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Can German Wine Cooperatives Compete on Quality?

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Abstract

The German Agricultural Society (DLG) manages a multi-round annual quality control scheme where wines undergo a blind, sensory testing procedure using a 5-point scale to determine superior quality wines worthy of an annual award (Bronze, Silver, Gold, and Gold Extra). We develop a hedonic model for the 2005 award competition estimating implicit prices for different product attributes including sensory awards, quality categories, and wine style. We also control for regional origin, variety, color, and age. To discern the impact of ownership structure, we distinguish cooperatives and private wineries. Silver and Bronze awards show significant price effects relative to Gold. We also estimate highly significant price effects between quality categories (e.g. Auslese +34% relative to Spätlese) and wine style (e.g. dry +10%). Our results indicate that cooperatively produced wines seem to lag behind in terms of strategically addressing the opportunities presented in today's global wine market (i.e. going for more varietal wines with aging potential that are competitive in terms of quality. Cooperatives seem to have opted for barrique-style wine and Chardonnay for which they gain higher implicit prices relative to non-coops. Our analysis suggests that this may not be wise in light of the characteristic strengths of German wine production.

Key Words: Cooperatives, Product Quality, Pricing.
JEL Codes: Q13, L15, D4

Can German Wine Cooperatives Compete on Quality?

1. Introduction

German 'quality wine' is classified according to a legally binding standard. Natural alcohol content and ripeness at harvest define the quality category (e.g. Kabinett, Spätlese). Acidity and residual sugar determine the style (e.g. dry). Any appraisal of sensory wine quality is based on subjective impressions. This particular notion of "quality" is outlined in the German wine laws and regulations. In addition, the wine law of the European Union (EU) assigns general conditions that apply to all wine-producing member states, taking common interests as well as national differences into account. For example, EU vineyard areas are divided into climatic zones to help compensate for the climatic variations that influence wine production. Moreover, common quality categories enable legal comparisons among member states. Each member state is permitted to determine the criteria and method of assessment necessary to meet local (and EU) quality standards. In Germany, quality is confirmed or denied by official uniform tests, required by the German Wine Law. Regulations governing quality categories and testing are important components of the law. Out of the official testing procedure, high scoring wines become eligible to enter the national wine competition.

In this paper, we analyze the two-round 2005 national wine competition administered by the German Agricultural Society (DLG). In particular, we distinguish cooperatively and privately owned wineries in order to discern the impact of ownership structure on prices and quality. We develop a hedonic model, including award level (bronze, silver, gold, gold extra), designation (e.g. Classic, Selection), wine style (e.g. dry, barrique aging), color (reds, whites), quality categories (e.g. Spätlese), regional origin (e.g. Rheingau), wine varieties (e.g. Rieslings) and a dummy for the competition round as independent variables in our model. We estimate point level models, in which we substitute award levels with actual sensory point ratings assigned during the competition. We focus on whether ownership structure has an impact on the estimated implicit prices for German quality wines. Our results indicate that wines from cooperatives tend to receive somewhat lower price premiums for key quality attributes. The estimated results exhibit expected signs and relative magnitudes and allow us to interpret why wines from cooperative producers tend to receive lower quality premiums. A detailed analysis of our model estimates allows us to interpret this result as well as to derive for some valuable marketing implications and strategic considerations for cooperative wine producers in Germany. The paper is structured as follows. In section two, we introduce the quality regulations and control scheme for German wines and in section three we provide a brief literature review. Section four describes the data analysis and results while in section five, we discuss the main findings.

2. Regulations and Quality Control

German wine producers are required to declare specific quality categories on their labels. The European Union wine law mandates two broad quality categories: table wine and quality wine. Within these quality categories, the German wine law specifies more sub-categories than other EU countries. Standard quality wine (labeled QbA) must be made exclusively from German produce, be from an approved grape variety grown in one of the 13 specified wine-growing regions, and reach an existing alcohol content of at least 7% by volume. However, winemakers are allowed to add sugar to QbA wines before fermentation to increase the alcohol level of the wine. This so-called chaptalization process is commonly used around the world adding more body to otherwise lighter wines.

