Profitability of Firms in European Food Retailing

Tagung SGA-SSE 2018 – Youth Session
David Lanter (MSc. ETH / MSc. EPFL)
Overview

1. Motivation
2. Theoretical background of profit drivers
3. Research questions
4. Econometric methodology
5. Data
6. Estimation results and discussion
7. Conclusion
Motivation

- Driving forces and persistence of profits of high concern for companies
  - Managerial implications
- European food retailing not analyzed systematically
  - Dynamic behavior remains theoretical black box
- Economic relevance and structure of EU food retailing (EU-28)
  - Important position in food supply chain as main distributor
  - 1'130 billion Euro in turnover generated by 910'000 firms
    - 99% of EU food retailers are micro-, small-, and medium-sized firms
    - High degree of industry concentration
Theoretical background of profit drivers

- **Perfect competition theory**
  - Profit, i.e. price above marginal costs, a “very” short-run phenomenon (Schumpeter 1934)
- **Industrial organization (IO) (Mason 1939, Bain 1951)**
  - Firm profits result from structural characteristics of industry (e.g. industry concentration and industry size)
  - Strategic decisions of firms not considered
    - No explanation for interfirm profit differences
- **Strategic management concepts**
  - Market-based view (MBV) (Porter 1981)
    - Firms dynamically shape industry through strategic decisions
  - Resource-based view (RBV) (Barney 1991)
    - Individual firm’s resource endowments main drivers for profits while industry structure neglected

Consideration of industry- and firm-specific variables as profit drivers
1. Which industry- and firm-specific variables drive profitability in EU food retailing?
2. How persistent are profits in EU food retailing?

Persistence: Percentage of profits maintained from period to period
(Schumacher and Boland 2005)
Econometric methodology

- Simplistic dynamic panel data model: \( \pi_{i,t} = C + \lambda \pi_{i,t-1} + \varepsilon_{i,t} \)
  - \( \pi_{i,t} \): Profit of firm \( i \) at time \( t \) measured as return on assets (ROA)
    - ROA\(_{i,t} = \frac{EBIT_{i,t}}{Total\ assets_{i,t}} \times 100 \)
  - \( \lambda \): Persistence – Percentage of profits maintained from period to period [-1;1]
  - \( \varepsilon_{i,t} \): Normally distributed error term \( N(0, \sigma^2) \)

- Extensive dynamic panel data model: \( \pi_{i,t} = C + \lambda \pi_{i,t-1} + \sum_j \alpha_j(X_{j,i,t}) + \varepsilon_{i,t} \)
  - \( \alpha_j \): Impact of industry or firm explanatory variable \( X_j \) on profit
  - Estimator: Arellano and Bond’s (1991) Generalized Method of Moments (GMM)
Data

- **Firm data**
  - Balance sheet database AMADEUS compiled by Bureau van Dijk

- **Firm explanatory variables based on RBV**
  - Financial risk
    - 1/Current ratio
    - Gearing ratio
  - Age
  - Age squared
  - Firm size: Logarithm of total assets
  - Firm growth: Growth factor of total assets
  - Market share: Firm sales divided by NACE\(^1\) industry sales

- **Industry data**
  - Eurostat database compiled by the European Commission

- **Industry explanatory variables based on IO**
  - Industry concentration: Herfindahl-Hirschman-Index (HHI)
  - Industry size: Logarithm of NACE industry sales
  - Industry growth: Growth factor of NACE industry sales

- 13'256 firms
- Time horizon: 2006 to 2014
- Countries: France (FR), Poland (PL), Spain (ES), Sweden (SE), United Kingdom (UK)

\(^1\) EU industry classification standard
Number of firms in final sample
- In accordance with Eurostat, micro-, small-, and medium-sized firms dominate final sample
- UK as an exception

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of firms in final sample</th>
<th>Number of firms according to Eurostat</th>
<th>Percentage of firms in final sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR</td>
<td>7'104</td>
<td>75'123</td>
<td>9.46%</td>
</tr>
<tr>
<td>PL</td>
<td>647</td>
<td>70'120</td>
<td>0.92%</td>
</tr>
<tr>
<td>ES</td>
<td>3'282</td>
<td>138'211</td>
<td>2.27%</td>
</tr>
<tr>
<td>SE</td>
<td>2'052</td>
<td>10'664</td>
<td>19.24%</td>
</tr>
<tr>
<td>UK</td>
<td>171</td>
<td>54'068</td>
<td>0.32%</td>
</tr>
<tr>
<td>Total</td>
<td>13'256</td>
<td>348'186</td>
<td>3.81%</td>
</tr>
</tbody>
</table>
**Estimation results and discussion**

- Simplistic dynamic panel data model:
  \[ \pi_{i,t} = C + \lambda \pi_{i,t-1} + \varepsilon_{i,t} \]

**Persistence**

<table>
<thead>
<tr>
<th>Variable</th>
<th>FR (^a)</th>
<th>PL</th>
<th>ES</th>
<th>SE</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged profits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\pi_{i,t-1})</td>
<td>0.713 (4.59)**</td>
<td>0.653 (3.38)**</td>
<td>0.659 (2.37)**</td>
<td>0.565 (2.32)**</td>
<td>0.592 (4.42)**</td>
</tr>
</tbody>
</table>

* Significant at 10% level; ** Significant at 5% level; *** significant at 1% level

\(^a\) Integration of second lag due to autocorrelation

- France highest persistence, Sweden lowest degree
  - Successful resistance against competitive forces over a period of 1 year
Estimation results and discussion (cont.)

