.93
black	18173	15325	18.45
cherry	17557	16262	19.58
ripe	17501	16345	19.68
nose	13199	13057	15.72
notes	13001	12252	14.75
red	12892	11468	13.81
spice	11992	11426	13.76
fresh	11500	10919	13.14
plum	11191	10274	12.37
berry	11187	10130	12.20
oak	10035	9106	10.96
fruits	9721	9294	11.19
rich	9625	9260	11.15
apple	9145	8308	10.00
blend	8732	8586	10.34
offers	8564	8422	10.14
texture	8386	8256	9.94
light	8342	7884	9.49
white	7901	7129	8.58
soft	7797	7574	9.12
dark	7783	7244	8.72

Table 5: Regression Results | Seemingly Unrelated Regression (SUR) II

	(VI)		(VII)	
VARIABLES	Log (price)	Points	Log (price)	Points
Linguistic Categories				
Function words	-0.011***	-0.085***	-0.011***	-0.085***
	(0.000)	(0.002)	(0.000)	(0.002)
Verb	-0.008***	-0.082***	-0.008***	-0.080***
	(0.001)	(0.003)	(0.001)	(0.003)
Adjective	-0.009***	-0.036***	-0.008***	-0.035***
	(0.000)	(0.002)	(0.000)	(0.002)
Quantity	0.004***	0.016***	0.004***	0.016***
	(0.001)	(0.003)	(0.001)	(0.003)
Punctuation				
Period	-0.014***	-0.086***	-0.013***	-0.083***
	(0.002)	(0.010)	(0.002)	(0.010)
Comma	0.009***	0.062***	0.009***	0.060***
	(0.001)	(0.002)	(0.000)	(0.002)
Word Counts				
Word Count	0.021***	0.161***	0.021***	0.161***
	(0.000)	(0.001)	(0.000)	(0.001)
Words per Sentence	-0.011***	-0.072***	-0.010***	-0.068***
	(0.001)	(0.004)	(0.001)	(0.004)
Sentiment				
Positive Tone	-0.000	0.043***	-0.000	0.043***
	(0.001)	(0.004)	(0.001)	(0.004)
Negative Tone	0.004**	-0.109***	0.003*	-0.111***
	(0.002)	(0.008)	(0.002)	(0.008)
Language Categories				
Analytic	-0.001***	-0.009***	-0.001***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
Clout	0.001***	0.012***	0.001***	0.012***
	(0.000)	(0.001)	(0.000)	(0.001)
Authentic	0.001***	0.004***	0.001***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Tone	-0.000***	0.007***	-0.001***	0.007***
	(0.000)	(0.001)	(0.000)	(0.000)
Controls				
Vintage (Dummies)	Yes	Yes	Yes	Yes
Variety (Dummies)	Yes	Yes	Yes	Yes
Reviewer (Dummies)	Yes	Yes	Yes	Yes
Country (Dummies)	No	No	Yes	Yes
Constant	2.403***	83.533***	2.209***	84.155***
	(0.625)	(2.614)	(0.621)	(2.595)
Observations	83,067	83,067	83,067	83,067
R-squared	0.406	0.498	0.418	0.509

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Instrumental Variables Regression

	(I)	(II)
	First Stage 2SLS	IV Regression
VARIABLES	Points	Log (price)
Points		0.131***
		(0.001)
Linguistic Categories		
Function Words	-0.052***	
	(0.001)	
Verb	-0.073***	
	(0.003)	
Adjective	-0.042***	
	(0.002)	
Quantity	0.031***	
	(0.003)	
Punctuation		
Period	-0.029***	
	(0.011)	
Comma	0.048***	
	(0.002)	
Word Counts		
Word Count	0.147***	
	(0.001)	
Words per Sentence	-0.026***	
	(0.004)	
Sentiment		
Positive Tone	0.051***	
	(0.005)	
Negative Tone	-0.150***	
	(0.009)	
Language Categories		
Analytic	-0.007***	
	(0.001)	
Clout	0.024***	
	(0.001)	
Authentic	0.005***	
	(0.000)	
Tone	0.011***	
	(0.001)	
Constant	84.587***	-8.323***
	(0.172)	(0.091)
Observations	83,067	83,067
R-squared	0.336	0.394

