Title
The determinants of Hungarian wine prices across foreign markets

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Conference Presentation

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Keywords
hedonic wine price; Vivino; web scraping; noble rot wines; Hungary; Tokaj region

Research Question
Research explores the determinants of Hungarian wine prices in foreign markets (Italy, the UK, Germany, France) focusing on the distinguished role of the Tokaj wine region and noble rot wines.

Methods
The cross-sectional data for Hungarian wines were obtained from Vivino on 25 July 2022, covering the prices and characteristics of Hungarian wines in the Italian, UK, German, and French markets.

Results
The ratings for Tokaj noble rot wines positively and significantly influence wine prices in most European markets. In contrast, Tokaj wine region had an insignificant impact on average wine prices.

Abstract
Introduction
Recorded evidence from the 13th century testifies to the tradition of winemaking in the Hungarian Tokaj wine region. In the 17th century, Louis XIV, King of France, described ‘Tokaji Aszú’ wine (noble rot wine from the Hungarian Tokaj wine region) as ‘the king of wines and the wine of the kings’. In the 18th century, wine producers in Alsace, France, and Friuli, Italy, put the words “Tokay” or “Tokai” on their labels to capture buyers. This confusion resulted in the Tokaj classification of the vineyards in 1730, which led to a royal decree issued in 1737, to establish the closed production district of Tokaj wines (Wine Folly 2022). Tokaj is still considered Hungary’s most famous wine region. Furthermore, the reputation of Hungarian quality wine is built on the esteemed dessert wines of Tokaj. The Tokaj wine region (5,990 hectares) is located in north-eastern Hungary.
In 2021, the total Hungarian vineyard area was 64,470 hectares, located in 6 wine regions, including 22 wine districts. 70% of vineyards are covered with white grape varieties, while 30% are red. Hungary produces approximately 1% of the global wine (25th in the world ranking), 2.5-3 million hectoliters of wine annually (OIV 2022). Hungary exported more than $117M in wine value. Still wine in bottles contributed the most to the wine export value (58.33%), however, the biggest volume of wine is exported in the format of bulk wine (60.11%). The top wine export markets are in European markets (World Bank 2022).

The research explores the determinants of Hungarian wine prices in foreign markets focusing on the distinguished role of the Tokaj wine region and noble rot wines. We applied Vivino data for Hungarian wines available in the Italian, UK, German, and French markets to test the role and characteristics of the wines from the Tokaj wine region played in average retail prices.

In the literature, the price-quality debate has been addressed by many researchers. In the literature, various wine quality ratings are known based on different technologies: expert ratings, machine learning predictions, or community ratings (such as the Vivino, 2022). Expert ratings are associated with estimating hedonic wine prices based on various characteristics of wine quality. Regarding community ratings, the Vivino app is the most popular and widely used among wine consumers. Several studies found that user-generated ratings have superior explanatory power for wine retail prices (Oczkowski and Pawsey, 2019), and there is a consistent path of research leveraging user-generated wine ratings (Kotonya et al., 2018; Mazzoli and Palumbo, 2022). In turn, Kwak et al. (2021) argue that Vivino, in some cases, is considered less reliable than traditional expert reviews.

Data and Methodology
The cross-sectional database was obtained from Vivino on 25 July 2022 for Hungarian wines, including 492 observations (reviews), covering the prices and characteristics of Hungarian wines in the Italian, UK, German, and French markets. In total, 243 observations (rated wines) were derived from the Tokaj wine region, of which 129 ratings were obtained for Tokaji noble rot (dessert) wines. We applied the quintile regression method to predict the determinants of average prices of Hungarian wines based on wine characteristics available on the Vivino platform. The following hedonic wine price model is estimated for Hungarian wines by quintile regression method:

$$\ln(\text{price})_i = \alpha + \beta_1 \ln(\text{ratings})_i + \beta_2 (\text{alcohol})_i + \beta_3 (\text{Hungarian variety})_i + \beta_4 (\text{Tokaj})_i + \beta_5 (\text{noble rot})_i + \epsilon$$

where

- $\ln(\text{price})$ represents wine price per bottle (0.75 litres) in Euro for wine $i$*
- $\ln(\text{ratings})$ represents the average Vivino rating for Hungarian wine $i$ (scale 1-5)**
- alcohol represents the alcohol grade for wine $i$
- Tokaji represents dummies for wine $i$, $= 1$ if wines are from Tokaj region, 0 otherwise
- noble_rot represents dummies for wine $i$, $= 1$ if the wine is made from Tokaj noble rot grape, 0 otherwise
- Hungarian_variety represents dummies for Hungarian wine $i$ = 1 if the grape variety is native Hungarian, 0 otherwise
- $\beta_i$ are the estimated coefficients for $i$
- $\epsilon$ captures the error term

*Since Tokaj noble rot wines are bottled in 0.5-liter packaging, their price is converted to the price per standard wine bottle (0.75 liter).

**The Vivino rating is an average for the individual Hungarian wine composed of all ratings that Vivino users have given from all over the world.

Results
Based on our sample (including the four foreign markets selected), the average prices of Hungarian wines range on a wide scale from 4.29 to 448.5 EUR, while the average prices of Tokaj wines were higher, varying between 5.35 and 448.5 EUR. The prices of Tokaji Aszu (noble rot, dessert) wines per bottle (0.75 litres) varied between 12 and 448.5 EUR, reaching the highest value. Based on the Vivino (2022) sample, the average rating for Hungarian wines was 3.98, ranging between 3.1 and 4.8 (on a 1-5 scale). Moreover, the ratings for Tokaji noble rot wines varied between 3.7 and 4.8, with an average of 4.31. In total, 242 wines were rated between 3 and 4, while 250 are rated on a 4-5 scale in the sample. This indicates that foreign buyers gave the highest score (quality perception) for Tokaj noble rot wines compared to regular Hungarian wines. Regarding countries where the Hungarian Vivino (2022) data were derived, the highest average scores (4.1) were given to Hungarian wines in the French market, followed by German (3.97), Italian and UK (3.96) at the date of selection. Considering different Hungarian wine regions, Tokaj
wines received the highest average score (4.11) and average price (38.51 EUR) in Vivino compared to other Hungarian wine regions. The quintile regression estimated on the determinants of Hungarian wine prices across foreign markets shows that the rating and attributes of Tokaji noble rot wines positively and significantly influence wine prices in most European markets. In turn, the fact that the wine is the wine produced in the Tokaj wine region had an insignificant impact on average prices. When wine is made from the Hungarian grape variety, it had negative impacts on prices in some cases. The results are more robust for the higher quintiles (50th and 75th quantiles) and the Italian markets.

References

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