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INDUSTRY CONCENTRATION AND COMPETITIVE ADVANTAGE: EVIDENCE FROM THE EU DAIRY INDUSTRY

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Annotation: The main aim of this paper is to investigate the relationship between industry concentration and competitive advantage of the dairy industry in the EU countries. The research was based on data of the European Statistical Office (Eurostat). Descriptive analysis, correlation analysis and panel data analysis were employed in the research. The time frame for the analyses covered the years from 2008 to 2016. The impact of market concentration on competitive advantage of the EU dairy industry appeared to be ambiguous. On the one hand, it was noticed that the higher industry concentration is observed, the more positive trade balance is recorded. On the other hand, correlations based on the fixed effect and trend adjusted data, as well as results obtained using dynamic panel models suggest a negative relationship between concentration and comparative advantages. The EU dairy policy implemented in 2008-2015 seems to have disturbed the nature of the examined relationship.

Key words: industry concentration, market power, competitive advantage, dairy industry, European Union

JEL classification: L66, Q13, Q17

1. Introduction

Trade liberalisation and economic integration affect decisions of enterprises on where to locate their operations and where to sell their products. Therefore, significant changes in the geographical location of production and processing, together with changes in market structures are observed on agri-food markets. The structure of industries changes in two major ways. Some external factors, such as mergers and acquisitions, as well as a firm's rate of internal growth influence industry concentration. Since the early 1980s, an extensive merger activity has taken place both in the food processing industry and the retail sector, making them more and more concentrated (Rogers, 2001; Clarke et al., 2002; McCorriston, 2002; Dobson, Waterson and Davies, 2003).

Classic theories of imperfect competition suggest that high industry concentration contributes to market power of large enterprises, resulting in lower competition, higher prices and welfare losses (Cf. Clarke, Davies and Waterson, 1984; Blažková, 2016). Basically, market power is defined as the ability of a firm or a group of firms to raise the price of a good or service above the competitive level (Kutlu and Sickles, 2012). As it was observed by Morrison (2001), concentration allows firms remaining in the industry to take advantage of their market position – to use their market power to depress prices to input suppliers, or elevate prices to consumers of the final product. To determine this situation Swinnen and Vandeplas (2010) used the term "double market power". The existence of a positive relationship between food retail prices, profits, price-cost margins and concentration was proved by Lamm (1981) and Aalto-Setälä

(2002). The results of these studies are consistent with Bain's (1956) considerations that high concentration implies fundamental market inefficiencies.

However, a greater industry concentration does not necessarily mean high market power. When leading to the use of economies of scale and having a positive impact on productivity, costs of the enterprises, and consumer prices, higher concentration may improve welfare and raise the competitive position of a particular industry (Cf. Blažková, 2016). A positive concentration-efficiency relationship across industries was proved by Clarke et al. (2002), while Gaudin (2018) showed that higher concentration of food retailing markets does not always have to be associated with higher prices. Also Porter (1990) presented statements in line with the efficiency theory. According to Pulak and Neha (2012), it means that mergers and acquisitions are executed to reduce costs by achieving scale economies and to enhance productive efficiency through a better allocation of resources leading to lower prices and hence greater allocative efficiency.

As Porter (1980) mentioned, agribusiness becomes more competitive through cost leadership and/or product differentiation. More specifically, technologies affecting the productivity of labour and capital, input costs, production economies, product quality and enterprise differentiation, advertising and promotion, along with some external factors are the primary sources of competitiveness on domestic and foreign markets (Harrison and Kennedy, 1997). Competitiveness of the food industry and its individual sectors may be simply defined as the ability to achieve profitable gain and market share in domestic and export markets, in which the industry is active (Wijnands et al., 2008). It can also be said that the competitive food industry has the ability to profitably sell its products on the international market (Brinkman, 1987). This viewpoint is consistent with the opinion by Krugman (1994), who indicated that measuring competitiveness on foreign markets does not make sense if the activity of a given industry focuses almost entirely on the domestic market. When measuring international competitiveness, trade related indicators, including export market share, trade balance or revealed comparative advantage, are typically ex-post measures, useful to demonstrate the competitive position of a country or a sector of the national economy.

