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To cite this article: Sebastian Stępień, Katarzyna Smędzik-Ambroży, Marta Guth, Andreea Muntean, Silvia Maican & Carmen Pastiu (2022) The importance and determinants of market integration of small family farms in selected countries of Central and Eastern Europe, Economic Research-Ekonomiska Istraživanja, 35:1, 5757-5776, DOI: [10.1080/1331677X.2022.2037445](https://doi.org/10.1080/1331677X.2022.2037445)

To link to this article: <https://doi.org/10.1080/1331677X.2022.2037445>



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Published online: 14 Feb 2022.



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The importance and determinants of market integration of small family farms in selected countries of Central and Eastern Europe

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ABSTRACT

One of the issues determining the economic situation of farms is the scope of their market integration. It can be therefore assumed that higher market integration leads to an improvement in the economic performance of households. The article has two aims. The first is to indicate the relationship between the degree of market integration of small-scale family farms and their economic condition. The second objective is to discover the determinants of the market integration of farms. The explanatory variables include economic (production value, total farm area, labour input, specialization of production) and demographic (farmer age, education level) factors. The novelty of our paper lies in in depth comparative analysis based on primary data from questionnaire surveys taken in 2018 and 2019 in five countries of Central and Eastern Europe: Serbia, Moldova, Lithuania Romania, and Poland. The results indicate the existence of a statistically significant positive correlation between the degree of market integration and economic performance. Factors that favorably influence the level of market connection include the scale of production, specialization and, to some extent, level of farmowner's education. The remaining variables are inconclusive or not statistically significant.

ARTICLE HISTORY

Received 15 December 2020
Accepted 30 January 2022

KEYWORDS

Agriculture; family farms; market integration; determinants; Central and Eastern European countries

JEL CODES

Q12; Q13; D23

1. Introduction

The countries of Central and Eastern Europe, with some exceptions (Czech Republic, Slovakia) are characterised by a fragmented agrarian structure and domination of smallholder farms. The consequence of this situation is a weak bargaining power of agricultural producers in the whole food supply chain. The added value that arises in the process of food production extends only slightly to the agricultural producer and is primarily captured by intermediaries, processors and sellers. As a result, the income

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of many small-scale farms is unfavourable compared to average wages in the economy. One way to solve this problem is to strengthen farmers' bargaining power in buying and selling transactions through the development of coordinated systems of market integration. It has been proven by many authors (i.e., Fałkowski, 2015) that market integrations are the stimulants of a positive economic condition of farms. Therefore, the question arises what factors determine the level of market integration of agricultural holdings? The answer to this question is important especially for decision makers who, through appropriate instruments, can influence the market integration of farms, thus indirectly influencing the economic situation of agriculture. It is especially important in the case of regions where small farms dominate. The impact directed at increasing market integration of small farms may improve the economic condition of agriculture in these regions.

The article has two aims. The first is to indicate the relationship between the degree of market integration of family farms and their economic condition. The authors hypothesize that the higher the market integration, the better the economic results of the analysed entities. The second objective is to discover the determinants of the market integration of farms. The explanatory variables include economic (production value, total farm area, labour input, specialization of production) and demographic (farmer age, education level) factors. In this case, it is assumed that stronger integration is accompanied by higher production, larger farm area, higher labour inputs, production specialization, higher education level and younger age of the farm manager. The added value of this research is the answer to the question what factors are stimulants and destimulants of market integration of small farms. Orientation of the agricultural policy towards strengthening of the market integration of these farms may result in the improvement of the economic performance in countries characterized by a fragmented agrarian structure, which include the CEE countries. Since the article focuses on determinants of market integration of small scale family farms from this region, the spatial scope of the publication covers selected five countries of Central and Eastern Europe: Moldova, Serbia, Romania, Lithuania and Poland. It is therefore possible to carry out a comparative analysis between the economies mentioned and find an answer to the question of universal premises of market integration, which is rare for this type of analysis and contributes to the development of institutional theory. The novelty of our paper lies in in-depth comparative analysis based on primary data from the 2018 and 2019 questionnaire surveys from five countries of Central and Eastern Europe. In total, the survey covered 3575 direct in depth interviews with small scale family farms owners from these countries. The research procedure is a threefold study. The first step was to estimate an 'index of economic condition' for five selected countries using the TOPSIS-CRITIC method (Technique for Order Preference by Similarity to an Ideal Solution). In the second step, we calculated the individual 'index of market integration', and then measured the statistical significance between 'the index of economic conditions' and 'the index of market integration'. The third step the impact of selected economic and demographic factors on the level of market integration was measured using regression analysis. The evaluation considered primary data from 2018 and 2019 obtained by survey questionnaire method. The article consists of the following sections: Literature review, with