The quality wine category has six higher-rated sub-categories identified by special quality attributes (labeled QmP). QmP must be from a certain district within a wine-growing region and reach specified *natural* alcohol content for the region, grape variety and special attribute category. Chaptalization is not allowed. The special attribute categories are subject to additional regulations concerning ripeness, method of harvesting, and marketing. In ascending order of ripeness at harvest the special attribute categories are:

- **Kabinett:** fine, usually "naturally" light wines made of fully ripened grapes, low in alcohol, may not be sold prior to January following the harvest.
- **Spätlese:** late harvest, from superior quality grapes, more intense in flavor and concentration than Kabinett, not necessarily sweet.
- **Auslese:** from selected, very ripe bunches; noble wines with intense in bouquet and taste, usually, but not always sweet.
- **Beerenauslese (BA):** from selected, overripe berries (e.g. botrytis), harvested only during suitable weather conditions, yielding rich, sweet dessert wines noted for their longevity.
- **Trockenbeerenauslese (TBA):** from individually selected, overripe berries (dried up almost to raisins); rare, rich, lusciously sweet wines with an extraordinary longevity.
- **Eiswein:** from grapes as ripe as BA, but harvested and pressed while frozen, unique wines with a remarkable concentration of fruit, acidity, and sweetness.

The wine law has been criticised because of its neglect for quality in the absence of yield limits. Another problem is that sugar content at harvest is the only criteria for quality categorization although the boundaries between sub-categories (e.g. Spätlese or Auslese) are adjusted by region. Thus, higher sugar levels are required for wines from warmer regions (e.g. Baden) relative to the cooler areas (e.g. Nahe). However, the required sugar levels for higher-rated categories are generous. Moreover, some producers choose to declassify wines reasoning that it is better to offer an excellent QbA rather than a mediocre Kabinett. As the new wine law came into force, modern early-ripening varieties were

introduced. Whereas previously, a wine labelled "Auslese" indicated a highly selective harvest in the vineyard and correspondingly high quality, it became much easier to produce high-sugar content "Auslese" from Ortega grapes. Moreover, it became perfectly legal to blend Riesling Auslese with a modern early-ripening variety or to chaptalize a QbA but not a QmP such that the former was not necessarily inferior to the latter. The potential for abuse became immense and the fine name that once attached to 'Auslese' was degraded.

In addition to the quality control required by the German wine law, each "quality wine" undergoes a critical, blind, sensory testing procedure based on a uniform 5-point scale. For each wine to be tested, producers submit a registration form on which they must state an array of information including vintage, color (red, white, rosé), special quality attributes, regional origin and vineyard site, and the retail price. A sensory evaluation awarding up to five points or fractions thereof is done for three characteristics (bouquet, taste and harmony). A minimum of 1.5 points (per characteristic) is necessary to qualify. The sum of this characteristics score yields an overall evaluation that is divided by three to determine the wine's point level rating. State Chambers of Agriculture (Landwirtschaftskammern) award bronze, silver and gold *medals* that require a minimum of 3.5, 4, and 4.5 points, respectively. These medal-winning wines become eligible to enter the annual national wine competition (Bundeswein-prämierung) administered by the DLG. The DLG uses the same testing procedure and "five-point system" to determine wines of superior quality, which are worthy award medals and prizes. Bronze, silver and gold awards are granted with a minimum of 3.5, 4, and 4.5 points, respectively. In a special competition, Gold Extra Prizes (Goldener Preis Extra) are awarded to wines with a perfect 5-point score. For consumers, medals and DLG awards are a valuable guide to assess wine quality. Prior to 2003 the award scheme was criticized for not being rigorous, awarding too many gold medals (e.g. 47% of all medals in 2002). In response, more rigorous judging decreased the share of gold to 29% in 2003.

3. Literature Review

Economists often use hedonic models based on Rosen (1974, 2002) to study price-quality relationships. Goods are valued for their utility-generating attributes (i.e. car features, wine quality ratings) which potential consumers evaluate when making their purchasing decisions. Competitive markets determine implicit prices for utility-generating attributes and the product price is the sum of all implicit prices. Rosen realizes an identification problem in estimating hedonic functions, because in equilibrium implicit prices are jointly determined by supply and demand. Therefore, implicit prices may reflect consumer preferences as well as supply factors. In order to resolve the identification problem, it is necessary to separate supply and demand conditions with the wine market in equilibrium. Consumers have made their utility-maximizing choices, given their knowledge of prices,

characteristics of alternative wines and other goods. In their purchase decision, they use available information on wine quality. Moreover, all producers have made their profit-maximizing decisions given production technologies and the costs of alternative wine qualities producible, and that the resulting prices and quantities clear the market. In this equilibrium, we may specify implicit prices without separating supply and demand conditions (Freeman, 1992). For a concise review on the theory of hedonic pricing models we refer to Nerlove (1995).

