

## THE PROBLEM OF GEOGRAPHICAL DELIMITATION OF AGRI-FOOD MARKETS: EVIDENCE FROM THE BUTTER MARKET IN EUROPEAN UNION

Michał Pietrzak  , Monika Roman 

Warsaw University of Life Sciences – SGGW

### ABSTRACT

Although market is a basic economic category, many studies neglect the need to define it in geographical dimension. It is fundamentally important in agribusiness, where the spatial competition and problem of market power at successive stages of supply chain occur. The aims of the paper are twofold: to discuss the problem of geographical delimitation of agricultural markets and to define geographic limits of the butter market based on Elzinga–Hogarty method. Using secondary data we find that the butter market is international in the scope, and after the abolition of the milk quota, this scope is evolving from European to semi-global.

**Key words:** market delimitation, delineation of geographic scope, agri-food market, butter market, European Union

### INTRODUCTION

Market is the basic economic category [Tirole 1988, Werden and Froeb 1993], for which the spatial dimension is fundamentally important. Typical textbook definitions claim that market is a set of sellers and buyers making with each other voluntary trade transactions [Png and Lehman 2007], therefore it is defined by supply and demand side. However, any attempt at giving empirical meaning to the set of sellers and buyers requires to delineating the spatial limits of such set (i.e. geographical scope of the market). Markets are areas where economic agents gain profits or lose, where they exploit market power or suffer from it, and where governments test their instruments of intervention trying to regulate economic processes. Indeed, the proper delimitation of the market is the pivotal issue.

Particularly, agri-food sector markets are characterized by disproportions of concentration levels (the problem of market power), the huge government intervention and many forms of public support. This is why the market definition should not be ignored. Increasing processes of economic integration (particularly due to globalization and trade agreements) broaden local and domestic agri-food markets. Though, very often markets are not explicitly defined in their geographic dimension. In fact in many economic analyses market is treated *ad hoc* as the domestic one, because it is convenient to do so e.g. according to data availability and comparability at national level. Nevertheless, market definition, which was not accurately done, would result in not proper quality of analyses and diagnoses and with biased conclusions [Bain 1967, Scherer 1970]. For example, market regulations which are addressed to poorly delimited market could be only partially

Michał Pietrzak  <https://orcid.org/0000-0002-0418-3436>; Monika Roman  <https://orcid.org/0000-0003-1799-0445>

 [michal\\_pietrzak@sggw.pl](mailto:michal_pietrzak@sggw.pl)

effective or not effective at all. In the pure theoretical considerations of textbooks it could be stated, that “empirical difficulty of defining a market will be ignored” [Tirole 1988], but we should be able to delineate markets for pragmatic purposes.

The aims of this paper are twofold. Firstly, we will discuss the issue of geographical definition of agricultural markets. We will consider the methods of resolving this problem. Secondly, we will use one of these methods, namely Elzinga–Hogarty test for the delimitation of one of the most popular dairy products – butter. The literature of Elzinga–Hogarty method applications to the agri-food market is limited, even though E-H test is one of the most useful methods used in other markets [Werden and Froeb 1993, Brorsen et al. 1997, Wårell 2005, Gaynor et al. 2013, Kostic 2014]. To the best knowledge of the authors, this paper is the second one to use E-H test for butter market and the first one to do this basing on data after milk quota abolition<sup>1</sup>.

## LITERATURE REVIEW

### Geographical issues in economics

“Our existence in time is determined for us, but we are largely free to select our location” [Lösch 1978]. The geographical issues are fundamental for economics, however, these concerns did not have been generally taken into account in mainstream economic theory for a long time [Blaug 1990, Ottaviano et al. 2002]. By the geographical considerations, we understand three issues: location, neighborhood and distance and in particular, the geographical scope of the markets.

Location theory until the Second World War was developed mainly by German authors: von Thünen, Launhardt, Weber, Predöhl, Christaller, Lösch. After World War II an important contribution in the economics of location was done i.a. by Perroux and Isard and

in the nineties by Porter and Krugman [Blaug 1990, Krugman 1991, Porter 1998].

