Attributes’ specification of wine indexes: is devil in the detail?

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Main candidates to explain wine price dispersion beyond wine name and vintage

Three bottles of château Lafite-Rothschild 1982... is the same price... Or should we take into account the state of preservation of the bottles?

What about the declining price effect and the auction company effect?

Location effect?

In the eye of investor: return, liquidity, transaction costs

In the eye of collector: rarity (age), specificities, state of preservation

In the eye of consumers: Quality, Reputation

Issue

• Information issue and price indices

• Composite, repeated sales, hedonic and hybrid indices were calculated and compared (Fogarty and Sadler, 2014; Masset and Weisskopf, 2018).

• In each case, specifying the relevant attributes is a crucial step, but the indices rarely retain more attributes than the wine-name, vintage, sometimes expert rating and age. Are they sufficient to capture the dispersion of wine prices? ... and so, to control the risk?

• Very few papers discussed the price dispersion on fine wine market (Ashefelter, 1989; Ginsburgh, 1998; Jaeger and Storchmann, 2011; Cardebat et al., 2017) but they all found evidence that the Law of One Price didn’t work.

• Beyond classical attributes, what are candidates to explain this price dispersion?

Purpose of the paper

• The aim of this paper is to identify the existence and the main sources of price dispersion from a very comprehensive auction prices database

• To deal with this aim, we use a two-stage method

• The first step takes into account the product heterogeneity in a comprehensive hedonic regression to explain the level of price.

The idea is to run the more complete hedonic model including all the variables (properties of wine, the state of preservation of the bottle (comments coming from auction sales rating), the location effect of the place where the bottle has been sold) and, the variables gathering all the encoded description of the "chateau" name, their fixed effect, vintage, age, presence and value of experts' grades, date of the sale, auction company.

• The second step identifies the main sources of dispersion in a model which are the most differentially affected due to the difference between agents. The hybrid model considers the residuals of the previous regression (the unexplained part of each price) and regresses them on the attributes.

• First stage: OLS regression of \(y_i\) to obtain the residual \(\hat{z}_i\)

\[ y_i = \beta_0 + \beta_1 \text{chateau fixed effect} + \beta_2 \text{vintage} + \beta_3 \text{presence and value of experts' grades} + \beta_4 \text{date of sale} + \beta_5 \text{location effect} + \epsilon_i \]

• Second stage: OLS regression of \(\log(\hat{z}_i)\) as an estimation of \(\text{Var}(\epsilon_i)\) (cf. Harvey, 1976, p. 462)

\[ \log(\hat{z}_i) = a + \beta_1 \text{chateau fixed effect} + \beta_2 \text{vintage} + \beta_3 \text{presence and value of experts' grades} + \beta_4 \text{date of sale} + \beta_5 \text{location effect} + \epsilon_2 \]

All quantitative variables are expressed in log form (except experts' grades)

\(a\): intercept

\(\text{chateau fixed effect}\), \(\text{vintage}\), \(\text{location effect}\), \(\epsilon_1\) and \(\epsilon_2\): the error terms of respectively equations (1) and (2).
Data

- Data are drawn from the websites of 6 wine auction companies (Acker Merrall, Bonhams, Christie’s, Sotheby’s, Zayci).
- 7,261 sales recorded in 120 auctions between 2012-10 and 2014-3.
- 62 wine names and 133 vintages (from 1816 to 2011).
- Hammer prices in current USD by lot (including relevant Buyer’s premium for the auction house but exclusive of sales tax or VAT).
- More than 250 attributes (or properties) are recorded by encoding auction house catalogs.

Results

- For readability concerns:
  - we use a parsimonious presentation where only significant variables are exhibited in the tables of results.
  - The chateaux and the date of sale dummy variables have been also removed although they are mostly significant.
- The complete results are available from authors on request.

### Table 2. Hedonic model including the bottle description (7261 observations)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Wine</td>
<td>0.004***</td>
<td>0.008***</td>
<td>0.012***</td>
<td>0.016***</td>
</tr>
<tr>
<td>Model 1 (continued)</td>
<td>0.004***</td>
<td>0.006***</td>
<td>0.010***</td>
<td>0.013***</td>
</tr>
<tr>
<td>Model 2 (continued)</td>
<td>0.007***</td>
<td>0.008***</td>
<td>0.013***</td>
<td>0.015***</td>
</tr>
<tr>
<td>Model 3 (continued)</td>
<td>0.009***</td>
<td>0.010***</td>
<td>0.014***</td>
<td>0.016***</td>
</tr>
<tr>
<td>Model 4 (continued)</td>
<td>0.011***</td>
<td>0.012***</td>
<td>0.016***</td>
<td>0.018***</td>
</tr>
</tbody>
</table>

### Estimation of the multiplicative heteroscedastic model (eq.2).

<table>
<thead>
<tr>
<th>Variables</th>
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<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Wine</td>
<td>0.020***</td>
<td>0.024***</td>
<td>0.028***</td>
<td>0.032***</td>
</tr>
<tr>
<td>Hammer price</td>
<td>0.013***</td>
<td>0.016***</td>
<td>0.019***</td>
<td>0.022***</td>
</tr>
<tr>
<td>Size bottle</td>
<td>0.020***</td>
<td>0.024***</td>
<td>0.028***</td>
<td>0.032***</td>
</tr>
<tr>
<td>Model 1 (continued)</td>
<td>0.023***</td>
<td>0.027***</td>
<td>0.030***</td>
<td>0.034***</td>
</tr>
<tr>
<td>Model 2 (continued)</td>
<td>0.026***</td>
<td>0.030***</td>
<td>0.033***</td>
<td>0.037***</td>
</tr>
<tr>
<td>Model 3 (continued)</td>
<td>0.029***</td>
<td>0.033***</td>
<td>0.036***</td>
<td>0.040***</td>
</tr>
<tr>
<td>Model 4 (continued)</td>
<td>0.032***</td>
<td>0.036***</td>
<td>0.039***</td>
<td>0.043***</td>
</tr>
</tbody>
</table>
Results

- Variables have the expected sign in most of the cases. The liquidity appears as an important variable in all the models while declining price effect is not significant (due the new rule during auction sales).
- The overall explanatory power of the hedonic regression is higher than those issued from prior works in the literature:
  - Taking into account the product heterogeneity allows for a better explanation of the wine price (nevertheless, the marginal explanatory power of the product heterogeneity seems weak regarding the $R^2$ evolution from a traditional hedonic to a complete one)
  - This result would suggest that the state of preservation of the bottle is a significant determinant of price
- The price dispersion might be explained by the attributes of the bottles overall. Some coefficients are very high and then could justify a large dispersion of wine prices

Conclusion

- From an academic viewpoint:
  - These findings provide a justification of the non-verification of the Law of One Price on the wine (auction) market: heterogeneity of products and agents seem to be one cause
- From a professional viewpoint:
  - Our results outline that providers of market price indices might increase their relevance by adding hedonic variables, but the cost of this extended consideration of product heterogeneity may exceed the explanatory gain of this operation
  - Further, data providers may offer more information on buyers and design their hedonic indices according to each market segment or category of actors

Thank you for your attention