Ithaca 2018 Abstract Submission

Title
WORLDWIDE DEMAND FOR WINE AND CORRELATED ALCOHOLIC BEVERAGES, 2010-2021

I want to submit an abstract for:
Conference Presentation

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Keywords
Wine demand, income, own-price and cross-price elasticities, panel data, SUR

Research Question
Estimation of the worldwide demand for wine and other alcoholic beverages and of income, own-price and cross-price elasticities.

Methods
A balanced data panel of 44 countries consuming alcoholic drinks for the period 2010-2021 is used to estimate three equations of demand through seemingly unrelated regression (SUR).

Results
The effect of income on the demand of wine, beer and spirits is positive but inelastic. The own price elasticities are negative and the cross-price effects are unclear.

Abstract
The wine industry has experienced an intense globalization process over recent decades, with the emergence of new producing countries, changes in demand, and an impressive growth in international trade. During the last fifteen years, world wine production has remained relatively stable, showing a diverse worldwide geography, although with high concentration in Western Europe. In 2016, the production was around 267 million hectoliters, 60% produced in Europe and 78% of the production concentrated in twelve countries. World wine consumption has increased but less markedly than competing alcoholic beverages, beer and spirits. In 2016, the total consumption stood at 242 million hectoliters (91% of production), concentrated 73% in twelve countries, also with a very diverse geography.

In the group of countries with a tradition of wine consumption, the statistic of alcoholic consumption show that wine has been declining in favor of beer, while in beer-focused countries the intensity of wine consumption has increased moderately and in the case of spirits, the importance of beer has exceeded that of wine. Anderson and Wittwer (2017) predict that, in the next decade, world production of wine and, simultaneously, consumption (in volume) will evolve moderately. The decrease in consumption in producing countries will be compensated for by the increase in other countries or even by the emergence of new consuming countries, not provoking significant changes in current geographical patterns of consumption. In value, both production and consumption should increase as a consequence of changes in the preference of consumers toward wines of higher quality.

These consumption changes of alcoholic beverages stand out future challenges to the wine industry, especially in exporting countries, reinforcing the need of research on wine consumption income and price elasticities, including in the issue the role of close substitutes and taking into account past and near future data.

As happens with other goods, with wine the evolution of demand is closely linked to societal changes. Due to globalization, with growing interaction between cultures, countries tend to copy each other leading to convergence in several areas, including patterns of alcohol consumption. Globally, over the period 2001-2015, the consumption per capita in volume of alcohol increased by about 25%, while the consumption of non-alcoholic beverages grew by two-thirds (Holmes and Anderson, 2017). Additionally, within alcoholic beverages, wine has been losing market share of the volume of alcohol consumed (from 34% in 1961 to 15% in 2014), while for beer and spirits an increase was verified (from 29% to 42% and from 37% to 43%, respectively).

Given this evolution, Holmes and Anderson (2017) suggest that the next step would be to see to what extent income, own-price and cross-price elasticities of demand for alcoholic and nonalcoholic beverages differ across countries, and how these playout over time.

Taking into account the suggestion of those authors and taking a predictive approach to the issue, the main goal of this paper is to estimate worldwide demand for wine and correlated alcoholic drinks, and correspondent elasticities, using data from 2010 to 2021 provided by Statista.com platform.

Econometrically, the demand for alcoholic beverages studied, namely wine, beer and spirits, has been analyzed using single equation model or equation demand systems (Chang et al., 2002). Hence part of the reason for the popularity of the demand system is due to the ease with which it can provide estimates and be used for testing the consumer theory, allowing us to test the restrictions imposed by adding up, homogeneity and symmetry, through linear restrictions on parameters, and also to compute elasticities (Chambers & Nowman, 1997). There are various systems of demand equations including, among others, Translog Model, Rotterdam, the Almost Ideal Demand System (AIDS). For example, the AIDS model employs the budget share of each good as the respective dependent variable, while the single equation model utilizes the quantity consumed as the dependent variable. Moreover, the AIDS is constrained by the choice of the functional form and restrictions (homogeneity, symmetry and adding up) implied by the economic theory, while the single equation model is not.

