Lausanne 2024 Abstract Submission

Title
Is More Always Better? The Returns to Alcohol by Volume - Evidence from the Austrian "Spirits Trophy 2023"

I want to submit an abstract for:
Conference Presentation

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Keywords
Alcohol by volume, hedonic model

Research Question
What are the returns to alcohol by volume in spirits?

Methods
Econometric analysis of some 900 spirits receiving an award in the Austrian "Spirits Trophy 2023", the results of which were published in a recent edition of gourmet magazine "Falstaff"

Results
Alcohol by volume has a statistically significant, yet non-linear impact on bottle prices (coefficient of linear term is negative, of squared term positive and of cubic term again negative).

Abstract
Hedonic models explaining the observable variation in wine prices (e.g. Goncalves et al. 2021, Rebelo et al. 2019, Roma et al. 2013) as well as in beer prices (e.g. Michis 2024, Thrane et al. 2023, Smith et al. 2016) often include alcohol by volume as a control variable without paying much attention to its magnitude and without asking whether the effect is linear which, in turn, suggests that “more is always better” in the sense that higher prices can be charged for wine and beer with higher alcohol content. To the best of my knowledge, Fanasch and Frick (2020) were the first to include not only the linear, but also the squared term of alcohol by volume in their estimation of a hedonic price model using a large sample of 55,500 different wines from Germany. Their results show that the implicit assumption that alcohol by volume has a positive and statistically significant linear effect on bottle prices does not hold. Particularly light wines with less than 9.5 percent of alcohol sell at higher prices than those with 9-10 percent. Beyond that point, prices increase nearly exponentially. Re-estimation of their data including a cubic term reveals that the latter coefficient fails to reach a conventional level of significance, suggesting that the effect is not only statistically significant, but also economically highly relevant.

In this paper, I extend the analysis of wine and beer price determinants by using data from the 2023 edition of the "Austrian Spirits Trophy", the results of which were published in a recent edition of gourmet magazine “Falstaff”. The dataset includes 906 different spirits from all over the world that received an award, ranging from Absinthe to Vodka (around 42 percent of the spirits in the sample had been produced in Austria, 16 percent in Italy, 10 percent in Switzerland, 8 percent in Germany and 5 percent in Scotland). For 872 of these the retail price is available in intervals ranging from 1-10€ 11-20€, 21-50€, 51-100€ and above 100€ (the spirit with the lowest alcohol content in the sample is an Italian Aperitivo with 11 percent and the one with the highest content of 68 percent is an...
Absinthe. The mean alcohol content is 37.8 and the standard deviation is 9.7). It appears that – as expected – the linear term of alcohol by volume has a statistically significant and positive effect on bottle prices (model 1). In the second model, the linear term is negative and statistically significant while the squared term is positive and significant, suggesting a u-shaped pattern. Finally, in the third model the coefficients of the linear and the cubic term are negative and significant while the coefficient of the squared term remains negative and retains its statistical significance. These findings suggest that the implicit assumption underlying most of the available evidence that alcohol by volume has a strictly positive impact on bottle prices of beer and wine may be inappropriate. It is, moreover, not compatible with the concept of decreasing marginal returns that is fundamental for most economic analyses.

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Is More Always Better? The Returns to Alcohol by Volume – Evidence from the Austrian “Spirits Trophy 2023”

Bernd Frick

Hedonic models explaining the observable variation in wine prices (e.g. Goncalves et al. 2021, Rebelo et al. 2019, Roma et al. 2013) as well as in beer prices (e.g. Michis 2024, Thrane et al. 2023, Smith et al. 2016) often include alcohol by volume as a control variable without paying much attention to its magnitude and without asking whether the effect is linear which, in turn, suggests that “more is always better” in the sense that higher prices can be charged for wine and beer with higher alcohol content. To the best of my knowledge, Fanasch and Frick (2020) were the first to include not only the linear, but also the squared term of alcohol by volume in their estimation of a hedonic price model using a large sample of 55,500 different wines from Germany. Their results show that the implicit assumption that alcohol by volume has a positive and statistically significant linear effect on bottle prices does not hold (Figure 1).

Particularly light wines with less than 9.5 percent of alcohol sell at higher prices than those with 9-10 percent. Beyond that point, prices increase nearly exponentially. Re-estimation of their data including a cubic term reveals that the latter coefficient fails to reach a conventional level of significance, suggesting that the effect documented in Figure 1 (not included in the initial publication) is not only statistically significant, but also economically highly relevant.

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2 In the dataset used by Fanasch and Frick (2020), alcohol by volume ranges from 5.5 to 20 percent with a mean of 12.1 and a standard deviation of 1.8. The former is lower than in most other studies while the latter is higher (e.g. Goncalves et al. 2021, Rebelo et al. 2019, Roma et al. 2013), suggesting that the wines in our dataset are more heterogeneous.
In this paper, I extend the analysis of wine and beer price determinants by using data from the 2023 edition of the “Austrian Spirits Trophy”, the results of which were published in a recent edition of gourmet magazine “Falstaff”. The dataset includes 906 different spirits from all over the world that received an award, ranging from Absinthe to Vodka\(^3\). For 872 of these the retail price is available in intervals ranging from 1-10\(\text{€}\), 11-20\(\text{€}\), 21-50\(\text{€}\), 51-100\(\text{€}\) and above 100\(\text{€}\)\(^4\).