Due to some degree of market failure or abuse of market power, manufacture of dairy products is one of the most unique industries within the EU food processing sector. The dairy industry plays a crucial role in the EU agri-food economy, accounting for 17 % of the turnover and 9 % of the number of employees in the total food industry in 2017 (Eurostat, 2019). The EU is also a key player in the world dairy market. In 2016 it produced a quarter of the world's available milk and had a 27 % share in global dairy exports (Eurostat, 2019). Only in part the EU holds this position due to the EU dairy policy regime aimed at supporting dairy producers and protecting the Single European Market (SEM) through trade barriers. Increased participation in the world dairy market is also connected with the expansion of EU milk production after the March 2015 quota abolition encouraging the export of the surplus supply of dairy products outside the EU (Mach, Hošková and Thompson, 2017). Having this in mind, the question arises what is the level of concentration in the EU dairy industry and whether it affects the competitiveness of this industry in the SEM framework. A previous study on market power in the European dairy industry by Čechura, Žáková Kroupová and Hockmann (2015) was based on a mark-up model and the application of the stochastic frontier methodology. The results showed that the abuse of oligopoly market power is not large and since the mark-up distribution is skewed toward lower values, a majority of milk processors

are characterized by only a small or almost no degree of market power. However, there are some companies (around 10 %) that reach a considerably high mark-up. In this context, the main aim of this paper is to investigate the relationship between industry concentration and competitive advantage of the dairy industry in the EU countries using aggregate country data.

2. Materials and Methods

The research was based on data of the European Statistical Office (Eurostat). In accordance with the statistical classification of economic activity in the EU (NACE), manufacture of dairy products includes the operation of dairies and cheese making, and manufacture of ice cream (NACE C105). The time frame for the analyses was determined by the availability of comprehensive, internationally comparable data and thus covered the period 2008-2016.

To estimate a competitive advantage in the EU dairy industry we used the following measures: export/import ratio (Ex/Im), revealed comparative advantage index (RCA), relative import advantage index (RMA), revealed symmetric comparative advantage index (RSCA) and trade balance index (TBI). More details on the construction and interpretation of the above-mentioned indexes can be found in Benesova et al. (2017). Due to the lack of country data on concentration ratios (CR) or Herfindahl-Hirschman Indexes (HHI) we applied two simple indicators to measure concentration in dairy industry. The first one was the share of large companies (employing over 250 people) in the total turnover of dairy industries (C1). The second one was the share of large companies in the total employment of dairy industries (C2). Both types of variables constitute an unbalanced panel data frame.

To study relationships between competitive advantage and concentration levels descriptive analysis, correlation analysis and dynamic panel models were employed in the research. Due to autocorrelation problems related with the lack of reliable control variables and persistence of economic phenomena a dynamic linear panel model was applied. It can be represented as follows:

$$y_{it} = \alpha y_{i,t-1} + X_{it}\beta + \eta_i + \varepsilon_{it} \quad (\mathbf{1})$$

where y_{it} is the observation on the dependent variable for cross-sectional unit i in period t, X_{it} is a 1×k vector of independent variables, β is a k×1 vector of parameters, α is an autoregressive parameter, and ε_{it} is an error term specific to unit i in period t. To estimate equation (1) a two-step difference estimator (GMM-DIFF) of Arellano and Bond (1991) with finite-sample corrections of Windmeijer (2005) was applied.

3. Results and Discussion

Table 1 presents an average concentration and competitve advantage measures in the manufacture of dairy products in the EU countries in 2008-2016 (a selected set of countries was determined by the availability of data). The greatest concentration of economic activity was observed for the dairy industry in Finland, Sweden, Lithuania and Croatia, where the share of large companies (employing over 250 people) in the total turnover of dairy industry amounted to at least 80 %, while their share in the total employment of dairy industry ranged between 68 % and 85 %. Dairy enterprises in Germany and the Netherlands ranked next. Among the above-mentioned countries only Lithuania and Germany showed the comparative advantage (RSCA>0) and kept a positive trade balance (TBI>0 and Ex/Im>1). Finland reached comparative advantages; however, it did not run export specialisation (TBI<0 and Ex/Im<1). A relatively high both comparative advantage and trade surplus accompanied by an average

level of concentration measures were reported for Ireland, France, Austria and Latvia. The lowest concentration of economic activity in the manufature of dairy products was recorded in Bulgaria and Italy. These countries had no revealed comparative advantage (RSCA<0) and they were net importers of dairy products (TBI<0 and Ex/Im<1).

