

Market Power in EU Food Processing Sector: A Stochastic Frontier Approach

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Structure

Introduction

Mark down pricing: Simple principles

Identification of the mark down and estimation strategy

Data

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Aims

Identification of the degree of non-competitive behaviour of the food processors with respect to farmers.

Whether the input processing markets differ significantly among countries?

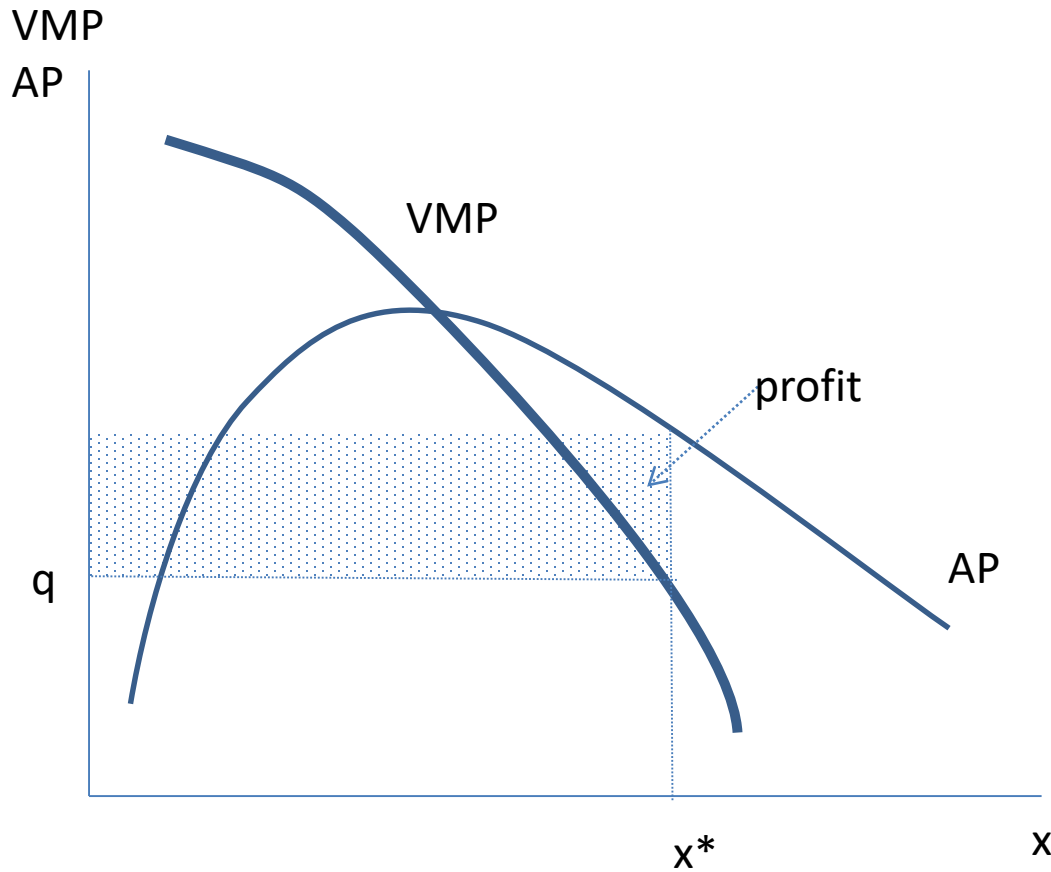
Whether the EU processing market is becoming increasingly competitive or whether an idiosyncratic development of market power can be observed?

