The effect of wine culture on the price-consumption relation

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Price of wine and culture

Introduction

• Over the past several decades, a substantial number of studies of alcohol demand investigated the effects of price on alcohol consumption

• Economists perspective: measure elasticity (i.e. the percentage change in consumption resulting from a 1-percent increase in price)

→ beverage alcohol prices are related inversely to drinking.

→ Average elasticity for wine: between -0.64 and -1.0 for wine


Objective

Show that the price – consumption elasticity for wine is moderated by a measure of “wine culture”


Hypothesis:

This relationship is:

• less intense and/or

• less significant

…for states having a well-developed wine culture.

Why focus on wine?

Wine = alcohol most related to culture, history, tasting, geography, philosophy…

Wine culture/tradition

• Electing to consume wine is not only an economic decision but also is influenced by other factor like social consideration, knowledge and appreciation of it.

(Blaylock and Blisard, 1993)

• The motivations for drinking wine, the consumption occasions, and the general knowledge about wines, reflected by an awareness of wine quality and characteristics should be taken into account when attempting any identification of wine consumption pattern.

(Demossier, 2010; Gual & Colom, 1997; Hall et. al., 1997; Ritchie, 2007)
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Wine culture/tradition

- Tradition of regular wine drinking during meals
- Binge-drinking
- Importance of other alcohol beverages (notably beer)
- Type of social drinking (After-work drinking (e.g. in pubs in UK and Ireland, bistros in France, etc.)
- Religious constraints

Drinking wine:
- To taste?
- To accompany a meal?
- To get drunk?
- To socialize?
- For pleasure?
- To relax? To forget?

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Wine culture/tradition

Given the decision to drink alcohol:

→ Why choosing wine (and not beer or spirits) and how much.

We hypothesize two main patterns

Higher wine culture

« i like wine, i choose wine, i want wine »
- I like the taste
- To enhance taste of the food
- To relax
- To be romantic
- ➔ lower elasticity

Lower wine culture

« i want to get drunk, and it is affordable »
- Alternative to beer
- Binge drinking
- Get drunk as main goal
- To have fun
- ➔ higher elasticity

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Wine culture/tradition

Hypothetical example:

Effect of a decrease in price:
- High “wine culture” Substitution effect (I): higher quality wines in replacement of lower quality wines ➔ no effect on consumption.
- High “wine culture” Revenue effect: consumption level already high (high “wine culture”). Consumers pocket the price difference ➔ no effect on consumption.
- Low “wine culture” Wine seen as a generic “alcoholic beverage”, lower price implies more possibility to buy ➔ in replacement of beer for example, or just in bigger quantity

...Vice-versa in presence of price increase.

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Originality

To the best of your knowledge:

• First paper to take into account « wine culture » in relation to price elasticity;

• Interpretation and analysis of fixed effects

• Classification of US states according to “wine culture” and the price elasticity.
Price of wine and culture

Measuring culture at state level

Multidimensionnel concept ➔ Seven variables

1. Wine Spectator:
   Number of subscribers to the Wine Spectator magazine (print and digital) in the state per capita - "credible source, most influential wine magazine in the United States (Yin and Yang, 1999, Morgenstern, 2000).

2. Diamond rating restaurants:
   Number of restaurants awarded a 4 or 5 Diamond rating by the American Automobile Association (AAA) in 2013 and 2014 per capita

3. State home wine production:
   Value of production by state per capita

   ➔ « Gastronomy »

4. Diversity of wine importing countries (1):
   Total number of wine importing countries (extra US) by state

5. Diversity of wine importing countries (2): Herfindahl index
   Degree of country concentration of wine imports

\[ \text{HERF} = \sum (\text{share of country j in total wine imports}) \]

« Import diversity »

6. European ancestry:
   Population self-identification ancestry from main wine-producing European countries:
   • France  • Germany
   • Italy    • Switzerland
   • Spain    • Austria
   • Portugal

7. Religion
   Share of the population that are members of Christian Churches that forbid or strongly discourage the consumption of alcoholic beverages

   ➔ « Population sociology »