- Extensive dynamic panel data model: \( \pi_{i,t} = C + \lambda \pi_{i,t-1} + \sum_j \alpha_j(X_{j,i,t}) + \varepsilon_{i,t} \)

**Persistence**

<table>
<thead>
<tr>
<th>Variable</th>
<th>FR (^a)</th>
<th>PL</th>
<th>ES</th>
<th>SE</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged profits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \pi_{i,t-1} )</td>
<td>0.668 (4.25)***</td>
<td>0.603 (2.84)***</td>
<td>0.351 (1.69)*</td>
<td>0.397 (2.19)**</td>
<td>0.658 (4.37)***</td>
</tr>
</tbody>
</table>

* Significant at 10% level; ** Significant at 5% level; *** significant at 1% level

\(^a\) Integration of second lag due to autocorrelation

- Persistence estimates undergo modifications
  - France highest persistence, Spain lowest degree
  - UK high value due to many large firms included
- Higher values than for other retail trade sectors (\( \hat{\lambda} \approx 0.390 \)) (Goddard et al. 2005)
Estimation results and discussion (cont.)

- Extensive dynamic panel data model: \( \pi_{i,t} = C + \lambda\pi_{i,t-1} + \sum_j \alpha_j(X_{j,i,t}) + \varepsilon_{i,t} \)

### Impact of explanatory variables on profit

<table>
<thead>
<tr>
<th>Industry</th>
<th>Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. variable</td>
<td>&lt; 0 *</td>
</tr>
<tr>
<td>Concentration (HDI)</td>
<td>ES, SE</td>
</tr>
<tr>
<td>Ln Industry size</td>
<td>SE, UK</td>
</tr>
<tr>
<td>Industry growth</td>
<td>SE, UK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm</th>
<th>Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/Current ratio</td>
<td>FR, PL, ES, SE</td>
</tr>
<tr>
<td>Age</td>
<td>FR, ES, SE</td>
</tr>
<tr>
<td>sqAge</td>
<td>ES, SE</td>
</tr>
<tr>
<td>Gearing ratio</td>
<td>FR, PL, ES, SE, UK</td>
</tr>
<tr>
<td>Ln Firm size</td>
<td>FR, PL, ES, SE</td>
</tr>
<tr>
<td>Firm growth</td>
<td>FR, ES, SE</td>
</tr>
<tr>
<td>Market share</td>
<td>FR</td>
</tr>
</tbody>
</table>

- **Industry concentration (+)**
  - Entry barrier preventing potential competitors from entering the market

- **Financial risk (-)**
  - Supports Bowman’s (1980) ‘risk-return paradox’

- **Firm size (+)**
  - Economies of scale and more negotiating power towards authorities
  - In contrast to Goddard et al. (2005)

* Significant at least on 10%-level

* Neglected due to multicollinearity
Conclusion

- Industry and firm explanatory variables influence profits as stated by IO and strategic management concepts (RBV)
- EU food retailing sector capable of withstanding competitive forces
- Managerial implications
  - Certain firm size required
  - Financial balance
- Competitive policy implications
  - Industry concentration as inhibitor of competition
- Potential improvements of model
  - Integration of other firm explanatory variables such as advertising, export revenue, or R&D
  - Account for impact of food retailing on food processing industry
Literature


Backup
Consists of NACE¹ activity class G 47.11 and group G 47.2

- NACE G 47.11: Retail sale in non-specialized stores with food, beverages or tobacco predominating (88% of turnover)
- NACE G 47.2: Retail sale of food, beverages and tobacco in specialized stores (12% of turnover)

¹ EU industry classification standard
EU food retailing sector (cont.)