Mark down pricing: simple principles

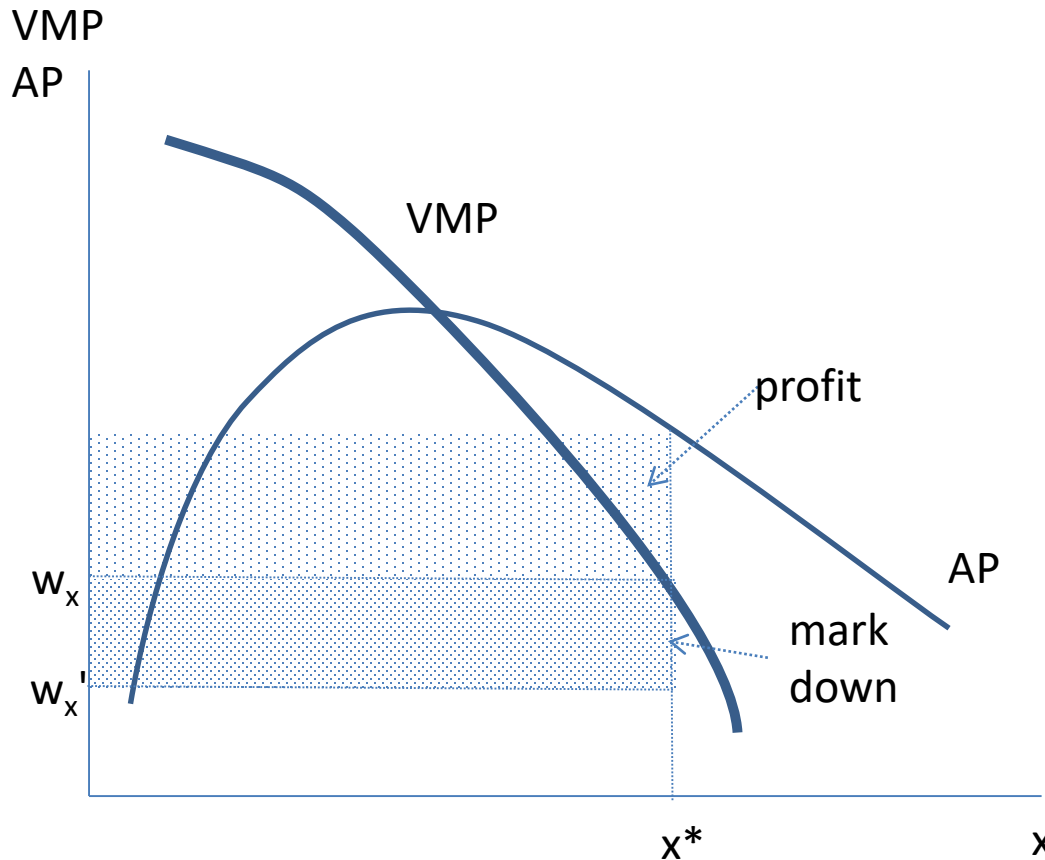
max profit

$$w_x = \text{VMP}$$

$$\pi = x^* (\text{VMP} - \text{AP})$$



Mark down pricing: simple principles



max profit

$$w_x = \text{VMP}$$

$$\pi = x^* (\text{VMP} - \text{AP})$$

mark down

$$w_x' < \text{VMP}$$

$$w_x' = a(s) + b(s) \text{VMP}$$

s strategies

- transaction cost
- market growth
- capacities
- entry barriers....

⇒ **market power**

Relative mark down

$$\frac{\text{VMP} - w_x}{\text{VMP}}$$

Identification of the mark down and estimation strategy

Relative mark down: $\frac{VMP - wx}{VMP}$

$$w'_{x_{it}} \leq \frac{\partial R_i(p_{it}, x_{it}, z_{it}, t)}{\partial x_{it}} = VMP_{it}$$

$$\frac{w'_{x_{it}} x_{it}}{R_{it}} \leq \frac{\partial R_{it}(p_{it}, x_{it}, z_{it}, t)}{\partial x_{it}} \cdot \frac{x_{it}}{R_{it}} = \frac{\partial \ln R_{it}}{\partial \ln x_{it}} = \frac{\partial \ln D^o_{it}}{\partial \ln x_{it}}$$

$$\frac{w'_{x_{it}} x_{it}}{R_{it}} = \frac{\partial \ln D^o_{it}}{\partial \ln x_{it}} - u_{it}, \quad u_{it} \geq 0$$

Empirical implementation

$$D_{it}^O = \frac{\partial \ln D_{it}^O}{\partial \ln x_{it}} = \beta_{xi} + \beta_{xx} \ln x_{it} + \beta_{xt} t + \beta_{zx}' \ln z_{it} + v_{it} - \mu_i - u_{it}.$$

Estimation: 4 step procedure

- (i) parameter estimate – two step GMM
- (ii) REM – GLS
- (iii) ML estimator – transient component
- (iv) ML estimator – persistent component