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Kernel Density of Wine Rating Points

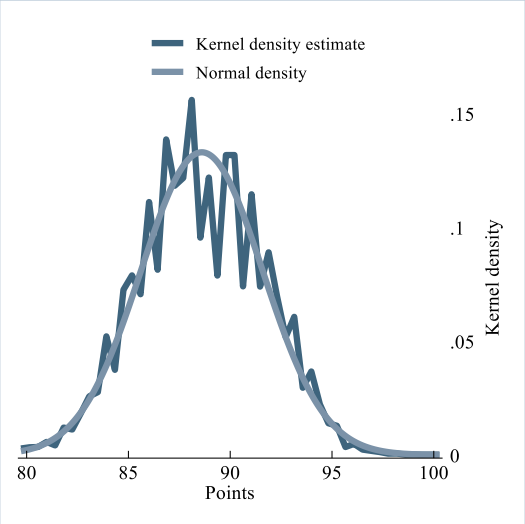
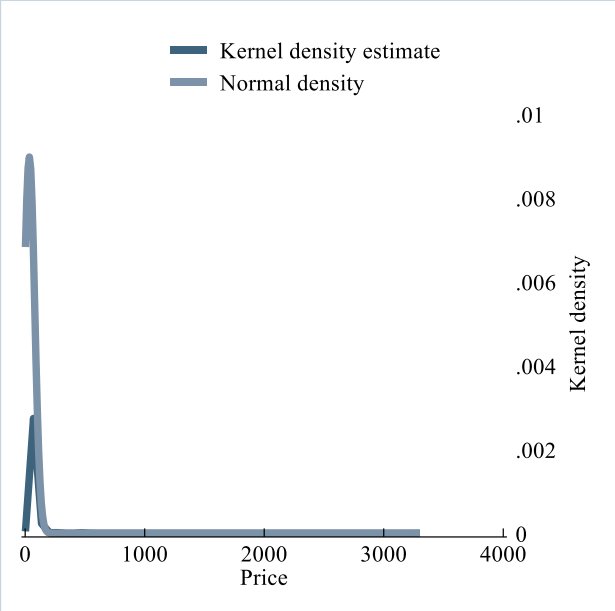