Several empirical studies estimate demand functions for alcoholic beverages. The results have been mixed so far, and seem sensitive to mode specification, data types, the estimation procedures, the sample period and countries under study. For example, Nelson (2013) in a meta-analysis summarized estimates of price and income elasticities for wine and distilled spirits. An average wine price elasticity of -0.45 was estimated, as well as an average spirits price elasticity of -0.55 and an income elasticity of about 1.00 for both alcoholic beverages. Uniquely, in our research the cross-price elasticity between wine, spirits and beer was considered, while there is also an attempt to predict future developments in demand taking into consideration forecasts until 2021.

Because demand for alcoholic beverages is likely to be influenced by similar random effects and the error terms of the equations are assumed to be contemporaneously correlated, it suggests the use of seemingly unrelated regression (SUR) in order to increase the robustness of the parameters. Therefore, in order to estimate the demand equation of wine, beer and spirits, the following three demand equations are fitted with a SUR model:

$$cp\square cw\square\_it = \beta\_{10} + \beta\_{11}\ gdppc\_it + \beta\_{12}\ pw\_it + \beta\_{13}\ pb\_it + \beta\_{14}\ ps\_it + \mu\_1i + \gamma\_1t + u\_1it$$
$$cpcb\_it = \beta\_{20} + \beta\_{21}\ gdppc\_it + \beta\_{22}\ pw\_it + \beta\_{23}\ pb\_it + \beta\_{24}\ ps\_it + \mu\_2i + \gamma\_2t + u\_2it$$
$$cpcs\_it = \beta\_{30} + \beta\_{31}\ gdppc\_it + \beta\_{32}\ pw\_it + \beta\_{33}\ pb\_it + \beta\_{34}\ ps\_it + \mu\_3i + \gamma\_3t + u\_3it,$$

Where $cp\square cw\square\_it$ is the consumption per capita of wine in country i at year t; $cpcb\_it$ is the consumption per capita of beer in country i at year t; $cpcs\_it$ is the consumption per capita of spirits in country i at year t; $gdppc\_it$ is the gross domestic product per capita of country i at year t; pw_it is the average price of wine in country i at year t; pb_it is the average price of beer in country i at year t; and, ps_it is the average price of spirits in country i at year t. μ_i and γ_t, which are country and time fixed effects respectively, are included to account for unobserved heterogeneity. Finally, u_it represents the error terms of each equation.

The consumption of wine, beer, and spirits per capita in liters from 2010 to 2021 and the average retail value per

unit in U.S. dollars of wine, beer and spirits are sourced from the Statista.com platform. GDP per capita in U.S. dollars and Consumer Price Indexes (CPI) were collected from the World Economic Outlook database of the International Monetary Fund.

A Breusch-Pagan test for independent equations was applied and the null hypothesis was rejected, so the error terms of the equations are contemporaneously correlated. This result supports the approach of a SUR model. Some linear Wald tests were also applied, to time and country fixed effects, respectively, proving that they are jointly significant.

The preliminary results estimated indicate with statistical significance that the consumption per capita of wine is positively influenced by the GDP per capita and negatively influenced by the average price of wine and of beer. These results suggest, as expected, that there is a positive income elasticity of wine demand and a negative own-price elasticity in the period 2010-2021. On the other hand, the average price of spirits does not present statistically significant effects on the consumption per capita of wine.

For the consumption per capita of beer, statistically significant positive impacts of GDP per capita and average price of spirits were estimated. As was verified for wine, these results suggest that there is a positive income elasticity of demand for beer and that, in the demand equation of beer, there is a substitution effect toward beer when the average price of spirits increases. The average prices of beer and wine do not present statistically significant effects on consumption per capita of beer.

It is estimated with statistical significance that per capita consumption of spirits is positively influenced by the GDP per capita and the average price of wine, but it is negatively influenced by the average price of beer. Therefore, it is also inferred that there is a positive income elasticity of spirits demand and a substitution effect of wine for spirits when the average price of wine increases. The average price of spirits does not present an estimated coefficient that is statistically significant.

In terms of structure, after an introduction, the paper presents a literature review on the demand equation for alcoholic drinks, focusing on wine, followed by a section that includes data, model and results. Finally, some concluding remarks are presented.

The main contribution of this paper is to estimate income and price elasticities not only for the past but also for the near future. Therefore, the results can be useful for wine industry stakeholders in preparing their business plans.

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WORLDWIDE DEMAND FOR WINE AND CORRELATED ALCOHOLIC BEVERAGES, 2010-2021

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