Scenarios and Prospects for the Swiss Wine Market

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Context of Swiss wines

- High imports (65% of consumption in 2016), high labor costs (wages and difficult mechanization) and tourism shopping ⇒ pressure on Swiss wine producers.
- General lowering in wine consumption (MIS-TREND, 2017).
- Very low exports (<1% in 2016) ⇒ low international visibility and difficult comparisons in terms of price and quality.
- Retail market share ⇒ about 1/3 of the whole Swiss wine consumption.
- Other channels of distribution: direct sale, Horeca, wholesalers (see Mercuriale OSMV).
- Main variables: Income, Quantity and Price (interpreted as equilibrium between demand and supply).

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The six Swiss wine regions

Figure 1: The six Swiss wine regions. (SWP, 2015)
Structure of the panel
- Nielsen retail market (scanned at the till) data available from the OSMV.
- 4×weekly data (13 observations per year).
- 5 years of time span (2012-2016).
- Identification variables: color, region, subregion, canton, grape varietal, AOC ("protected designation of origin"), foreign, etc.
- 78 Swiss AOC types of wines (examples: Merlot red Ticino, Fendant white Valais), 8 Swiss non-AOC and 12 foreign wines (4 countries times 3 colors).

Type of variables
- **Main variables**: income, quantity, price and promotions facts.
- **Economic variables**: exchange rates, CPI, wine import prices.
- **Climatic variables**: temperature, sunshine and rainfall.

**Figure 2**: Proportion of colors by region

**Figure 3**: Graphical regression Vaud AOC white by sub-region

**Figure 4**: Seasonality of Valais wines (monthly frequency)
Motivation and methodology

- **Motivation**
  - Identify supply and demand shocks consequences on the Swiss retail market.
  - Provide a tool for understanding price change persistence (price promotions) for both producers and consumers.

- **Methodology**
  - Panel vector autoregressive model (Panel VAR) and impulse response function (IRF) adapted for longitudinal analysis and for specific types of wines.
  - Sign restrictions strategy enables us to disentangle demand and supply shocks effect on two main variables: quantity and price equilibrium.

Methodology (1/3)

Panel vector autoregressive model (Panel VAR) with Equations 1 and 2:

\[
X_{i,t} = C_i + \sum_{p=1}^{P} \beta_p X_{i,t-p} + Z_t \gamma + \varepsilon_{i,t}
\]

\[
X_{i,t} = \begin{bmatrix} Q_{i,t} \\ P_{i,t} \end{bmatrix}, \quad \beta_p = \begin{bmatrix} \beta_{11p} & \beta_{12p} \\ \beta_{21p} & \beta_{22p} \end{bmatrix}, \quad \varepsilon_{i,t} = \begin{bmatrix} \varepsilon_{1i,t} \\ \varepsilon_{2i,t} \end{bmatrix}
\]

Where:
- \(X_{i,t}\) is a vector which includes two variables: \(Q_{i,t}\) and \(P_{i,t}\); \(C_i\) (constant), \(X_{i,t-p}\) (lags of quantity and price vectors for previous time) link to matrices parameters \(\beta_p\) (past technical analysis), \(Z_t\) (matrix of control variables), \(\gamma\) (parameter vector).
- \(\varepsilon_{i,t}\) (vector of idiosyncratic error term) which captures exogenous supply and demand shocks.

Methodology (2/3)

- **Three approaches**:
  - **Technical analysis** of past data (years 2012-2016)
  - **Influencing factors** for modeling and forecasting
  - **Exogenous shocks** of supply and demand

- **Model**: «Panel vector autoregressive model» (Panel VAR)

\[
X_{i,t} = C_i + \sum_{p=1}^{P} \theta_p X_{i,t-p} + \beta Z_{i,t} + \varepsilon_{i,t} \quad \text{avec} \quad X_{i,t} = \begin{bmatrix} P_{i,t} \\ Q_{i,t} \end{bmatrix}
\]

- **Indices**:
  - \(I\) types of wine (Fendant Valais, Merlot Ticino)
  - \(t\) period (month, trimester, year)