In the light of information available in Table 1 it can be noted that countries with a higher level of concentration are characterized by a slightly higher level of comparative advantages in trade. This is reflected in the positive correlations between variables representing the level of concentration and the level of comparative advantages (Table 2). Such a relationship may be spurious and results from other factors related to, among other things, the inability to demonstrate comparative advantages when faced with the milk quotas binding. To overcome potential spurious relationships the correlation coefficients were calculated for data corrected for fixed effects with the use of Least Square Dummy Variables (LSDV) and for trend corrected data with the use of 1st differences. Now it can be noted that the increase in concentration is accompanied by deterioration of comparative advantages (Table 2). Similar observations in the Indian manufacturing sector were made by Pulak and Neha (2012), while Porter (1990) already mentioned that lower concentration can be conducive to improving export competitiveness through innovation.

Table 1. Average concentration and competitive advantage measures in the manufacture of dairy products in the EU countries in 2008-2016

Country	C1	C2	Ex/Im	RCA	RMA	RSCA	TBI
Bulgaria	0.21	0.14	0.50	0.36	0.86	-0.47	-0.34
Italy	0.30	0.23	0.51	0.86	1.30	-0.08	-0.33
Spain	0.54	0.54	0.43	0.30	0.30	-0.54	-0.40
Greece	0.54	0.53	0.45	1.03	1.57	0.00	-0.39
Belgium	0.55	0.59	0.88	0.91	1.28	-0.05	-0.07
Latvia	0.57	0.39	1.24	1.41	0.66	0.17	0.11
Romania	0.59	0.41	0.19	0.18	0.66	-0.69	-0.68
Ireland	0.60	0.64	2.44	1.87	0.93	0.30	0.41
France	0.61	0.61	1.53	1.25	1.25	0.11	0.21
Portugal	0.63	0.39	0.39	0.64	0.85	-0.23	-0.44
Austria	0.63	0.55	1.40	1.32	0.77	0.14	0.17
Poland	0.66	0.58	2.19	0.83	0.51	-0.10	0.35
United Kingdom	0.68	0.61	0.37	0.78	0.85	-0.12	-0.46
Hungary	0.69	0.59	0.80	0.42	0.77	-0.41	-0.11
The Netherlands	0.72	0.64	1.56	0.67	0.93	-0.20	0.22
Germany	0.72	0.72	1.29	1.42	1.42	0.17	0.12
Croatia	0.81	0.68	0.12	0.23	0.76	-0.63	-0.79
Lithuania	0.83	0.78	1.83	1.51	0.71	0.20	0.28
Sweden	0.84	0.82	0.29	0.49	1.01	-0.35	-0.55
Finland	0.85	0.85	0.49	2.01	2.01	0.33	-0.35

Source: EUROSTAT, 2019; own calculations

Table 2. Correlation coefficients between concentration and competitive advantage measures in the manufacture of dairy products in the EU countries in 2008-2016

Transformation	Levels		LSDV		1st diff	
Variables	ln(C1)	ln(C2)	ln(C1)	ln(C2)	ln(C1)	ln(C2)
ln(Ex/Im)	0.068	0.182	-0.230	-0.286	-0.121	-0.140
ln(RCA)	0.134	0.237	-0.110	-0.155	-0.087	-0.139
ln(RMA)	-0.028	0.065	0.021	-0.065	0.080	-0.019
RSCA	0.151	0.246	-0.112	-0.157	-0.106	-0.164
TBI	0.115	0.220	-0.263	-0.305	-0.130	-0.150

Source: EUROSTAT, 2019; own calculations

In the next step several versions of dynamic panel models were estimated. The dependent variable was the level of comparative advantages (Ex/Im or TBI) and the independent one constituted the concentration level (C1 or C2). In addition, two control variables were taken into account as explanatory variables, which apparently should be of key importance for foreign trade in dairy products. The first one was domestic demand represented by the disposable income of households. The second one were milk procurement prices, which, as we know, are to a large extent derived from the prices of processed products (no information was available on industry prices). Attempts to estimate models with fixed effects failed, because model residuals showed a significant autocorrelation. Therefore, dynamic panel models were used, in which the delayed dependent variable represents the effect of omitted variables and the lack of immediate adjustments in the sector. Estimated models (Table 3) can be considered correct ones, as indicated by the absence of second-order autocorrelation (AR2) and validity of the instruments applied (Sargan test).

