

Padua 2017 Abstract Submission

I want to submit an abstract for:

Conference Presentation

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Keywords

wine futures, futures pricing, quality uncertainty, stochastic optimization

Research Question

How can winemakers determine the optimal price and percentage of wine futures in the presence of quality (tasting score) uncertainty?

Methods

Stochastic optimization, multinomial logit model for consumer valuation

Results

The proposed stochastic model improves the profits of Bordeaux winemakers by 4.10% on average. We estimate that the futures market improves the profit of Bordeaux winemakers by 7.82% on average.

Abstract

Wine Futures: Pricing and Allocation as Levers against Quality Uncertainty

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Extended Abstract:

This study shows how wine futures can be used as pricing and quantity levers in order to mitigate the negative consequences of quality uncertainty in the process of winemaking. Selling wine in the form of wine futures refers to the winemaker's decision to offer her/his wine in advance and prior to the completion of the winemaking process. Fine wine often requires a long aging process for the liquid resting in barrels, e.g. eighteen to twenty-four months for most Bordeaux style wines. Thus, a winemaker has her cash tied up in this inventory for a long period of time before the wine gets bottled and distributed for retail. Wine futures can offer the winemaker the opportunity to collect some of this cash investment earlier and transfer a proportion of the risk stemming from uncertain bottle reviews to consumers.

The paper builds a stochastic optimization model in order to assist a winemaker in her decisions regarding the proportion of wine to be sold in advance in the form of wine futures and the price of wine futures. Consequently, the model determines the proportion of the wine that should be distributed for retail sale in later periods. The uncertainty in the life of a fine wine producer arises from the critical reviews of tasting experts. These experts review the wine while it is still aging in barrels and provide a score that indicates projections regarding the quality of the wine. Potential buyers rely on this information in order to determine whether to purchase wine futures. The same tasting experts provide a second review when the winemaking process is completed and the wine is bottled. This bottled wine review can differ from the review provided in the barrel phase. The model in this paper helps the winemaker to mitigate the negative consequences of the uncertainty stemming from as-yet unknown bottle reviews.

We begin the discussion with the description of the winemaking process. A fine wine producer in the US and in Europe harvests grapes in September and/or October. After crushing grapes and shuffling the juice in a tank, red wines are then transferred to oak barrels; this marks the beginning of the aging process. The wine continues its aging process in barrels for eighteen to twenty-four months.

Tasting experts visit these fine wine producers six to eight months after harvest (in March and April). These tasting experts provide their reviews and assign a barrel score, often out of 100 points. The most influential and widely-distributed magazine Wine Spectator, for example, describes its 100-point scoring system as follows: A classic (great) wine receives a score between 95 to 100, and an outstanding wine (a wine of superior character and style) 90 to 94, a very good wine (a wine with special qualities) 85 to 89 points, a good wine (well-made wine) 80 to 84 points, a mediocre wine (a drinkable wine that may have minor flaws) 75 to 79. A wine that receives a score 74 or below is not recommended by Wine Spectator.

The same tasting expert provides another score, called bottle score, when the wine completes its aging process and gets bottled. This bottle score can differ from barrel score, and is the primary source of the risk for a fine wine producer. This work develops a stochastic optimization model that uses the barrel scores in order to mitigate the uncertainty in bottle reviews.

Tasting reviews have significant impact on the quality perception of wine. Wine Spectator is the most widely distributed magazine in the wine industry and has a significant impact on the quality perception of wine. Masset et al. (2015) demonstrates that a 10% increase in barrel scores provided by Wine Spectator leads to a 4% increase in futures price.

The winemaker and wine futures consumers exhibit distinct properties that differ from the common description of risk aversion in (the industrial organization theory of) economics literature. According to the industrial organization theory, (large) firms can diversify their risk and do not need to behave in a risk-averse manner. The same theory indicates that individual consumers would exhibit a risk-averse behavior as they possess limited resources and cash. However, consumers in the wine industry are affluent collectors and/or financially-healthy merchants and distributors. The empirical analysis in Noparumpa et al (2015a) does not support a risk-averse behavior on the part of wine futures consumers. Therefore, the consumers of wine futures in this study are considered to be risk-neutral

in order to reflect the true operating environment in this industry. Because winemakers are often small in size with limited financial resources, they exhibit a risk-averse behavior. These unique features are incorporated into the empirical analysis as well.

This paper develops a stochastic optimization model and establishes the use of wine futures as a price and quantity lever in order to mitigate quality uncertainty. The winemaker financially benefits from the use of wine futures, but more importantly, reduces the negative consequences of uncertain tasting expert reviews that get established when the wine is bottled. Selling some of her wine in advance, the winemaker recuperates her cash investment in a liquid that is uncertain in value; the firm can use this money to reinvest in business, improve quality, and expand her growth initiatives.

The study makes two sets of contributions. First, we develop an analytical model that helps winemakers improve their profits. The proposed model incorporates uncertain consumer valuations of wine futures and bottled wine and the random bottle score that is assigned to the wine at the end of the production process. The analysis leads to closed-form expressions for the optimal futures price, futures quantity and the expected profit.

Second, we test the model by illustrating how it benefits the winemakers. We show that the proposed stochastic model can improve the profits of Bordeaux winemakers by 4.10% on average. We also estimate the financial benefits from using the futures market for these Bordeaux winemakers: The futures market helps improve their profits by 7.82% on average. Thus, the model makes a substantial contribution to their bottom line profits. Finally, establishing a futures market in other regions, e.g. the US and Italy, can be extremely beneficial for the small and artisanal winemakers. Using one small winery from the Finger Lakes region in the US, we demonstrate that this small winemaker would sell a higher percentage of their wine with deeper discounts benefiting her more than the Bordeaux winemakers. Thus, establishing a futures market would enable small and artisanal winemakers to utilize these price and quantity levers to create a healthy and sustainable growth opportunity.

This study also sheds light into the benefits from price efficiency over the traditional practice of market-clearing price mechanisms. It is often believed that winemakers, as well as many retailers, use market-clearing prices in order to sell out the inventory of short selling season items. Wine for a specific vintage can be perceived as a short selling season item, because winemakers need to replace the shelf space and limited storage space (for barrels dedicated to aging the wine) with the upcoming vintage's bottles and barrels. This paper demonstrates that, by using price as a lever, winemakers can increase their expected profits.

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