Spatial competition theory was developed by Sraffa [1926], Hotelling [1929] and [Salop 1979]. The recent review of the literature could be found in Biscaia and Mota [2013]. Spatial competition theory was applied in agriculture by seminal paper of Sexton [1990] and further work of him and his colleagues [Rogers and Sexton 1994, Sexton 2000, Sexton and Zhang 2001, Sexton et al. 2003, Graubner et al. 2011, Russo et al. 2011, Crespi et al. 2012, Sexton 2013]. Sexton claimed that many studies of the new empirical industrial organization (NEIO) fail to properly define markets they intend to study before conducting the investigation and treat market delimitation question superficially at best. They use statistical data at the national level without questioning whether the geographic scope of the market as have in fact domestic character [Sexton 2000]. Sexton’s conjecture leads us to the central problem of our paper i.e. how to delineate the geographic scope of markets? Sexton complained that usually markets are defined too broad [Sexton 2000]. This is probably true in many cases of raw agricultural inputs markets e.g. raw milk, particularly in large countries like the United States. But due to the processes of globalization, one could imagine that at the next stage of marketing chain (processing) markets for agri-food outputs (e.g. butter) are delineated too narrow. So, it is extremely important to find a method and to define the real scope of the market, as it is. This reasoning leads us to the third issue of geographical considerations, namely the problem of geographical market delineation.

### Delineation of geographic scope of the market

At the beginning of the 1980s, researchers such as Stigler or Horowitz acknowledged the small contribution of economists into the solution of the problem of

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<sup>1</sup> The European Union (EU) introduced the milk quota regime in 1984. A milk quota was one of the measures used to intervene in agriculture. Their purpose was to bring rising milk production under control. Milk quotas constituted a limit on the amount of milk that a farmer could sell every year without paying a levy [Chantreuil et. al. 2008]. The introduction of milk production quotas was a significant factor shaping the supply, demand and prices on the milk market. Quotas were an administrative instrument for influencing the market and its equilibrium [Hamulczuk and Stańko 2009]. However, regarding the liberalization of Common Agricultural Policy (CAP) milk quotas tend to lose their role as a tool of controlling of supply. Therefore, milk quotas were abandoned at the end of March 2015.

market definition in practice [Massey 2000]. Stigler wrote: “my lament is that this battle on market definitions (...) has received virtually no attention from us economists (...) the determination of markets has remained an underdeveloped area of economic research at either the theoretical or empirical level” [Stigler 1983]. However, already in the 1970s and early the 1980s quantitative methods supporting the market delimitation processes have started to be developed [Werden and Froeb 1993, Massey 2000]. These methods could be roughly separated into two basic groups of approaches: first, those based on prices and second, those based on physical flows.

Those approaches which were based on prices are based on the studies of Cournot and Marshall. Cournot defined the market as “the whole of any region in which buyers and sellers are in such free intercourse with one another that the prices of the same goods tend to equality easily and quickly” [Marshall 1920]. In line with the Marshall’s law of one price: “the more nearly perfect a market is, the stronger is the tendency for the same price to be paid for the same thing at the same time in all parts of the market: but of course if the market is large, allowance must be made for the expense of delivering the goods” [Marshall 1920]. There is a variety of methods of delimitation of markets based on prices. We can take into account: analyses of correlation, the rate of adjustments, the Granger causality test, and tests of exogeneity and cointegration. In general, it is assumed, that the closer is the correlation or cointegration of price movements between two areas, the stronger is their integration, suggesting that these areas form a single market. Even though strongly grounded in the economic theory, the approaches based on prices are however sometimes criticized according to the: difficulties with access to the good quality comparable data and methodical/statistical constraints e.g.: random convergence of price movements or convergence caused by variation of a factor of production common for the considered markets; no uniform criterion, from which the link between prices is sufficiently strong etc. [Brosen et al. 1997, Audy and Erutku 2005, Wärell 2005].

Methods grouped in another category, based on goods’ flows, assume that if areas trade with each

other at a significant level, it means that they belong to the same market. It is also presumed that movements of goods (in quantitative terms) reflect the substantial shifts in demand and supply which affect prices. As a such, to define a geographic dimension of the market one should only gather quantitative data on production and consumption, import (flows from outside) and export (flows into outside), thus avoiding many difficulties and traps linked to the price tests.

### The Elzinga–Hogarty method

The most often used method based on data concerning movements of goods is the Elzinga–Hogarty method, i.e. E-H test [Crane and Welch 1991, Wärell 2005, 2007]. The E-H test, for simultaneous verification, uses two partial tests: LOFI (Little-Out-From-Inside), referring to the supply side of the market, and LIFO (Little-In-From-Outside), pertaining to the demand side of the market [Elzinga and Hogarty 1973, 1978].

$$LOFI = \left[ \frac{\text{production} - \text{export}}{\text{production}} \right] \cdot 100\% \quad (1)$$

$$LIFO = \left[ \frac{\text{consumption} - \text{import}}{\text{consumption}} \right] \cdot 100\% \quad (2)$$

The LOFI test (1) refers to the supply side of the market and its positive verification means that “if the firms in a hypothetical geographic market area receive little of their business from customers outside of the geographic market area, this is an indicator of the propriety of defining that area as a market” [Elzinga and Hogarty 1973]. Conversely, the LIFO test (2) refers to the demand side and its positive verification happens “if only a small proportion of the product consumed in the hypothetical geographic market area is ‘imported’ into the area from outside, this is an indicator of a unique geographic market area” [Elzinga and Hogarty 1973]. Positive and simultaneous verification of both tests indicates the existence of a separate geographical market.