In addition to sensory quality, reputation indicators will also affect wine prices. Assuming competitive markets and imperfect information, Shapiro (1983) presents a theory framework to examine producer reputation effects on prices. He shows that reputation allows high-quality producers to sell their products at a premium which can be interpreted as return on investments in reputation building. For consumers, it is costly to improve their knowledge about quality. Since the quality of a bottle of wine is unknown until it is de-corked, any associated quality and reputation indicator will affect how much consumers are willing to pay. In an imperfect information environment, learning about quality indicators (e.g. award winning wines) contributes to building a reputation in the minds of consumers. In this sense, any sensory quality assessment may serve as a vehicle for consumers to learn about the reputation for quality of producers and regions.

Few studies have analyzed the relationship between ownership structure and product quality. Applying game theory, Hoffmann (2005) analyzes privately (investor) owned firms and producer cooperatives in a duopoly framework. First, firms simultaneously choose the level of quality to produce and then compete in prices. He shows that depending on the cost structure for quality, firms can have a structural cost advantage due to ownership structure in addition to a quality advantage. With fixed cost of quality, privately owned firms will charge higher prices and generate a larger consumer surplus than coops through marketing higher qualities. With variable cost of quality, cooperatives have a structural cost advantage which is used to market larger quantities of higher quality product generating larger profits, larger consumer surplus and larger social welfare.

Coelho et al. (2008) examine the financial performance of cooperatives and investor owned firms (IOF) with respect to profits, leverage, solvency and efficiency. They largely confirm their hypotheses that IOF tend to outpace cooperatives in terms of profits, solvency and efficiency while coops are expected to have more leverage. Many studies have applied hedonic models defining implicit prices for wine quality and reputation attributes. For a review of the relevant empirical literature, we refer to San Martin, Troncoso and Brümmer (2008). To our knowledge, no empirical study has looked at the relationship between ownership structure, product pricing and quality.

4. Data Analysis and Results

We analyze a detailed data set of award winning wines at the German national wine competitions (Bundesweinprämierung) in 2005. Competition results are published in print and online (www.wein.de). The usable sample size was reduced by 174 observations because these wines were listed without price information and by 758 that were listed without information on ownership structure. Producers are asked state a retail price per bottle on the registration form *before* entering the federal competition but after succeeding at the State level. Therefore, the price information used in the estimation is *pre*-competition and does not reflect any direct effects from winning a federal award. We use dummy variables for the award level as an indicator of sensory quality and for the quality categories ensuing from the wine law (i.e. Spätlese, Auslese). The data set also denotes wine style, color, regional origin, age at the time of judging, and whether or not the wine was aged in barrique (oak barrels). For a list of the independent variables used in the model is provided in Table 1. All variables are categorical dummies, except for the judging age (in years). Award round, color, wine style and barrique are regular dummy variables. As the dependent variable we use the logarithm of the retail price [$\log(\text{Price})$].

Table 2 lists summary statistics for the 2005 competition including average prices, award levels and corresponding point levels. In 2005, 27.6% of all DLG awards were Gold medals, 43% silver, and 29 bronze. The average nominal price was 8.54€ (8.46€ for wines from cooperative and 8.59€ for non-cooperative producers). Note, that the smaller regions receive a more than proportional share of prizes awarded. The sample contains about 42.7% red wine which is significantly higher than in previous years (e.g. 29.5% in 2001). About 63% of the wines were tested in the fall competition and 37% in the spring.

We hypothesize that wine from private producers receives a price premium relative to cooperatively produced wine. To test this hypothesis, we employ a hedonic pricing model differentiating cooperative vs. non-cooperative producers. Other explanatory variables include award level (bronze, silver, gold, gold extra), designation (e.g. Classic, Selection), wine style (e.g. dry, barrique aging), color (red, white), quality categories (e.g. Spätlese), regional origin and wine variety (e.g. Rieslings, Pinot Noir). We also include a dummy variable for the fall competition in our model. Moreover, we estimate a model, in which we substitute the award level dummies with an actual sensory point rating assigned during the competition. We employ a log-linear function for the estimation. Following Oczkowski (1994), we employed a RESET test which rejected other functional forms (i.e. inverse, linear). Thus, we estimate the following regression model:

$$\log(P_i) = \alpha + \beta_1 D_i \text{Award} + \beta_2 D_i \text{Quality category} + \beta_3 D_i \text{Designation} + \beta_4 D_i \text{Region} + \beta_5 D_i \text{Variety} \\ + \gamma_1 \text{Bar}_i + \gamma_2 \text{Color} + \gamma_3 \text{Style} + \delta \text{Age}_i + \eta_1 \text{Coop} + \eta_2 \text{Fall} + \varepsilon_i$$

where $\log(P_i)$ is the logarithm of price P_i and the error term ε_i is distributed identically and independently with a zero mean and uniform variance. Because we include categorical dummies for award level, quality category, designation and regional origin (D_i), we need to select a base category of wines in order to avoid the dummy variable trap. We selected "Gold" as the base award level, "Pfalz" as the base region, "Spätlese" as the base quality attribute, and no designation as the base attributes in our estimation. Given its log-linear functional form, estimating the equation above yields price premiums and discounts β_i ($i=1, \dots, 5$) relative to the contribution of the base category defined in Table 2. Specifically, β_1 is the coefficient for the award level, β_2 for the quality category, β_3 for designation, β_4 for regional origin, and β_5 for variety. The γ -coefficients are the price premiums for barrique, color, and style while δ is the age coefficient. η_i ($i = 1, 2$) are the coefficients for the cooperatives and the autumn competition, respectively.

The estimation results are provided in Table 3 (Award-level model) and 4 (Point-level model). The last column for each model translates the estimated coefficients into money (€) equivalents relative to the base category wine at the average price. Base category is a non-dry-white Gold award winning Spätlese from Pfalz without designation and variety as indicated in Table 2. As hypothesized, cooperative wines are sold at a significant discount of about 11% (or 93¢) relative to non-cooperatively produced wines. Analyzing coop and non-coop wines in separate model allows us to infer on the underlying factors for this difference. It reveals that the award level discounts are larger for non-coops indicating that DLG awards receive a higher premium (e.g. 62¢ vs. 41¢ for Gold vs. Silver medals). Gold extra awards are insignificant for coops and only slightly significant for non-coops. The Classic designation shows no significance in all models while Selection is highly significant and coops actually receive a higher premium for their Selection wines (4.40€ vs. 3.42€). The age premium is also larger for cooperative wines (75¢ vs. 26¢). The premium for dry wines is about equal for both producer categories (± 5 ¢). The premiums for Barrique-style and red wine are somewhat larger for coops (+24¢ and +49¢, respectively). The coefficients for all quality categories are significant. Relative to the base quality category (Spätlese), cooperatives perform better for QbA and Beerenauslese (BA). For all other quality categories, non-cooperative wines receive higher price premiums, but the differences are rather small (see Figure 1). However, these results largely confirm our hypothesis: cooperatives receive lower price premiums for their wines, especially for award winning wines and for the high-end quality categories (except BA). Many non-cooperative producers operate on a much smaller scale and it seems logical that they are more focused on promoting their award winning high high-end quality wines.

Interestingly, all wines receive a higher premium when judged during the autumn competition. This may be due to the fact that producers hold back maturing wines for a later award round. Private producers submit a higher proportion of maturing red wines for the autumn competition and thus get a higher price premium relative to cooperatives.

Price differentials for the wine regions are all highly significant relative to the base region (i.e. Pfalz). Only Nahe and Rheingau cooperatives are an exception. Pfalz as the base region and Rheinhessen are the largest German growing regions with large vineyard areas producing the bulk of German quality wine. Thus, they are less suited to promote and market overall regional quality and sell at a relative discount. Many of the smaller regions carry large price premiums and local cooperatives may be well positioned to promote the regional origin of their wine (e.g. Ahr coops +7.90€). However, Württemberg coops also receive a high premium relative to their private counterparts.

Finally, we need to discuss the results for the varietals as shown in Figure 2 (i.e. Riesling, Gewürztraminer, Chardonnay, Pinot Blanc, and Dornfelder). First, observe that only white varietals carry a significant premium relative other varietals. Pinot Noir and cooperatively produced Dornfelder are insignificant. In the full sample, Dornfelder sells at a discount of 8.3% or 71¢. This indicates that the strengths of German wine production are still white wines. Second, Chardonnay exhibits a positive premium for cooperatives but it carries little weight as it is not a mayor variety to lift up their overall relative to non-cooperatives. Third, for Rieslings, non-coops receive a premium almost twice as high as coops. This carries a lot of weight in the overall model as Rieslings account for almost ¼th of all observations. Thus, a major reason for the strengths of non-cooperative producers in securing higher quality premiums is their success promoting the German flagship variety.