\(^3\) Around 42 percent of the spirits in the sample had been produced in Austria, 16 percent in Italy, 10 percent in Switzerland, 8 percent in Germany and 5 percent in Scotland.

\(^4\) The spirit with the lowest alcohol content in the sample is an Italian Aperitivo with 11 percent and the one with the highest content of 68 percent is an Absinthe. The mean alcohol content is 37.8 and the standard deviation is 9.7.
Table 1
OLS Estimation Results

<table>
<thead>
<tr>
<th></th>
<th>(1) Bottle Price</th>
<th>(2) Bottle Price</th>
<th>(3) Bottle Price</th>
<th>(4) Bottle Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>0.0281***</td>
<td>-0.0346*</td>
<td>-0.174**</td>
<td>-0.158**</td>
</tr>
<tr>
<td></td>
<td>(0.00532)</td>
<td>(0.0190)</td>
<td>(0.0693)</td>
<td>(0.0693)</td>
</tr>
<tr>
<td>Alcohol$^2$</td>
<td>---</td>
<td>0.000884***</td>
<td>0.00503***</td>
<td>0.00462**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.000258)</td>
<td>(0.00200)</td>
<td>(0.00200)</td>
</tr>
<tr>
<td>Alcohol$^3$</td>
<td>---</td>
<td>---</td>
<td>-0.0000370**</td>
<td>-0.0000336*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0000177)</td>
<td>(0.0000177)</td>
</tr>
<tr>
<td>Points</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0266***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.00939)</td>
</tr>
</tbody>
</table>

Bottle Size Dummies included
Spirit Type Dummies included
Country Dummies included

| Constant         | 1.011            | 1.640**          | 3.085***         | 0.451            |
|                  | (0.648)          | (0.669)          | (0.961)          | (1.334)          |

| $N$               | 872              | 872              | 872              | 872              |
| $Adjusted R2$     | 37.8             | 38.6             | 38.9             | 39.4             |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

It appears from Table 1 that – as expected – the linear term of alcohol by volume has a statistically significant and positive effect on bottle prices (Model 1). In the second model, the linear term is negative and statistically significant while the squared term is positive and significant, suggesting a u-shaped pattern (Figure 2) Finally, in the third model the coefficients of the linear and the cubic term are negative and significant while the coefficient of the squared term remains negative and retains its statistical significance (Figure 3).

These findings suggest that the implicit assumption underlying most of the available evidence that alcohol by volume has a strictly positive impact on bottle prices of beer and wine
may be inappropriate. It is, moreover, not compatible with the concept of decreasing marginal returns that is fundamental for most economic analyses\(^5\).

Figure 2
Predictive Margins from OLS Model with Linear and Squared Term

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\(^5\) Perhaps surprisingly, other studies have included the squared and cubic term of bottle age on auction prices (Dimson et al. 2015) and the squared and cubic term of winery reputation on bottle prices to account for superstar effects (Castriota et al. 2022).
Figure 3
Predictive Margins from OLS Model with Linear, Squared and Cubic Term
Robustness Checks

Table 2
Ordered Probit Estimation Results

<table>
<thead>
<tr>
<th></th>
<th>(1) Bottle Price</th>
<th>(2) Bottle Price</th>
<th>(3) Bottle Price</th>
<th>(4) Bottle Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>0.0566*** (0.00983)</td>
<td>-0.0581* (0.0351)</td>
<td>-0.336*** (0.129)</td>
<td>-0.307** (0.130)</td>
</tr>
<tr>
<td>Alcohol^2</td>
<td>---</td>
<td>0.00160*** (0.000470)</td>
<td>0.00984*** (0.00372)</td>
<td>0.00909** (0.00374)</td>
</tr>
<tr>
<td>Alcohol^3</td>
<td>---</td>
<td>---</td>
<td>-0.0000731** (0.0000328)</td>
<td>-0.0000668** (0.0000329)</td>
</tr>
<tr>
<td>Points</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.0501*** (0.0174)</td>
</tr>
</tbody>
</table>

Bottle Size Dummies included
Spirit Type Dummies included
Country Dummies included

cut1 | 0.957 (1.161) | -0.231 (1.213) | -3.115* (1.773) | 1.822 (2.468) |
cut2 | 3.185*** (1.172) | 2.014* (1.219) | -0.865 (1.773) | 4.071* (2.469) |
cut3 | 5.245*** (1.177) | 4.088*** (1.223) | 1.219 (1.772) | 6.172** (2.473) |
cut4 | 6.558*** (1.180) | 5.419*** (1.225) | 2.555 (1.771) | 7.520*** (2.476) |

N | 872 | 872 | 872 | 872
Pseudo R2 | 24.5 | 25.1 | 25.3 | 25.9

Standard errors in parentheses
*p < 0.10, **p < 0.05, ***p < 0.01
Literature