The Elzinga–Hogarty method has some crucial advantages. Most importantly, E-H test has low

requirements of data as compared to the methods based on prices. Moreover, this is also a quite simple method in the application. Last but not least, E-H method allows to visualizing the scope of the market obtained by the procedure.

However, this method is rarely used in the agricultural economics literature. There are a lot of studies of interconnections of prices of agricultural product between countries or regions [Zanias 1993, Gil et al. 2000, Christos et al. 2012]. Particularly popular are studies of raw milk markets [Katrakilidis 2008, Bakucs et al. 2010, Jha et al. 2012, Acosta et al. 2014, Kabbiri et al. 2016]. Some authors try to broaden the scope of research taking into account the whole dairy supply chain [Serra and Godwin 2010, De Fátima Oliviera et al. 2015].

Nevertheless, the literature about applications Elzinga–Hogarty method to the agri-food markets is limited to: edible oil [Kostic 2014], sugar [Pietrzak and Mucha 2015, Pietrzak et al. 2016a, b] and butter [Roman 2016] Roman in her studies also compared results of E-H method with cointegration test (method based on prices) on the example of butter market (2016, 2017).

In her paper, Roman [2016] – basing on Elzinga–Hogarty method – delineated the geographical scope of the butter market for one year – 2013. However, it is worth to do this type of analysis on several periods (as it was done in this article: 2013 and 2015) if we would like to assess differences before and after milk quota abolition. Our paper differs also from Roman’s article [2016] in one important assumption. E-H test requires to make assumption about starting point of the analysis. Roman [2016] started her analysis from the Polish market. Such “polonocentric” approach seems to be rather subjective. In our paper we started our analysis from German market. Germany is the biggest producer of butter in EU, so this country fits better to basic point to start the E-H procedure. The adoption of a different starting point (Germany) in our analysis made it possible to compare our results with those obtained by Roman [2016] and to examine how important is the initial assumption of the initial point in the Elzinga–Hogarty method.

## RESEARCH DESIGN

The basic research questions we would like to answer in empirical part of our study are as follows: how broad is the geographical scope of butter market in Europe? Does it changed after abolition of the quota system? Specifically, we focus on investigating which countries created butter market in 2013 and which ones did it in 2015 (the first year of abolition of the system).

Why we choose the butter market for empirical tests? This is due to the fact that butter is particularly well suited for spatial considerations, regarding bulky and perishable character of raw materials used. Moreover, this character is changing due to processing, butter is much less bulky and much less perishable than raw milk input. So, one could expect much broader geographical scope in the case of butter market relatively to the raw milk market. Butter is an important output of dairy industry accounting for 5% share<sup>2</sup> in global milk production (measured as milk equivalent, see Table 1).

Regarding the diversity of “butter” category, authors made the assumption, that butter market will be studied integrally, regardless the type of butter, its origin and a kind of customer. Therefore data were drawn basing on the commodity code “040510 – Butter – emulsion of milk fat and water that is obtained by churning cream” (FAO database).

We used secondary data in order to verify the geographical scope of the butter market. We are based on data sets collected by the Food and Agriculture Organization, The United Nations – Statistics Division, Canadian Dairy Information Centre, United Nations Comtrade Database – International Trade Statistics and European Commission – Eurostat.

To define the geographical scope of butter market we decided to use the Elzinga–Hogarty method. This is due to the advantages of this approach discussed in the literature review. Moreover, one should be aware that alternative methods, namely those based on prices require the usage of the long time series. For the period after the abolition of milk quotas this assumption could not be met at all (the available data would cover only 2 years). This is additional argument for using E-H method.

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<sup>2</sup> In some countries butter accounts even for 19% (Ireland) or 16% (Denmark) of processed milk.

