

Ithaca 2018 Abstract Submission

Title

Forecasting Auction Prices of Illiquid Wines

I want to submit an abstract for:

Conference Presentation

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Keywords

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Research Question

Can auction prices for infrequently traded wines be predicted from measures of brand and vintage value better than direct price history?

Methods

We used an age-period-cohort model and auction details to create a base model. Then compared forecast accuracy between adding brand and vintage or modeling price history alone.

Results

The brand-vintage model accuracy exceeds the direct historic model accuracy with increasing volume of brand and vintage auctions, but decreases for the highest priced and most traded wines.

Abstract

Infrequently traded wines are challenging for wine value forecasting. Auction houses need estimates for such wines when negotiating consignments, and wine buyers would like to have more than intuition for bidding on such wines. For frequently traded wines, age-period-cohort models and similar hedonic pricing models can make effective long-range forecasts of price. For rarely traded wines, the goal is to use a forecast model based upon brand value and vintage value instead.

A dataset from auctionforecast.com was used to study auction prices for Bordeaux wines at 10 different auction houses: Acker Wines, Bidford, Bonhams, the Chicago Wine Company, Christies, Langton's, Sothebys, Spectrum, Veiling Sylvies, and Zachy's. 640,000 auction prices spanning a period from 2001 to 2016 and vintages from 1970 to 2011 were used for the analysis. To be considered for the test, a wine must have at least 10 auction results for other vintages, so that the needed models could be created.

Leveraging previously published work, the 640,000 auction prices were analyzed using an age-period-cohort model to measure the price dynamics by age of the wine, calendar date (market effects), and a specific wine factor. The lifecycle versus age and market versus date are common to all Bordeaux wines. The specific wine factor is discarded in favor of the comparative analysis done here.

A baseline auction price model is created that takes as inputs the lifecycle and market measures, as well as factors for auction house, location of auction (country), and bottle size. These results were reported in the previous study.

On top of this baseline forecast, two models were created. The first model (brand-vintage) estimates factor values by brand and vintage, excluding all data for the wine being forecast. Brand refers to the name of the wine ignoring vintage, so a specific producer may have multiple brands. Note that the brand-vintage model is not using any history for the specific wine, other for other vintages of the same brand and the same vintage for other brands. This approach required the brand-vintage models to be re-estimated every time the test wine was changed, because excluding that wine from the dataset would potentially affect the estimates of both the brand and vintage coefficients.

The second model (history-only) uses previous auctions prices for a specific wine to predict future auction prices for that wine. This is a simple regression model using the baseline forecast and the previous auction results for a given wine as inputs in order to estimate the price scaling for the wine. To create a realistic test, the "next auction price" was assumed to be no sooner than four weeks, allowing time for data gathering and analysis in a real-world setting. This filter specifically excludes cases where multiple lots for the same wine at the same auction will carry highly correlated prices. Although useful to know on that day, it has no bearing on the current goals of longer range forecasting.

The model forecast accuracies were compared as the difference between absolute percentage errors for each auction. Given the auction-level forecast errors, a regression model was created to predict the errors versus factors that should affect the accuracy of the two models: the amount of historic data used for modeling brand value, vintage value, price per bottle, popularity of the wine in terms of number of trades per year, and the number of previous auction values available for the model.

The conclusion was that the brand-vintage model accuracy grows relative to the historic-data model as the log of the number of previous observations of brand value and vintage. However, the historic-data model accuracy grows with increasing price per bottle and increasing frequency of auctions for that wine. Looking at the standardized coefficients, the strongest error predictor was the log of the amount of auctions used to measure brand value. The second most important was the amount of training data for estimating the vintage value, followed by the price per bottle. Log transformations were used for all of these factors in order to maximize forecast accuracy. Other error measures were tested. No change in the overall results was found, but the difference of absolute percentage errors was found to be the most predictable measure, probably because of the reduced sensitivity to outliers.

The overall finding is that brand-vintage models are effective for predicting prices of illiquid (infrequently traded) wines, but historic-data models work well for the most popular and highest priced wines. The latter wines are assumed to be the ones that are so closely studied by the market that models are barely needed to predict price. All of these results make good intuitive sense. The results also suggest that an optimal approach would be to combine both models into a single forecast, which will also be tested later in order to assess how much potential benefit can be gained.

Future analysis will repeat the above study for Burgundy, California, and Australian wines to confirm that the same patterns hold throughout.