- Overall trends towards
  - Higher industry turnovers
  - Fewer food retailing firms
  - Increased average turnover per firm

- High degree of industry concentration measured by HHI
  - Uneven distribution of turnovers
  - France as exception

- 99% of EU food retailers are micro, small, and medium-sized firms

<table>
<thead>
<tr>
<th>Country</th>
<th>HHI</th>
<th>Largest firm</th>
<th>Total assets [Euro th]</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>425</td>
<td>DISTRIBUTION CASINO</td>
<td>8'194'000</td>
</tr>
<tr>
<td>Poland</td>
<td>3'021</td>
<td>AUCHAN POLSKA</td>
<td>1'500'936</td>
</tr>
<tr>
<td>Spain</td>
<td>4'751</td>
<td>MERCADONA SA</td>
<td>7'060'386</td>
</tr>
<tr>
<td>Sweden</td>
<td>10'273</td>
<td>SYSTEMBOLAGET</td>
<td>612'796</td>
</tr>
<tr>
<td>UK</td>
<td>12'469</td>
<td>TESCO PLC</td>
<td>60'692'010</td>
</tr>
</tbody>
</table>

Unconcentrated: $0 < HHI < 1'500$
Reasonably concentrated: $1'500 < HHI < 2'500$
Highly concentrated: $2'500 < HHI < 10'000$
High bargaining power against food processing industry
  - Uneven turnover distribution
    - Large players account for majority of turnover
  - Intensification of concentration process due to mergers and acquisitions
  - EU food retailing sector gathers information about buying patterns and preferences
  - Private label products substitute global brands

<table>
<thead>
<tr>
<th>Country</th>
<th>Biscuits [%]</th>
<th>Cereals [%]</th>
<th>Ham [%]</th>
<th>Milk [%]</th>
<th>Soft drinks [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>21.4</td>
<td>13.5</td>
<td>38.3</td>
<td>42.3</td>
<td>9.0</td>
</tr>
<tr>
<td>Poland</td>
<td>12.7</td>
<td>16.1</td>
<td>7.4</td>
<td>22.7</td>
<td>8.3</td>
</tr>
<tr>
<td>Spain</td>
<td>34.4</td>
<td>37.8</td>
<td>52.9</td>
<td>46.2</td>
<td>11.1</td>
</tr>
<tr>
<td>Sweden</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>UK</td>
<td>21.3</td>
<td>21.8</td>
<td>62.7</td>
<td>66.5</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Percentage of private labels by country and product groups in 2012 (Based on data gathered by Planet Retail)
## Data and explanatory variables

- Firm size distribution in final sample

<table>
<thead>
<tr>
<th>Country</th>
<th>Micro sample</th>
<th>Micro Eurostat</th>
<th>Small sample</th>
<th>Small Eurostat</th>
<th>Medium sample</th>
<th>Medium Eurostat</th>
<th>Large sample</th>
<th>Large Eurostat</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>79.54%</td>
<td>92.97%</td>
<td>16.90%</td>
<td>5.26%</td>
<td>3.31%</td>
<td>1.57%</td>
<td>0.25%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Poland</td>
<td>80.04%</td>
<td>95.37%</td>
<td>17.34%</td>
<td>3.79%</td>
<td>2.42%</td>
<td>0.73%</td>
<td>0.20%</td>
<td>0.11%</td>
</tr>
<tr>
<td>Spain</td>
<td>89.76%</td>
<td>97.95%</td>
<td>8.44%</td>
<td>1.85%</td>
<td>1.37%</td>
<td>0.13%</td>
<td>0.42%</td>
<td>0.07%</td>
</tr>
<tr>
<td>Sweden</td>
<td>86.76%</td>
<td>86.84%</td>
<td>12.49%</td>
<td>n/a</td>
<td>0.75%</td>
<td>n/a</td>
<td>0.00%</td>
<td>n/a</td>
</tr>
<tr>
<td>UK</td>
<td>40.99%</td>
<td>89.70%</td>
<td>17.39%</td>
<td>9.43%</td>
<td>22.98%</td>
<td>0.65%</td>
<td>18.63%</td>
<td>0.21%</td>
</tr>
</tbody>
</table>

*Micro: 1 – 9 employees*
*Small: 10 – 49 employees*
*Medium: 50 – 249 employees*
*Large: 250 or more employees*
Previous empirical evidence of profit persistence

- Profit persistence in food processing industry (Hirsch and Gschwandtner 2013)

<table>
<thead>
<tr>
<th>Country</th>
<th>$\hat{\lambda}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>0.110</td>
</tr>
<tr>
<td>France</td>
<td>0.205</td>
</tr>
<tr>
<td>Italy</td>
<td>0.151</td>
</tr>
<tr>
<td>Spain</td>
<td>0.250</td>
</tr>
<tr>
<td>UK</td>
<td>0.304</td>
</tr>
</tbody>
</table>

- Profit persistence in retail trade (Goddard et al. 2005)

<table>
<thead>
<tr>
<th>Country</th>
<th>$\hat{\lambda}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>0.411</td>
</tr>
<tr>
<td>France</td>
<td>0.329</td>
</tr>
<tr>
<td>Italy</td>
<td>0.151</td>
</tr>
<tr>
<td>Spain</td>
<td>0.250</td>
</tr>
<tr>
<td>UK</td>
<td>0.443</td>
</tr>
</tbody>
</table>

- Strongly affected by high bargaining power of the food retailing sector