**Figure 5**: Forecast for Swiss wine

Methodology (3/3)

Panel vector autoregressive model (Panel VAR) with Equations 1 and 2:

\[
X_{i,t} = C_i + \sum_{p=1}^{P} \beta_p X_{i,t-p} + Z_t \gamma + \varepsilon_{i,t}
\]

\[
X_{i,t} = \begin{bmatrix} Q_{i,t} \\ P_{i,t} \end{bmatrix}, \quad \beta_p = \begin{bmatrix} \beta_{11p} & \beta_{12p} \\ \beta_{21p} & \beta_{22p} \end{bmatrix}, \quad \varepsilon_{i,t} = \begin{bmatrix} \varepsilon_{1i,t} \\ \varepsilon_{2i,t} \end{bmatrix}
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- \(\varepsilon_{i,t}\) (vector of idiosyncratic error term) which captures exogenous supply and demand shocks.

Following Faust (1998), Canova and De Nicolo (2002), Uhlig (2009) Canova and Ciccarelli (2013), the subsequent differential \(\frac{\partial X_{i,t+1\delta}}{\partial \varepsilon_{i,t}} \geq 0\) or \(\frac{\partial X_{i,t+1\delta}}{\partial \varepsilon_{i,t}} \leq 0\) allows us to disentangle respectively demand from supply shocks (see sign restrictions).

**Figure 6**: Examples of supply and demand shocks
Examples of supply and demand shocks

(a) Vineyard damaged in Cortaillod, Canton Neuchâtel.

(b) Exchange rate EURO/CHF in 2012-2016 (SNB, 2016).

Table 2: Panel VAR-Granger causality Wald test

<table>
<thead>
<tr>
<th>Dep. variable</th>
<th>Excluded</th>
<th>chi2</th>
<th>df</th>
<th>Prob&gt;chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(Q_{i,t})</td>
<td>ln(P_{i,t})</td>
<td>72.344</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ALL</td>
<td>72.344</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ln(P_{i,t})</td>
<td>ln(Q_{i,t})</td>
<td>1.319</td>
<td>1</td>
<td>0.251</td>
</tr>
<tr>
<td></td>
<td>ALL</td>
<td>1.319</td>
<td>1</td>
<td>0.251</td>
</tr>
</tbody>
</table>

H_0: Excluded variable does not Granger-cause Equation variable
H_1: Excluded variable Granger-causes Equation variable

Table 1: Panel VAR for Swiss AOC wines

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>ln(Q_{i,t})</th>
<th>ln(P_{i,t})</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(Q_{i,t-1})</td>
<td>0.8743***</td>
<td>0.0124</td>
</tr>
<tr>
<td></td>
<td>(0.0465)</td>
<td>(0.0108)</td>
</tr>
<tr>
<td>ln(P_{i,t-1})</td>
<td>1.6338***</td>
<td>0.5252***</td>
</tr>
<tr>
<td></td>
<td>(0.1921)</td>
<td>(0.0724)</td>
</tr>
<tr>
<td>Observations</td>
<td>4485</td>
<td>4485</td>
</tr>
<tr>
<td>No. of labels</td>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1.

Results show a strong heterogeneity for impulse responses functions (IRF) as well as supply-demand ratios in explaining forecasting error terms among different wine specifications such as region of origin, color and grape varietal.
Results (4/5) - Nowcasting

Figure 7: Correlation Dôle blanche (rosé) – temperature maximum

Conclusions

- We analyze the supply and demand shocks consequences on the Swiss retail market (panel structure).
- Innovative model to look at both producers’ (retailers) and consumers’ behaviors.
- Price promotions seem to be good tools a priori in order to push consumers to buy more, especially for specific labels with high price elasticity.
- However price could be seen as signal of good quality and once it has been too much lowered, it is consequently difficult to come back to its natural price.
- Climatic variables (temperature) could be useful for nowcasting consumption of specific types of wines (rosés).
- Turning to preliminary forecasting analysis, panel structure and aggregate data seem obviously more difficult to predict.

Results (5/5) - Forecasting

Figure 8: Forecast for Swiss wine

Thank you for your attention!