**Table 1.** Basic data about the milk and butter production in analysed countries

Country	Milk production				Butter production				Butter production as a percentage of milk production (%)	
	2013		2015		2013		2015		2013	2015
	thous. t	%	thous. t	%	thous. t *	%	thous. t*	%		
World	767 158	100.0	802 754	100.0	39 492	100.0	41 282	100.0	5.1	5.1
Belgium	3 529	0.5	4 010	0.5	516	1.3	323	0.8	14.6	8.1
Denmark	5 082	0.7	5 321	0.7	283	0.7	841	2.0	5.6	15.8
France	24 460	3.2	25 845	3.2	2 624	6.6	2 931	7.1	10.7	11.3
Germany	31 324	4.1	32 900	4.1	2 901	7.3	3 363	8.1	9.3	10.2
Ireland	5 601	0.7	6 591	0.8	1 004	2.5	1 237	3.0	17.9	18.8
Italy	11 281	1.5	11 100	1.4	649	1.6	633	1.5	5.8	5.7
Netherlands	12 408	1.6	13 526	1.7	881	2.2	1 435	3.5	7.1	10.6
Portugal	1 848	0.2	2 070	0.3	170	0.4	213	0.5	9.2	10.3
Spain	6 559	0.9	6 902	0.9	234	0.6	277	0.7	3.6	4.0
UK	13 943	1.8	15 460	1.9	957	2.4	988	2.4	6.9	6.4
USA	91 278	11.9	94 635	11.8	5 576	14.1	5 554	13.5	6.1	5.9
Total of countries above	207 313	27.0	218 360	27.2	15 794	40.0	17 794	43.1	7.6	8.1

\*Butter production is expressed in thousands of tones milk equivalent.

Source: Own elaboration on basis of: CDIC [2017], Eurostat database, FAO database, UN Comtrade database.

While conducting E-H test described above we decided to use LOFI (1) and LIFO (2) thresholds established at the level of 90% (so-called strong market threshold) as suggested by Elzinga and Hogarty [1973].

As we mentioned before the crucial methodological issue is deciding where to start E-H method procedure. We choose Germany as the starting point. Germany is the largest producer of butter in European Union (this country produces almost 23% of EU butter production and belongs to the world's big 3. The largest producer are United States – 16% of global butter production, the second one is New Zealand (9% of global butter production) and the third position occupies Germany, which covers 8% of butter production in the world. We start with the question: are domestic boundaries of European countries valid delineation of the market in the

case of butter? We try to answer basing on the example of the biggest butter producer in Europe, namely Germany. Even though that Germany is not only the big producer but also the big country, we found that the proper answer is “not”.

## RESULTS AND DISCUSSION

As already mentioned, Germany was taken for the analysis as a starting point in 2013. Because LOFI and LIFO tests were not simultaneously positively verified (Table 2) the area of Germany was enlarged by adding subsequent countries (according to the largest trade exchange) until the required threshold of both tests was met by such enlarged area. The area of Germany failed to meet the LOFI test – as a consequence of significant exports of butter, mainly to the Netherlands (17.4%

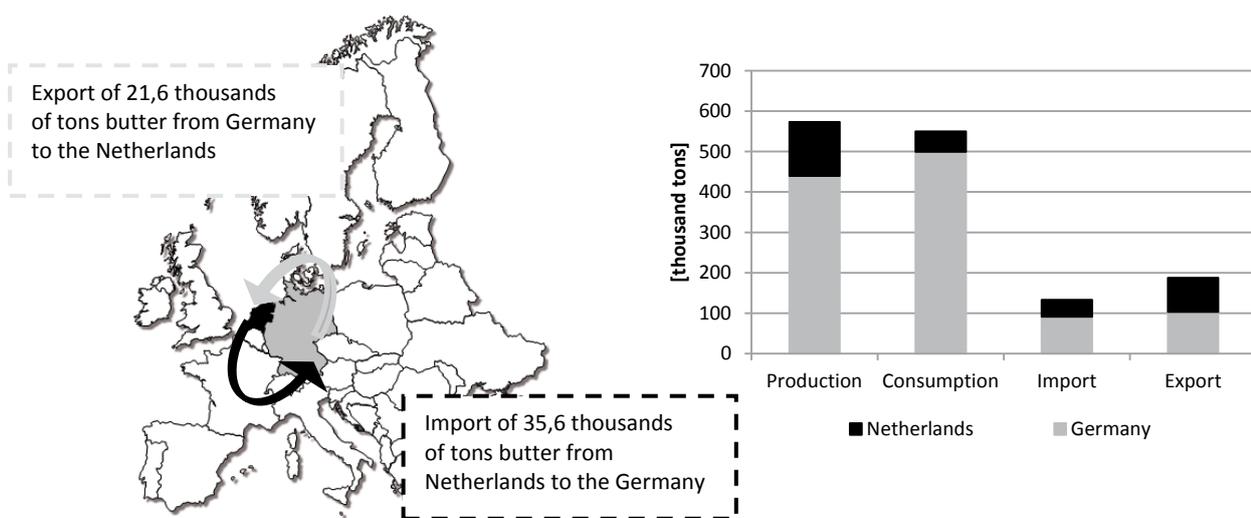
of export). Consequently, the first country which was added to Germany, was the Netherlands – the largest recipient of German butter (Fig. 1). The E-H tests for an enlarged area were still not met, despite the increasing value of the LIFO test, the LOFI test fell down.