Overall, the results indicate that the sensory quality awards and variety effects dominate while quality categories and regional effects play only a minor role in explaining the higher price premiums for non-cooperatively produced wines. The main results are by and large confirmed with the point-level model (presented in Table 4) where we substituted the award level dummies with actual sensory point ratings assigned during the competition. Note, that the overall explanatory power is higher for the cooperative models indicating that a higher proportion of the variation in prices can be explained by our independent variables. Thus, cooperatives create a more coherent product fitting a common model as individual producers/growers join forces in the wine-making process.

5. Summary and Conclusion

In Germany, wine quality is conferred or denied by official testing. The German wine law classifies wines by their degree of ripeness at harvest and defines basic wine styles in terms of residual sugar content and acidity. Producers are required to declare specific quality categories on their labels. Quality wines include six higher-rated sub-categories identified by special quality attributes (QmP). The German wine regulations, which are quite different in other EU countries, have been subject to much criticism especially because there are no yield limits and sugar content at harvest is the sole criterion for legal quality categorization.

The annual DLG wine competition awards DLG bronze, silver and gold medals as well as special Gold Extra Prizes based on a uniform sensory testing procedure. Our analysis suggests that cooperatives receive lower price premiums for DLG medals and for their high-end quality categories (except BA). We argue that cooperatives operating on a larger scale could gain significantly by promoting quality through their award winning high-end quality wines. However, estimated implicit price differences in quality categories between coops and non-coops are small and the gains from such collective repositioning will not be very large. In addition, cooperatives might also want to submit more of their maturing (red) wines for the later autumn competition and thus be able to secure higher price premium.

Overall, sensory quality awards and variety effects dominate in explaining why non-cooperatives wines receive higher price premiums. Our model estimates reconfirm that the core strength of German wine production is still with white wines. As global wine market is dominated by varietal wines, German producers could gain significantly through varietal rebranding. Estimated varietal premiums are significant for the white wines in the sample and range from 48¢ to 129¢. Therefore, when it is applicable cooperative producers should focus on single variety white wines in their efforts to secure higher quality premiums. In particular Riesling the German flagship variety seems to be well positioned in this regard as it obtains the highest varietal premium in this sample.

Critics of the German wine law argue that the reputation of the quality categories has degraded. Our estimation confirms this argument at least for lower quality categories. At 30¢, a cooperatively produced Kabinett carries relatively little value versus a QbA. For non-coops this difference is almost 1€ Thus, the collective reputation of cooperatively produced Kabinett wine appears to be weak. Here, Tirole's (1996) model of collective reputation is applicable to quality categorization. The collective reputation of any quality category (e.g. Kabinett, Spätlese) has strong public good properties and it is crucial to maintain their intrinsic value. Otherwise, they will have no place in this market and consumers will start to ignore them. Reflecting on the theoretical work in this area, our study confirms that privately owned firms generate higher prices than coops through marketing higher qualities, assuming that the cost of quality for wine is largely determined by fixed external factors (terroir).

Discerning consumers value more specific information. The degree of regional differentiation in Germany is mainly a result of the wine law. As consumers mature and become aware of producers (brands) or sub-regional quality and reputation indicators, they will pay more attention to producer and site-specific quality signals. Then, they become less reliant on more diffuse signals, such as special quality attributes specified by the wine law which may blur the supremacy of distinct vineyard sites in larger regions. Efforts by leading German wine estates to change the current regulatory system and to

demand stricter quality controls point in this direction. They strive for stronger property rights and value in sub-regional or site names, thereby raising the rates of return on individual promotion efforts.

Finally, we like to address the question raised in the title of this paper. Can German wine cooperatives compete on quality? Based on our estimation results the qualified answer is yes, provided that they follow some of the strategic considerations suggested in this paper. Currently, they seem to lag behind in terms of strategically addressing the opportunities presented in today's global wine market. That may imply going for more varietal wines with aging potential that are competitive in terms of quality awards received in wine competition as well as through superior quality reviews by wine experts. The age premium is about 4% larger for private wineries indicating that they are trying to capture the storage premium while cooperatives may have to move their wines more quickly. Cooperatives seem to have opted for barrique-style wine and Chardonnay for which they gain higher implicit prices relative to non-coops. Our analysis suggests that this may not have been very wise in light of the characteristic strengths of German wine production.