Table 3. Panel model estimation for selected competitive advantage measures in the manufacture of dairy products in the EU countries in 2008-2016

Dependent variable: ln(Ex/Im)								
Independent variables	**Coeff.**	**p-val.**	**Coeff.**	**p-val.**	**Coeff.**	**p-val.**	**Coeff.**	**p-val.**
Const.	0.007	0.203	0.012	0.102	0.001	0.720	0.003	0.660
ln(C1)	-0.282	0.000	-0.325	0.000	–	–	–	–
ln(C2)	–	–	–	–	-0.409	0.027	-0.443	0.099
ln(Income)	–	–	-0.161	0.598	–	–	-0.034	0.900
ln(Price)	–	–	-0.178	0.038	–	–	-0.108	0.190
ln(Ex/Im)_1	0.862	0.000	0.806	0.000	0.848	0.000	0.833	0.000
Selected statistics								
AR(1)	-2.142	0.032	-1.900	0.058	-2.047	0.041	-1.930	0.054
AR(2)	0.572	0.567	0.455	0.649	0.863	0.388	0.813	0.416
Sargan test	15.332	0.965	11.174	0.997	13.176	0.988	12.966	0.990
Se	0.143		0.139		0.139		0.138	
Dependent variable: TBI								
Independent variables	**Coeff.**	**p-val.**	**Coeff.**	**p-val.**	**Coeff.**	**p-val.**	**Coeff.**	**p-val.**
Const.	0.002	0.276	0.006	0.024	0.000	0.964	0.002	0.282
ln(C1)	-0.099	0.010	-0.141	0.000	–	–	–	–
ln(C2)	–	–	–	–	-0.188	0.043	-0.201	0.082
ln(Income)	–	–	-0.131	0.183	–	–	-0.080	0.341
ln(Price)	–	–	-0.075	0.130	–	–	-0.051	0.178
TBI_1	0.882	0.000	0.720	0.000	0.840	0.000	0.785	0.000
Selected statistics								
AR(1)	-2.777	0.006	-2.051	0.040	-2.655	0.008	-2.479	0.013
AR(2)	-0.305	0.760	-0.625	0.532	0.129	0.898	-0.064	0.949
Sargan test	17.685	0.913	11.024	0.997	16.422	0.944	13.804	0.983
Se	0.056		0.052		0.054		0.053	

Source: EUROSTAT, 2019; own calculations

Generally, the coefficients for C1 and C2 variables were negative and statistically significant, indicating a negative influence of market concentration on the international competitiveness in dairy industries of individual countries (Table 3). The control variables had expected signs, but were usually non-significant. The lack of significance for parameters, as well as problems with finding appropriate control variables may result from the impact of milk quotas on the market. We need to bear in mind that in 2008-2015 milk quotas were being gradually eliminated, which may have disturbed the nature of the examined relationship.

4. Conclusion

The main goal of the research was to investigate the relationship between industry concentration and competitive advantage of the dairy industry in the EU countries. The review of economic theories and empirical studies does not explicitly indicate the nature of this relationship. The results of empirical research on the relationship between concentration in the dairy industry and comparative advantages are not definite. A simple analysis showed that countries characterized by a higher level of concentration in the dairy industry generate a better trade balance than countries with a lower level of concentration. Nevertheless, it may result from other factors and may be disturbed by the impact of dairy production quotation. The analyses performed with the use of data adjusted for country specific effects and trends reveal negative correlations between changes in concentration and changes in comparative advantages. The negative relationship between concentration and comparative advantages was also confirmed by results obtained from dynamic panel models. As the EU dairy policy implemented in 2008-2015 seems to have disturbed the nature of the examined relationship, a suggestion to reinvestigate this correlation in at least a mid-term perspective after the March 2015 quota abolition may be understood as a direction for future research. It is also possible that the analysis at the enterprise level rather than at the sector one would help us to verify the existence, strength and direction of the dependence in question.

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