The largest share of butter exports from the joined Germany and Netherlands area goes to France (approx. 64 thousand t), thus France was added to the analysed market. Germany + the Netherlands + France area still failed to meet both LIFO and LOFI tests. The largest

**Table 2.** Determination of the geographical scope of the butter market with the use of the LOFI/LIFO tests

2013					2015				
Order	Country	LOFI test (%)	LIFO test (%)	90% threshold ("strong market")	Order	Country	LOFI test (%)	LIFO test (%)	90% threshold ("strong market")
1	Germany	71.6	74.6		1	Germany	73.4	72.4	
2	+ Netherlands	67.2	75.8		2	+ Ireland	63.2	83.2	
3	+ France	81.8	78.9		3	+ Netherlands	62.7	81.6	
4	+ Ireland	77.9	86.6		4	+ France	76.9	84.8	no
5	+ UK	82.4	85.9	no	5	+ Belgium	81.0	89.6	
6	+ Belgium	86.1	89.4		6	+UK	86.0	90.9	
7	+ Italy	88.8	90.6		7	+ Italy	88.2	91.3	
8	+ Denmark	89.3	92.3						
9	+ Spain	89.9	93.0		8	+ USA	92.1	94.7	yes
10	+ Portugal	90.1	93.1	yes					

Source: Own elaboration on basis of: CDIC [2017], Eurostat database, FAO database, UN Comtrade database.



**Fig. 1.** Butter market in Germany and the Netherlands in 2013

Source: Own elaboration on basis of: CDIC [2017], Eurostat database, FAO database, UN Comtrade database.

trading partner of the combined area of Germany + the Netherlands + France was Ireland, thus Ireland was added to the analysed countries. The adding process continued until Portugal has been added to the group and the required thresholds for both E-H tests were met (Table 2, Fig. 2). The geographical scope of the butter market in 2015 was defined in an analogous way (Table 2, Fig. 3).

The butter market as defined in 2013 covered area of Germany + 9 countries. Market delineated in such way represents production at the level of 1.55 million t

(approx. 26% of worlds' production) and consumption at the level of 1.50 million t, with the relatively small amounts of export and imports. So, the geographical scope of the butter market is much broader than the domestic one. Indeed it could be defined as regional (in the broad sense), namely European. Two years later, in 2015 (the first year of milk quota system abolition) the spatial dimension of butter market was broadened by covering not only Germany + six European countries but also one country from other continent, namely United States. This market represents



**Fig. 2.** Geographic scope of the butter market in 2013

Source: Own elaboration on basis of: CDIC [2017], Eurostat database, FAO database, UN Comtrade database.



**Fig. 3.** Geographic scope of the butter market in 2015

Source: Own elaboration on basis of: CDIC [2017], Eurostat database, FAO database, UN Comtrade database.

production at the level of 2.45 million t (approx. 40% of worlds' production) and consumption at the level of 2.09 million t, with the relatively small amounts of export and import. The geographical scope of the butter market seems to evolve into the global one and could be defined as semi-global. Strikingly, this evolution coincides with the liberalization of the CAP in the field of the dairy market regulations, however, it does not prove casualty relations.

There are two limitations of obtained results. Firstly, the assumptions which were taken into account in the study, and secondly, the weaknesses of the method adopted. We assumed the broad product definition, treating butter integrally (as a whole, without dividing into sub-products) independently from the type of butter, its origin, and kind of customer. For example, one could claim the need of separation packet from bulky butter as different product markets etc. However, we are convinced that our assumption is justified because of the close substitution between such types of butter. Nevertheless, to overcome this controversy it would be desirable to conduct an assessment of the proximity of different kinds of butter e.g. based on price methods.

The subsequent assumption covers the adoption of the “strong” market threshold (90%). Such approach is suggested by the authors of the Elzinga–Hogarty method and it is also present in its practical applications. However, it should be admitted that the adoption of the “weak” market threshold (75%) would result in a conclusion that the borders of the Germany + the Netherland + France (in 2013) and Germany + Ireland + the Netherlands + France (in 2015) are sufficiently broadly delineated as geographical scope of the butter market (Table 2). Nevertheless, even markets defined in such relatively narrow way are still much broader than domestic.

The second group of arguments limiting obtained results may be drawn from controversies of the E-H method due to:

- level of analysis – it is not specified in the E-H method, at what level one should make calculations (e.g. the regions in the country, the whole country, group of countries, e.g. EU etc.);
- procedure – the choice of the starting point is somewhat subjective (starting from different areas could result in a different geographic scope of the butter market)<sup>3</sup>.
- period of analysis – E-H test is a snapshot analysis done in a single moment of time, which does not concern the dynamics of change in relations between countries; however, this could be overcome by multiplying snapshots as we tried to do.