Figure 2: Kernel Density of Wine Prices



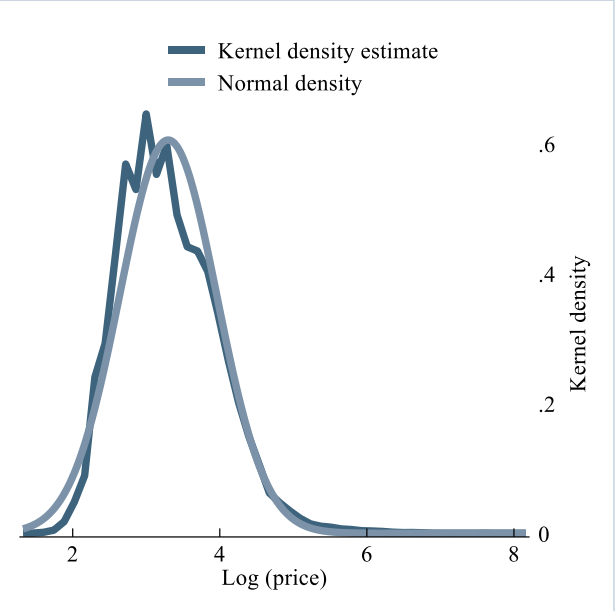


Figure 3: Quantile Regression Plots for Dependent Variable Rating Points

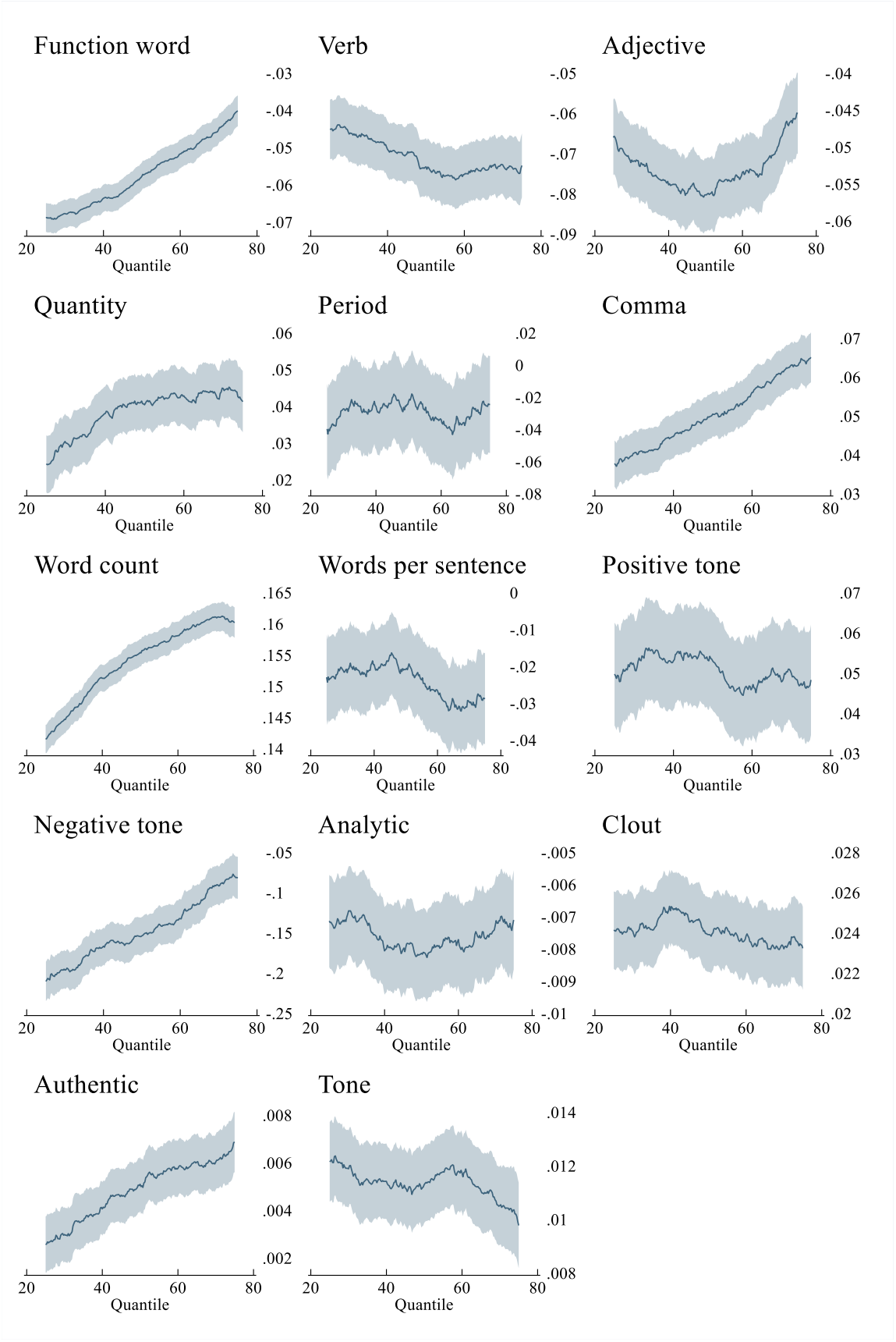


Figure 4: Quantile Regression Plots for Dependent Variable Log (price)