Relative mark down:

$$\frac{VMP_{it} - w_{x_{it}}}{VMP_{it}} = \frac{VMP_{it} \frac{x_{it}}{R_{it}} - w_{x_{it}} \frac{x_{it}}{R_{it}}}{VMP_{it} \frac{x_{it}}{R_{it}}} = \frac{\tilde{D}_{it}^o - w_{x_{it}} \frac{x_{it}}{R_{it}}}{\tilde{D}_{it}^o} = \frac{u_{it}}{\tilde{D}_{it}^o}$$

Data: Number of observations, variable definitions

| Country | Slaughtering | Fruit & Vege. | Dairy | Milling |
|----------------|--------------|---------------|-------|---------|
| Austria | 69 | 31 | 39 | 1 |
| Belgium | 539 | 318 | 276 | 167 |
| Bulgaria | 200 | 64 | 83 | 32 |
| Czech Republic | 381 | 68 | 282 | 110 |
| Germany | 375 | 186 | 414 | 115 |
| Denmark | 41 | 31 | 15 | 38 |
| Estonia | 58 | 10 | 43 | 9 |
| Spain | 2031 | 835 | 570 | 329 |
| Finland | 159 | 52 | 84 | 32 |
| France | 1887 | 462 | 623 | 351 |
| United Kingdom | 837 | 546 | 450 | 266 |
| Greece | 223 | 468 | 206 | 118 |
| Hungary | 226 | 111 | 79 | 60 |
| Ireland | 72 | 0 | 17 | 19 |
| Italy | 2211 | 1321 | 1666 | 868 |
| Lithuania | 125 | 19 | 99 | 31 |
| Latvia | 58 | 19 | 70 | 18 |
| Netherlands | 55 | 71 | 64 | 20 |
| Poland | 1189 | 521 | 754 | 207 |
| Portugal | 279 | 97 | 75 | 106 |
| Romania | 676 | 126 | 317 | 219 |
| Sweden | 393 | 143 | 27 | 110 |
| Slovenia | 66 | 18 | 27 | 9 |
| Slovakia | 89 | 24 | 87 | 36 |

Cost share=
Material
costs/Revenue

Material costs = the
total costs of
materials and energy

Labour = number of
employees

Capital = deflated
book value of fixed
assets

Parameter estimates

1st step: GMM estimate

| Dairy | | | |
|-------|-------------|----------|---------|
| RSH | Coefficient | Std.Err. | P-value |
| T | -0.001 | 0.000 | 0.144 |
| L | -0.041 | 0.011 | 0.000 |
| M | 0.081 | 0.010 | 0.000 |
| C | -0.028 | 0.007 | 0.000 |
| _cons | 0.351 | 0.126 | 0.006 |

2nd step: REM

| | Coefficient | Std.Err. | P-value |
|----------|-------------|----------|---------|
| sigma_u | 0.112 | | |
| sigma_e | 0.049 | | |
| rho | 0.836 | | |
| constant | 0.350 | 0.004 | 0.000 |

3rd step: transient component

| | Coefficient | Std.Err. | P-value |
|----------|-------------|----------|---------|
| frontier | | | |
| onee | 0.030 | 0.001 | 0.000 |
| usigmas | | | |
| constant | -6.525 | 0.087 | 0.000 |
| vsigmas | | | |
| constant | -6.451 | 0.032 | 0.000 |

4th step: persistent component

| | Coefficient | Std.Err. | P-value |
|----------|-------------|----------|---------|
| frontier | | | |
| onee | 0.118 | 0.002 | 0.000 |
| usigmas | | | |
| constant | -3.817 | 0.040 | 0.000 |
| vsigmas | | | |
| constant | -5.554 | 0.057 | 0.000 |