We do not conjecture that we have proven the semi-global nature of the butter market. But we are convinced that the results of our analysis could be reliable. Such statement needs to be confirmed or rejected by using other methods (i.e. based on prices). Nevertheless, one could doubt about e.g. concerns on oligopoly power in butter market if they are based on the domestic market analysis. One could doubt also about the policy, addressed to the market defined in the narrower manner than it really is. We hope to open discussion about the agricultural markets definitions.

## CONCLUSIONS

Due to the spatial character of agricultural markets it is particularly important to properly define their geographical scope. Without valid delineation of the market, analyses could be biased and erroneous conclusions and action could be taken. The use of the Elzinga–Hogarty method, which we tested for delimitation of the butter market, resulted in the quite broad

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<sup>3</sup> One should note that in the previous paper one of the authors assumed Poland as the “starting point” in E-H procedure [Roman 2016]. However in this paper, after careful consideration, we decided to start with Germany (the biggest player in Europe). Nevertheless, such assumption is crucial for the results of the research. For example, our present research gives roughly similar results to results obtained by Roman, but not the same. In both research the core of the butter market in 2013 was the same: Germany, France, UK, Italy, Ireland, Netherlands and Belgium. However in previous Roman's study there were also Poland and Czech Republic clustered into this market. In our present study those two countries are not included, but Denmark, Spain and Portugal are added instead. Those results show that Elzinga–Hogarty method is sensitive to the initial assumption embodied in the decision with which country to start the procedure.

definition of the market scope, namely European in 2013 and semi-global in 2015. The broadening of the market scope coincides with the milk quota abolition in UE. When interpreting the obtained results, some limitations should be taken into account. Firstly, the specific research assumptions adopted and secondly, limitations of the Elzinga–Hogarty method used. Given the important controversy which regards the definition of the geographical scope of the market, the authors call for a continuation of research within the geographical delineation. In particular, it would be worthwhile to apply alternative methods. It could be done by using quantitative methods based on prices. Moreover, it could be also done by using qualitative methods drawn from strategic management theory, e.g. by Yip's model [Yip 2002] or by method proposed by Pietrzak [2014]. This complies with the proposition of Sleuwaegen [1999], who postulates to combine different methods of market definition, particularly antitrust methods with those rooted in strategic management.

## REFERENCES

- Acosta, A., Ihle, R., Robles, M. (2014). Spatial Price Transmission of Soaring Milk Prices From Global to Domestic Markets. *Agribusiness*, 30 (1), 64–73.
- Audy, E., Erutku, C. (2005). Rice Tests to Define Markets: An Application to Wholesale Gasoline in Canada. *Journal of Industry Competition and Trade*, 5 (2), 137–54.
- Bakucs, Z., Fałkowski, J., Ferto, I. (2010). Milk Market Integration between Hungary and Poland. *Materiały konferencyjne zamieszczone na stronie internetowej* [http://ageconsearch.umn.edu/bitstream/91809/2/74Bakucs\\_falkowski\\_ferto.pdf](http://ageconsearch.umn.edu/bitstream/91809/2/74Bakucs_falkowski_ferto.pdf) [accessed: 30.03.2016].
- Bain, J.S. (1967). *Barriers to New Competition*. Harvard University Press, Cambridge.
- Biscaia, R., Mota, I. (2013). Models of spatial competition: A critical review. *Papers in Regional Science*, 92 (4), 851–871.
- Blaug, M. (1990). *Economic Theory in Retrospect*. Cambridge University Press, Cambridge.
- Brorsen, B.W., von Bailey, D., Thomsen, M.R. (1997). Mapping Market Areas Using Nonparametric Smoothing. *Geographical Analysis*, 29 (3), 214–231.
- Canadian Dairy Information Centre – CDIC (2017). Global butter consumption (kg per capita) in 2013 and 2015. Retrieved form: [http://www.dairyinfo.gc.ca/index\\_e.php?s1=dff-fcil&s2=cons&s3=consglo&s4=tb-bt](http://www.dairyinfo.gc.ca/index_e.php?s1=dff-fcil&s2=cons&s3=consglo&s4=tb-bt).
- Chantreuil, F., Donnellan, T., Van Leeuwen, M., Salamon, P., Tabeau, A., Bartova, L. (2008). EU Dairy Quota Reform – AGMEMOD Scenario Analysis. In: *European Association of Agricultural, XVII International Congress Economists*, Ghent, 26–29.08.2008.
- Christos, J. (2012). Emmanouilides and Panos Fousekis, Testing for the LOP under nonlinearity: an application to four major EU pork markets. *Agricultural Economics*, 43 (6), 715–723.
- Crane, S.E., Welch, P.J. (1991). The Problem of Geographic Market Definition: Geographic Proximity vs. Economic Significance. *Atlantic Economic Journal*, 19 (2), 12–20.
- Crespi, J.M., Saitone, T.L., Sexton, R.J. (2012). Competition in U.S. Farm Product Markets: Do Long-Run Incentives Trump Short-Run Market Power? *Applied Economic Perspectives and Policy*, 34 (4), 669–695.
- De Fátima Oliviera, M., da Silva Carvalho, M.L., Lucas, M.R., Henriques, P.D. (2015). Price Transmission in the Milk Portuguese Market. *Agricultural Economics Review*, 16 (1), 35–46.
- Elzinga, K.G., Hogarty, T.F. (1973). The Problem of Geographic Market Delineation in Antimerger Suits. *Antitrust Bulletin*, 18, 45–81.
- Elzinga, K.G., Hogarty, T.F. (1978). The Problem of Geographic Market Delineation Revisited: The Case of Coal. *Antitrust Bulletin*, 23, 2–19.
- Gaynor, M.S., Kleiner, S.A., Vogt, W.B. (2013). A Structural Approach to Market Definition with an Application to the Hospital Industry. *The Journal of Industrial Economics*, 61 (2), 243–289.
- Gil, J.M., Angulo, A.M., Zapata, H.O. (2000). Further Empirical Evidence of Wheat and Barley Market Integration in the EU. *Journal of International Food & Agribusiness Marketing*, 11 (2), 45–61.
- Graubner, M., Balman, A., Sexton, R.J. (2011). Spatial Pricing and the Location of Processors in Agricultural Markets. Paper prepared for presentation at the EAAE 2011 Congress, Zurich, 30.08–02.09.2011.
- Hamulczuk, M., Stańko, S. (2009). Ekonomiczne skutki likwidacji kwot mlecznych w Unii Europejskiej – wyniki symulacji z wykorzystaniem modelu agmemod. *Zagadnienia Ekonomiki Rolnej*, 4, 3–20.
- Hotelling, H. (1929). Stability in Competition. *The Economic Journal*, 39 (153), 41–57.
- Jha, A.K., Singh, K.M., Singh, R.K.P. (2012). Market Integration in Wholesale Milk Markets in India. *Social Science Research Network*. Working Paper. <http://dx.doi.org/10.2139/ssrn.2062821>
- Kabbiri, R., Dora, M., Elepu, G., Gellynck, X. (2016). A Global Perspective of Food Market Integration:

- A Review. *Agricultural Economics Research, Policy and Practice in Southern Africa*, 55 (1–2), 62–80.
- Katrakilidis, C. (2008). Testing for Market Integration and the Law of One Price: an Application to Selected European Milk Markets. *International Journal of Economic Research*, 5 (1), 93–104.
- Kostic, M. (2014). Testing the Boundaries of the Relevant Market in the Competition Policy. *Economic Horizons*, 16 (1), 31–44.
- Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy*, 3 (99), 483–499.
- Lösch, A. (1978). *The Economics of Location*. Yale University Press, New Haven.
- Marshall, A. (1920). *Principles of Economics*. Reprinted in 2011 by ThaiSunset Publications.
- Massey, P. (2000). Market Definition and Market Power in Competition Analysis: Some Practical Issues. *The Economic and Social Review*, 31 (4), 309–328.
- Ottaviano, G., Tabuchi, T., Thisse, J.F. (2002). Agglomeration and Trade Revisited. *International Economic Review*, 43 (2), 409–435.
- Pietrzak, M. (2014). Problem geograficznego zakresu rynków/sektorów w dobie globalizacji i regionalizacji. *Zagadnienia Ekonomiki Rolnej*, 338 (1), 3–21.
- Pietrzak, M., Mucha, M. (2015). Delimitacja rynku na przykładzie sektora cukrowniczego. *Zagadnienia Ekonomiki Rolnej*, 342 (1), 120–141.
- Pietrzak, M., Roman, M., Mucha, M. (2016a). Określanie zasięgu geograficznego rynku cukru z wykorzystaniem metody Elzinga-Hogarty. *Zagadnienia Ekonomiki Rolnej*, 346 (1), 22–40.
- Pietrzak, M., Roman, M., Mucha, M. (2016b). Zmiany we wspólnej organizacji rynku cukru a jego zasięg geograficzny. *Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie, Problemy Rolnictwa Światowego*, 16 (2), 258–268.
- Png, I., Lehman, D. (2007). *Managerial Economics*. Blackwell Publishing Limited, Malden.
- Porter, M.E. (1998). Clusters and the New Economics of Competition. *Harvard Business Review*, 76 (6), 77–90.
- Rogers, R.T., Sexton, R.J. (1994). Assessing the Importance of Oligopsony Power in Agricultural Markets. *American Journal of Agricultural Economics*, 76 (5), 1143–1150.
- Russo, C., Goodhue, R.E., Sexton, R. (2011). Agricultural Support Policies in Imperfectly Competitive Markets: Why Market Power Matters in Policy Design. *American Journal of Agricultural Economics*, 93 (5), 1328–1340.
- Roman, M. (2016). Zastosowanie metody E-H do określenia zasięgu geograficznego rynku masła. *Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu*, 18 (3), 298–302.
- Roman, M. (2017). Powiązanie cen masła między rynkiem polskim a wybranymi rynkami krajów Unii Europejskiej. *Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu*, 19 (4), 169–174.
- Salop, S.C. (1979). Monopolistic competition with outside goods. In: *The Bell Journal of Economics*, 10 (1), 141–156.
- Scherer, F.M. (1970). *Industrial Market Structure and Economic Performance*. Rand McNally College Publishing Company, Chicago.
- Serra, T., Godwin, B.K. (2010). Price transmission and asymmetric adjustment in the Spanish dairy sector. *Applied Economics*, 35 (18), 1889–1899.
- Sexton, R.J. (1990). Imperfect Competition in Agricultural Markets and the Role of Cooperatives: A Spatial Analysis. *American Journal of Agricultural Economics*, 72 (3), 709–720.
- Sexton, R.J. (2000). Industrialization and Consolidation in the U.S. Food Sector: Implications for Competition and Welfare. *American Journal of Agricultural Economics*, 82 (5), 1087–1104.
- Sexton, R.J. (2013). Market Power, Misconceptions, and Modern Agricultural Markets. *American Journal of Agricultural Economics*, 95 (2), 209–219.
- Sexton, R.J., Sheldon, I., McCorriston, S., Wang, H. (2003). Analyzing Vertical Market Structure and Its Implications for Trade Liberalization and Market Access. *International Agricultural Trade Research Consortium, Working Paper 03-8*.
- Sexton, R.J., Zhang, M. (2001). An Assessment of the Impact of Food Industry Market Power on U.S. Consumers. *Agribusiness*, 17 (1), 59–79.
- Sleuwaegen, L. (1999). Competitive distortions and state aid to firms. How to define the relevant market? Retrieved from: <http://ec.europa.eu/DocsRoom/documents/2652> [accessed: 11.12.2014].
- Stigler, G.J. (1983). *The Economists and the Problem of Monopoly*. University of Chicago Law Occasional Paper, 19, 1–22.
- Sraffa, P. (1926). The Laws of Returns under Competitive Conditions. *The Economic Journal*, 36 (144), 535–550.
- Tirole, J. (1988). *The Theory of Industrial Organization*. The MIT Press, Cambridge, MA.
- Wårell, L. (2005). Defining Geographic Coal Markets Using Price Data and Shipments Data. *Energy Policy*, 33 (17), 2216–2230.
- Wårell, L. (2007). *Market Integration and Merger Assessments in the Mineral Industries*. Doctoral thesis, Luleå University of Technology, Luleå.