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Table 1: Description of Independent Variables

Variable	Parameters
Cooperative	Cooperative Producer = 1, Private Producer = 0.
Award Levels	Gold Extra, Gold* , Silver, Bronze
Designation	Classic, Selection, None*
Age	1 – 7 Years
Award Round	Spring competition = 0, Autumn competition = 1
Color	Red Wine = 1, non-red = 0
Wine Style	Dry = 1, other style = 0.
Barrique	Barrique = 1, non-barrique = 0
Quality Category	Qualitätswein (QbA), Kabinett, Spätlese* , Auslese, Beerenauslese (BA), Trockenbeerenauslese (TBA), Eiswein
Regions	Ahr, Baden, Franken, Hess. Bergstr., Mittelrhein, Mosel-Saar-Ruwer, Nahe, Pfalz* , Rheingau, Rheinhessen, Saale-Unstrut, Sachsen, Württemberg
Varieties	Riesling, Gewürztraminer, Chardonnay, Pinot Blanc, Pinot Noir, Other Varieties* , Dornfelder
* Parameters in Bold are chosen as base category. Source: DLG, Own calculation.	

Table 2: Distribution of Competition Awards and Average Prices

	All Wines	Coop-Wines	Non-Coop
Average price (min, max)	8.54	8.46 (2, 53)	8.59 (2, 99)
Average age (min, max)	1.601	1.746 (1, 4)	1.528 (1, 7)
Average points (max = 5)	4.170	4.213	4.145
Classic Designations	83	17 (20.5%)	66 (79.5%)
Selection Designations	53	19 (35.8%)	34 (64.2%)
Bronze Medals	1057	324 (30.7%)	733 (69.3%)
Silver Medals	1544	575 (37.2%)	969 (62.8%)
Gold Medals	992	412 (41.5%)	580 (58.5%)
Gold Extra Medals	45	11 (24.4%)	34 (75.6%)
# of observations	3593	1311 (36.5%)	2282 (63.5%)

Source: DLG, own calculations.

Table 3: Award-level Results [dependent variable: log(Price)]

Parameter	ALL Coeff.	Wines t	€ ^a	COOP Coeff.	Wine t	€ ^a	Non- Coeff.	COOP t	Wine € ^a
Constant	1.504	53.8		1.295	32.1		1.551	41.7	
Cooperative	-0.108	-9.09	-0.93						
Bronze	-0.100	-7.78	-0.85	-0.044	-2.34	-0.37	-0.118	-6.91	-1.01
Silver	-0.067	-5.77	-0.57	-0.049	-3.08	-0.41	-0.072	-4.52	-0.62
Gold Extra	0.107	2.52	0.91	0.083	1.13†	0.71	0.092	1.78*	0.79
Classic	-0.039	-1.21†	-0.33	-0.019	-0.31†	-0.16	-0.062	-1.60†	-0.53
Selection	0.442	11.27	3.78	0.520	9.13	4.40	0.399	7.71	3.42
Age	0.048	4.36	0.41	0.089	5.25	0.75	0.030	2.10	0.26
Award Round	0.074	6.41	0.63	0.049	3.25	0.42	0.078	4.80	0.67
trocken (dry)	0.105	9.56	0.90	0.104	6.52	0.88	0.109	7.40	0.93
Barrique	0.182	10.8	1.56	0.193	7.65	1.64	0.163	7.20	1.40
Red Wine	0.520	30.2	4.45	0.568	23.4	4.80	0.502	21.4	4.31
Qualitätswein (QbA)	-0.205	-15.8	-1.75	-0.222	-11.9	-1.88	-0.185	-10.6	-1.59
Kabinett	-0.289	-17.6	-2.47	-0.258	-10.0	-2.18	-0.299	-14.2	-2.56
Auslese	0.346	22.7	2.96	0.326	14.8	2.76	0.362	17.8	3.11
Beerenauslese	0.975	33.6	8.32	1.053	28.1	8.91	0.907	21.7	7.79
TBA	1.485	31.4	12.68	1.454	22.4	12.30	1.539	23.8	13.22
Eiswein	1.347	47.1	11.51	1.358	29.4	11.49	1.346	37.3	11.56
Ahr	0.603	12.0	5.15	0.933	13.9	7.90	0.393	5.63	3.38
Baden	0.352	20.0	3.01	0.353	16.3	2.99	0.389	13.0	3.34
Franken	0.396	21.2	3.38	0.452	13.4	3.82	0.371	16.2	3.19
Hess. Bergstraße	0.191	4.96	1.63	0.172	4.00	1.46	0.230	3.37	1.97
Mittelrhein	0.159	2.63	1.36				0.136	2.12	1.17
Mosel-Saar-Ruwer	0.174	7.84	1.48				0.144	5.83	1.24
Nahe	0.240	8.32	2.05	-0.014	-0.12	-0.12	0.218	6.84	1.87
Rheingau	0.321	9.50	2.74	0.257	1.84*	2.17	0.299	8.05	2.57
Rheinhessen	-0.075	-4.69	-0.64	-0.151	-2.75	-1.28	-0.088	-4.80	-0.76
Saale-Unstrut	0.748	20.5	6.39	0.600	6.43	5.08	0.746	18.0	6.40
Sachsen	0.426	8.21	3.64	0.436	3.57	3.69	0.410	6.94	3.52
Württemberg	0.167	10.3	1.43	0.204	9.59	1.72	0.107	4.38	0.92
Riesling	0.143	8.80	1.22	0.083	2.72	0.70	0.150	7.61	1.29
Gewürztraminer	0.137	5.48	1.17	0.115	3.23	0.98	0.148	4.42	1.27
Chardonnay	0.120	3.81	1.03	0.182	3.38	1.54	0.093	2.42	0.80
Pinot Blanc	0.071	3.51	0.61	0.056	1.77*	0.48	0.071	2.76	0.61
Pinot Noir	0.011	0.70†	0.09	-0.001	-0.04†	-0.01	0.023	1.01†	0.19
Dornfelder	-0.083	-3.29	-0.71	-0.024	-0.69†	-0.20	-0.103	-2.96	-0.88
R ² (adj. R ²)	75.3%	(75.0%)		82.3%	(81.8%)		72.4%	(72.0%)	
F-Value		309.46			185.15			173.42	
Observations		3,593			1,311			2,282	
No mark and * indicates significance at the 5% and 10% level, respectively. † indicates not significant. ^a relative to base category at average prices. Source: Own calculations.									