Estimation results: Dairy

| | Mean | Std.Dev. | Cases |
|-----------------|--------------|----------|-------|
| Austria | 0.163 | 0.022 | 15 |
| Belgium | 0.207 | 0.096 | 268 |
| Bulgaria | 0.113 | 0.081 | 71 |
| Czech Republic | 0.135 | 0.097 | 281 |
| Germany | 0.166 | 0.077 | 336 |
| Denmark | 0.159 | 0.027 | 15 |
| Estonia | 0.088 | 0.013 | 34 |
| Spain | 0.195 | 0.127 | 524 |
| Finland | 0.157 | 0.084 | 74 |
| France | 0.249 | 0.123 | 560 |
| Great Britain | 0.110 | 0.066 | 352 |
| Greece | 0.079 | 0.062 | 175 |
| Hungary | 0.160 | 0.112 | 49 |
| Italy | 0.077 | 0.024 | 17 |
| Ireland | 0.185 | 0.104 | 1618 |
| Litva | 0.067 | 0.026 | 99 |
| Lithuania | 0.058 | 0.015 | 70 |
| Netherland | 0.161 | 0.043 | 43 |
| Poland | 0.083 | 0.061 | 698 |
| Portugal | 0.230 | 0.148 | 75 |
| Romania | 0.148 | 0.076 | 301 |
| Sweden | 0.131 | 0.090 | 26 |
| Slovenia | 0.128 | 0.024 | 27 |
| Slovakia | 0.089 | 0.028 | 86 |
| EU | 0.160 | 0.108 | 5814 |

Estimation results: Milling

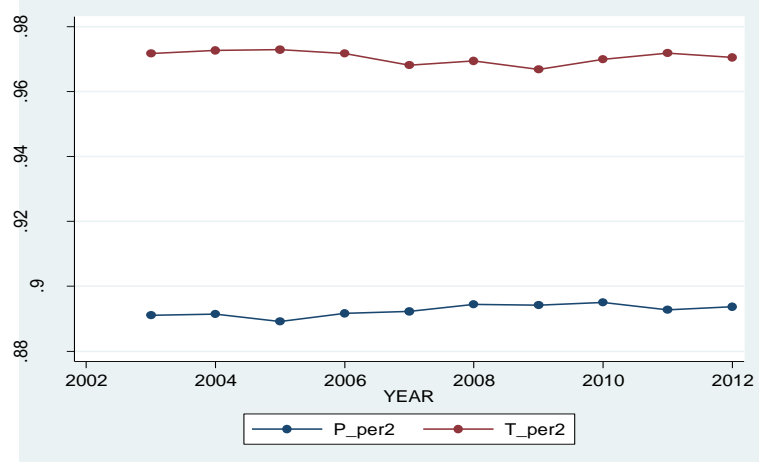
| | Mean | Std.Dev. | Cases |
|------------------|--------------|----------|-------|
| Austria | NA | NA | NA |
| Belgium | 0.204 | 0.100 | 162 |
| Bulgaria | 0.179 | 0.094 | 26 |
| Czech Republic | 0.161 | 0.084 | 106 |
| Germany | 0.279 | 0.100 | 107 |
| Denmark | 0.144 | 0.043 | 30 |
| Estonia | 0.070 | 0.003 | 9 |
| Spain | 0.136 | 0.062 | 323 |
| Finland | 0.297 | 0.199 | 27 |
| France | 0.272 | 0.117 | 317 |
| Great Britain | 0.126 | 0.067 | 215 |
| Greece | 0.092 | 0.045 | 109 |
| Hungary | 0.201 | 0.100 | 37 |
| Italy | 0.203 | 0.148 | 17 |
| Ireland | 0.154 | 0.092 | 826 |
| Litva | 0.063 | 0.027 | 27 |
| Lithuania | 0.060 | 0.006 | 18 |
| Netherland | 0.210 | 0.064 | 20 |
| Poland | 0.104 | 0.082 | 179 |
| Portugal | 0.144 | 0.085 | 101 |
| Romania | 0.098 | 0.052 | 203 |
| Sweden | 0.225 | 0.117 | 103 |
| Slovenia | 0.224 | 0.009 | 9 |
| Slovakia | 0.144 | 0.106 | 33 |
| EU | 0.164 | 0.105 | 3004 |