Principal-component analysis

The analysis identifies three components + one variable

<table>
<thead>
<tr>
<th>Components</th>
<th>1 « Imports »</th>
<th>2 « Gastronomy »</th>
<th>3 « Sociology »</th>
</tr>
</thead>
<tbody>
<tr>
<td>WINEPROD</td>
<td>.410</td>
<td>.341</td>
<td>-.010</td>
</tr>
<tr>
<td>EURO</td>
<td>-.166</td>
<td>-.185</td>
<td>.915</td>
</tr>
<tr>
<td>WINESPECATOR</td>
<td>.503</td>
<td>.760</td>
<td>.202</td>
</tr>
<tr>
<td>NBIMPORT</td>
<td>.897</td>
<td>.080</td>
<td>-.082</td>
</tr>
<tr>
<td>HERF</td>
<td>-.834</td>
<td>.019</td>
<td>-.006</td>
</tr>
<tr>
<td>RELIGION</td>
<td>-.292</td>
<td>-.282</td>
<td>-.853</td>
</tr>
<tr>
<td>DIAMOND</td>
<td>-.135</td>
<td>.902</td>
<td>-.118</td>
</tr>
</tbody>
</table>

Two methodologies

1. Panel data estimation:

\[
\log(\text{Gallons})_t = \text{const} + \beta \log(\text{Price of wine})_t + \delta_1 \log(\text{Price of beer})_t + \delta_2 \log(\text{Income})_t + \delta_3 (\text{Preferences})_t + \epsilon_t + \sigma_t + \eta_t
\]

Where:
- **Consumption:** Gallons is the gallons of wine per capita consumed in the state, source: NIAAA Nat. Institute on Alcohol Abuse and Alcoholism.
- **Price of wine/beer:** ACCRA American Chamber of Commerce Research Association - retail price of the best selling wine, exclusive of sales taxes for several cities across US - Annual state level data are calculated by averaging the quarterly figures from one or more cities within each state - then adjusted using CPI.
- **Preferences:** set of variables measuring preferences toward wine consumption (income, urban, education, rural).
- \( \epsilon_t \): a year fixed effect.
- \( \sigma_t \): a state fixed effect.

**Hypothesis 2(a):** the use of state fixed effects should significantly alter the value and/or significance of the \( \beta \) coefficient relatively to OLS.

**Hypothesis 2(b):** the state fixed effects should be correlated with our culture variables.

**Panel estimation results(1): OLS and fixed effects**

<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS Coefficient</th>
<th>FE Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>PriceW</td>
<td>-0.7535***</td>
<td>-0.0830***</td>
</tr>
<tr>
<td>PriceB</td>
<td>0.1266</td>
<td>0.1210**</td>
</tr>
<tr>
<td>Income</td>
<td>2.4671***</td>
<td>0.3042***</td>
</tr>
<tr>
<td>URBAN</td>
<td>-0.0007***</td>
<td>0.0043***</td>
</tr>
<tr>
<td>bachelor</td>
<td>0.0052***</td>
<td>-0.0003</td>
</tr>
<tr>
<td>black</td>
<td>0.0008</td>
<td>-0.0021</td>
</tr>
<tr>
<td>latino</td>
<td>0.0091***</td>
<td>-0.0165***</td>
</tr>
<tr>
<td>cons</td>
<td>-23.2904***</td>
<td>-2.3970***</td>
</tr>
<tr>
<td>NB obs</td>
<td>1066.0000</td>
<td>1066</td>
</tr>
<tr>
<td>R2</td>
<td>0.5922</td>
<td>0.9781</td>
</tr>
<tr>
<td>Time effect F-test</td>
<td>YES ***</td>
<td>YES ***</td>
</tr>
<tr>
<td>State effect F-test</td>
<td>NO</td>
<td>YES ***</td>
</tr>
</tbody>
</table>

Correlation coefficient between state fixed effects and culture factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Correlation</th>
<th>Rank correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (imports)</td>
<td>0.2104</td>
<td>0.2401</td>
</tr>
<tr>
<td>2 (Gastronomy)</td>
<td>0.4380</td>
<td>0.6219</td>
</tr>
<tr>
<td>3 (religion/European ancestry)</td>
<td>0.1758</td>
<td>0.1809</td>
</tr>
</tbody>
</table>