Werden, G.J., Froeb, L. (1993). Correlation, Casualty and All that Jazz: The Inherent Shortcomings of Price Tests for Antitrust Market Delineation. *Review of Industrial Organization*, 8, 329–353.

Yip, G.S. (2002). *Total Global Strategy II*. Pearson Education, Prentice Hall, Upper Saddle River, NJ.

Zanias, G.P. (1993). Testing for Integration in European Community Agricultural Product Markets, 44 (3), 418–427.

## **PROBLEM DELIMITACJI RYNKÓW ROLNO-SPOŻYWCZYCH NA PRZYKŁADZIE RYNKU MASŁA W UNII EUROPEJSKIEJ**

### **STRESZCZENIE**

Rynek jest podstawową kategorią ekonomiczną, tymczasem w wielu badaniach zaniedbuje się konieczność zdefiniowania rynku w wymiarze geograficznym. Wymiar ten ma jednak fundamentalne znaczenie w agrobiznesie, w którym w związku z przestrzennym charakterem konkurencji występuje problem siły rynkowej na różnych etapach łańcucha dostaw. Autorzy w niniejszym artykule postawili przed sobą dwa cele: omówienie problemu delimitacji geograficznej rynków rolnych oraz określenie granic geograficznych rynku masła według metody Elzingi–Hogarty’ego. Korzystając z danych wtórnych, stwierdzono, że rynek masła ma zasięg międzynarodowy, a po zniesieniu kwotowania produkcji mleka zakres ten zmienił się z europejskiego na półglobalny.

**Słowa kluczowe:** delimitacja rynku, określenie zasięgu geograficznego, rynek rolno-spożywczy, rynek masła, Unia Europejska