Estimation results: Slaughtering

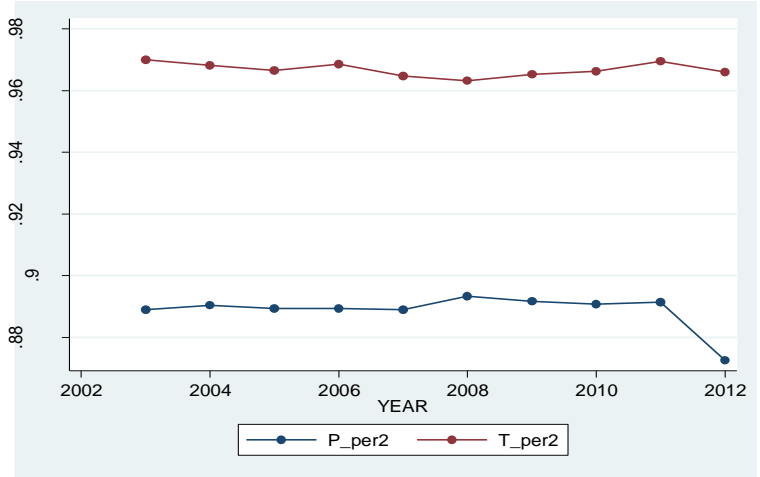
| | Mean | Std.Dev. | Cases |
|------------------|--------------|----------|-------|
| Austria | 0.238 | 0.046 | 25 |
| Belgium | 0.256 | 0.145 | 489 |
| Bulgaria | 0.177 | 0.136 | 151 |
| Czech Republic | 0.128 | 0.067 | 370 |
| Germany | 0.258 | 0.111 | 273 |
| Denmark | 0.147 | 0.080 | 30 |
| Estonia | 0.127 | 0.070 | 58 |
| Spain | 0.183 | 0.158 | 1940 |
| Finland | 0.352 | 0.104 | 151 |
| France | 0.263 | 0.136 | 1615 |
| Great Britain | 0.109 | 0.066 | 634 |
| Greece | 0.061 | 0.041 | 198 |
| Hungary | 0.225 | 0.188 | 150 |
| Italy | 0.065 | 0.031 | 53 |
| Ireland | 0.207 | 0.145 | 2071 |
| Litva | 0.054 | 0.021 | 123 |
| Lithuania | 0.051 | 0.021 | 58 |
| Netherland | 0.228 | 0.102 | 30 |
| Poland | 0.111 | 0.115 | 1023 |
| Portugal | 0.149 | 0.112 | 256 |
| Romania | 0.150 | 0.092 | 635 |
| Sweden | 0.190 | 0.115 | 383 |
| Slovenia | 0.230 | 0.115 | 60 |
| Slovakia | 0.114 | 0.083 | 81 |
| EU | 0.187 | 0.142 | 10857 |

Estimation results: mark down over time

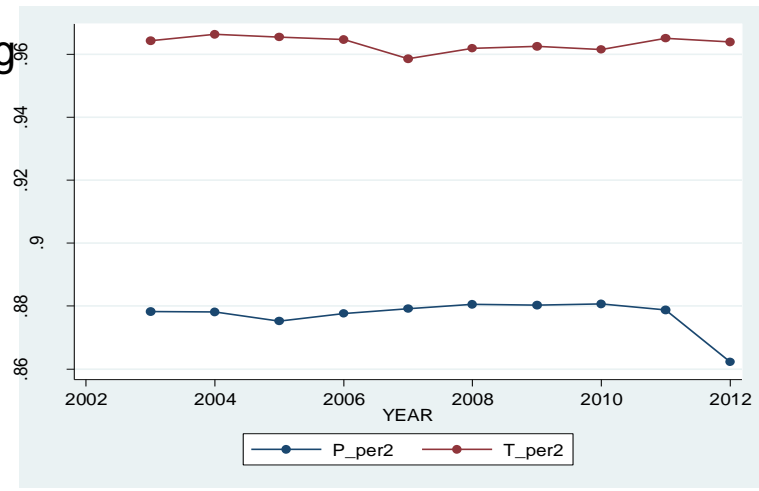
Dairy



Milling



Slaughtering



Source: own calculations

Conclusions (1)

Identification the degree of oligopsonistic market power (by sector):

- Mean mark-down varies from 18.7% (slaughtering) to 16% (dairy and milling)
- Differences between first and last decile suggest that some large companies exercise market power

Conclusions (2)

Whether output processing markets differ significantly among countries in the degree of non-competitive behaviour?

- Degree of market power varies from 5 to 35%
⇒ differences between countries

Whether EU processing market is becoming increasingly competitive or whether an idiosyncratic development of market power can be observed?

- Changes in the mark-down in EU output processing markets over analysed time are marginal



Thank you!



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