Table 4: Point-level Results [dependent variable: log(Price)]

Parameter	ALL Coeff.	Wines t	€ ^a	COOP Coeff.	Wine t	€ ^a	Non- Coeff.	COOP t	Wine € ^a
Constant	0.938	15.2		1.036	11.2		0.889	10.94	
Cooperative	-0.110	-9.27	-0.94						
Points	0.122	8.94	1.04	0.055	2.67	0.47	0.142	8.03	1.22
Classic	-0.036	-1.13†	-0.31	-0.018	-0.31†	-0.16	-0.058	-1.49†	-0.50
Selection	0.440	11.2	3.76	0.520	9.12	4.40	0.393	7.61	3.37
Age	0.048	4.39	0.41	0.087	5.13	0.73	0.032	2.25	0.27
Award Round	0.076	6.60	0.65	0.050	3.28	0.42	0.081	5.03	0.70
trocken (dry)	0.104	9.48	0.89	0.104	6.50	0.88	0.108	7.35	0.92
Barrique	0.182	10.8	1.56	0.194	7.68	1.64	0.163	7.19	1.40
Red Wine	0.522	30.3	4.46	0.570	23.48	4.82	0.503	21.51	4.32
Qualitätswein (QbA)	-0.205	-15.8	-1.75	-0.224	-11.95	-1.89	-0.184	-10.61	-1.58
Kabinett	-0.286	-17.4	-2.45	-0.255	-9.91	-2.15	-0.297	-14.23	-2.55
Auslese	0.345	22.5	2.94	0.327	14.80	2.77	0.358	17.67	3.07
Beerenauslese	0.974	33.7	8.32	1.060	28.35	8.97	0.901	21.60	7.74
TBA	1.478	31.3	12.63	1.453	22.32	12.29	1.530	23.73	13.14
Eiswein	1.343	47.0	11.47	1.359	29.42	11.50	1.339	37.17	11.50
Ahr	0.604	12.1	5.16	0.940	13.97	7.95	0.393	5.65	3.38
Baden	0.351	20.0	3.00	0.351	16.21	2.97	0.391	13.10	3.36
Franken	0.393	21.0	3.35	0.451	13.41	3.81	0.369	16.12	3.17
Hess. Bergstraße	0.189	4.91	1.61	0.171	3.96	1.44	0.227	3.34	1.95
Mittelrhein	0.165	2.74	1.41				0.143	2.23	1.22
Mosel-Saar-Ruwer	0.171	7.74	1.46				0.143	5.81	1.23
Nahe	0.240	8.34	2.05	-0.016	-0.13†	-0.14	0.220	6.94	1.89
Rheingau	0.321	9.50	2.74	0.255	1.82*	2.15	0.300	8.10	2.58
Rheinhessen	-0.075	-4.68	-0.64	-0.145	-2.64	-1.23	-0.087	-4.75	-0.75
Saale-Unstrut	0.747	20.4	6.38	0.608	6.52	5.15	0.744	18.01	6.39
Sachsen	0.428	8.26	3.66	0.446	3.65	3.77	0.414	7.01	3.55
Württemberg	0.166	10.2	1.41	0.201	9.45	1.70	0.107	4.41	0.92
Riesling	0.142	8.76	1.22	0.082	2.70	0.69	0.150	7.62	1.28
Gewürztraminer	0.138	5.50	1.18	0.114	3.19	0.96	0.150	4.48	1.29
Chardonnay	0.119	3.79	1.02	0.183	3.39	1.55	0.092	2.40	0.79
Pinot Blanc	0.071	3.52	0.61	0.056	1.74*	0.47	0.072	2.80	0.61
Pinot Noir	0.011	0.69†	0.09	-0.003	-0.13†	-0.02	0.022	1.01†	0.19
Dornfelder	-0.082	-3.24	-0.70	-0.023	-0.66†	-0.19	-0.101	-2.91	-0.87
R ² (adj. R ²)	75.3%	(75.1%)		82.2%	(81.8%)		72.5%	(72.1%)	
F-Value		328.67			196.79			185.23	
Observations		3,593			1,311			2,282	
No mark and * indicates significance at the 5% and 10% level, respectively. † indicates not significant. ^a relative to base category at average prices. Source: Own calculations.									