Coherently with Young and Bielinska-Kwapisz (2003)
## Price of wine and culture

### Panel estimation results (2)

→ adding wine culture measures

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>Fixed effect</th>
<th>OLS + Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Coefficient</td>
<td>Coefficient</td>
</tr>
<tr>
<td>PriceW</td>
<td>-0.7535***</td>
<td>-0.0830**</td>
<td>-0.5406***</td>
</tr>
<tr>
<td>PriceB</td>
<td>0.1266</td>
<td>0.1210**</td>
<td>0.3070**</td>
</tr>
<tr>
<td>Income</td>
<td>2.4671***</td>
<td>0.3042***</td>
<td>0.9534***</td>
</tr>
<tr>
<td>URBAN</td>
<td>-0.0007</td>
<td>0.0043***</td>
<td>0.0011</td>
</tr>
<tr>
<td>bachelor</td>
<td>0.0052***</td>
<td>-0.0003</td>
<td>0.0007</td>
</tr>
<tr>
<td>black</td>
<td>0.0008</td>
<td>-0.0021</td>
<td>-0.0010</td>
</tr>
<tr>
<td>latino</td>
<td>0.0091***</td>
<td>-0.0165***</td>
<td>0.0010</td>
</tr>
<tr>
<td>Factor1 « Imports »</td>
<td>-</td>
<td>-</td>
<td>0.1076***</td>
</tr>
<tr>
<td>Factor2 « Gastronomy»</td>
<td>-</td>
<td>-</td>
<td>0.2845***</td>
</tr>
<tr>
<td>Factor3 « Sociology»</td>
<td>-</td>
<td>-</td>
<td>0.0835***</td>
</tr>
<tr>
<td>cons</td>
<td>-23.2904***</td>
<td>-2.3970***</td>
<td>-8.6794***</td>
</tr>
</tbody>
</table>

NB obs 1066  1066  1066
R² 0.5922  0.9781  0.7310
Time effect F-test Yes ***  Yes ***  Yes ***
State effect F-test No  Yes ***  No

***: sign at 1%, **: sign at 5%, *: sign at 10%

### Second methodology

#### 2. Time-series individual state estimation:

For each state, estimate:

\[
\log(\text{Gallons}_t) = \beta_0 + \beta_1 \log(\text{Price of wine}_t) + \beta_2 \log(\text{Income}_t) + \beta_3 \log(\text{Preferential}_t) + \beta_4 \Delta \text{Trend}_t + \epsilon_t
\]

**Hypothesis 3:** the \( \beta_i \) coefficients can be classified according to the level of wine culture.

#### Price of wine and culture

- **Central states**: Illinois, Ohio, Michigan, Wyoming, North Dakota, Minnesota, Missouri, Nebraska, Wisconsin, Iowa, Indiana, Pennsylvania
- **East Coast states**: Connecticut, Massachusetts, New York, New Jersey, Maine, Colorado, N. Hampshire, Vermont, Nevada
- **Southern states**: Mississippi, North Carolina, Texas, Louisiana, Tennessee
- **Western states**: Arizona, Nevada, Utah, California, Hawaii
- **Factor 2 Gastronomy**: Mississippi, North Carolina, Arizona, Nevada, Utah, California, Hawaii
- **Factor 3 Sociology**: Connecticut, Massachusetts, New York, New Jersey, Maine, Colorado, N. Hampshire, Vermont, Nevada

#### Elasticity

- **High**: Washington, Oregon, California, Nevada, Utah, Utah, Hawaii, California
- **Low**: South Carolina, North Carolina, West Virginia, Kentucky

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**Factor 2 “gastronomy”**
Price of wine and culture

Conclusion & Sum up

State fixed effects:

- Strongly significant
- Affect the elasticity (reduction)
- Correlated with wine culture/tradition measures

Wine culture measures:

- Affect the elasticity (reduction – smaller than adding state fixed as the latter, of course, can capture also regulation/taxe/legal peculiarities of different states)

Possibility to cluster US states according to wine culture & price-consumption elasticity

Thank you!

Questions?

Comments?

Ideas?