Figure 1: €Premium for Quality Categories relative to Spätlese

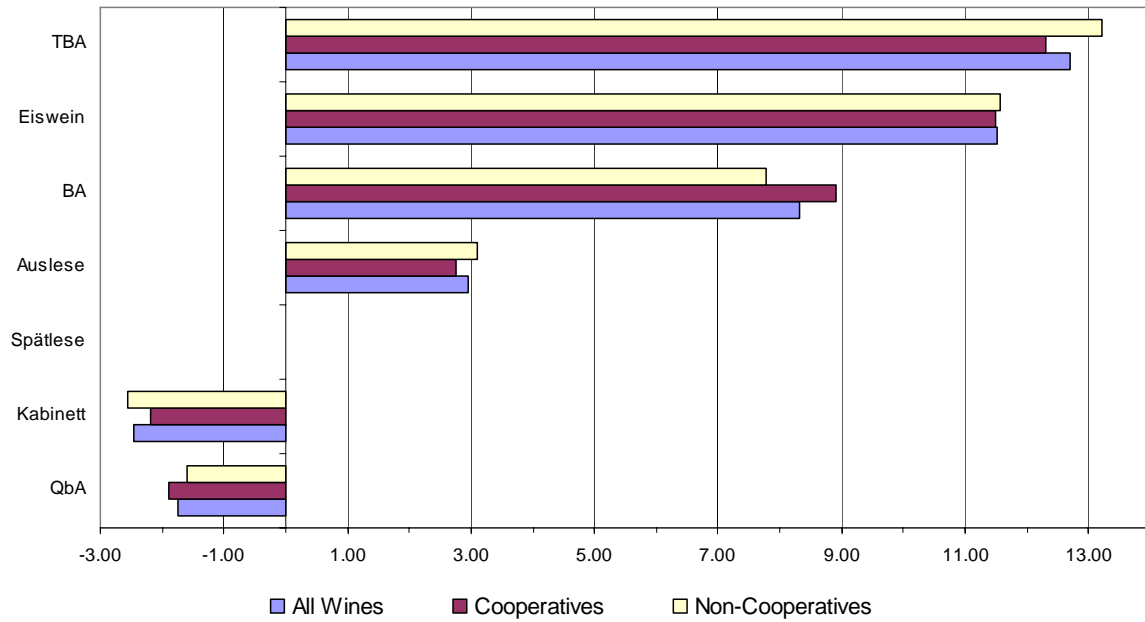


Figure 2: €Premium for Selected Varietals