reference to the New Institutional Economics theory; Methods, including spatial scope and data set, measurement of the farm economic condition and market integration indices, and presentation of regression analysis of the market integration score; Results; Discussion; and Conclusions.

1.1. Literature review: Market integration in the New Institutional Economics theory

Small farms considered as those with a low asset base, by operating very limited amount of agricultural land and depending on household members for most of the used labour (Thapa, 2009) are seen to have low levels of efficiency and productivity, which in line with weak integration into markets, results in insufficient household income. Economic integration as a process of merging economies, resulting from the desire of the entities forming them to improve the efficiency of their operations. The integration of farmers is supported by many aspects. Among other things, producers joining together increase their joint bargaining power, which enables them to obtain higher prices in sales and pay lower prices for the means of production. Moreover, they may have easier access to external sources of financing. Horizontal integration creates opportunities for joint investment in equipment that supports the production and distribution process. The effectiveness of horizontal integration processes depends on its level. Thus, better organization of producers is a condition for reducing transaction costs and competing more effectively on the market. On the agricultural side, voluntary entry into integration unions can be a consequence of farmers' conscious choice. When selling agricultural products, their producers can use the intermediation of agents, dealers, wholesalers, as well as sell products on stock exchanges and auctions. Vertical integration enables relatively easier regulation of market balance (demand-supply) and contributes to the formation of a stable, specialized resource base. Farmers, thanks to strengthening bonds with the buyer, reduce the production risk, providing themselves with the guarantee of collection, and sometimes they can even increase the sale price of their products. Vertical integration ties between economic entities are formed as a result of:

- entering into a contract (contractual integration), i.e., signing contracts with raw material suppliers who produce to the customer's order,
- acquisition of ownership (capital integration) and the start of production of food on land that belongs to the owner of the processing plant,
- creating legal standards by the state (institutional integration), where the state regulates the manner of association from the point of view of the priorities adopted (Wyrzykowska, 2004).

Development of links of agricultural producers with the market is determined, among others, by: the percentage of farms producing mainly for the market, the share of agricultural land in the total area of the farm, the stocking rate of livestock per 100 ha and the density of the road network. As a result, it can be concluded that the

progress of agri-food integration depends mainly on the profitability of agricultural production.

Market institutions determine the activity of farms and shape their economic results. According to a commonly held assumption, the institutions include all the formal and informal rules that govern human interactions (North, 1990, 3). In terms of economics, this issue usually concerns the conditions under which the transaction takes place between the buyer and the seller. The efficiency of institutions ensures continuity of rules and transaction mechanisms and creates a higher degree of behavioural certainty. This results in reduced uncertainty and risk in economic processes, and future income can be predicted with greater probability (Hayami & Ruttan, 1985, 95).

The use of the framework of the New Institutional Economics in social research became widespread in the second half of the twentieth century and in relation to the agricultural economy in the 1980s and 1990s (Binswanger & Rosenzweig, 1986; Hayami & Otsuka, 1993; Hobbs, 1997). These authors paid special attention to the issue of transaction costs that occur in the process of concluding market transactions. These include the costs of gathering information about the market, searching for offers, managing and signing contracts (costs of negotiations, procedures, creating provisions), costs of monitoring and implementing contracts and more. According to Williamson (2000, 595–613), the creation of institutions related to transactions makes sense when, as part of such coordinated activities, the enterprise is able to operate cheaper than if the transactions were carried out directly on the market. Transaction costs can also be understood as costs of lost benefits in a situation where a single entity (e.g., an agricultural producer) does not have adequate information about the market conditions in which he or she operates and therefore incurs losses, for example due to lower selling prices of agricultural raw materials. Considering that the proper assessment of economic efficiency should take into account both the ability to reduce production costs and the possibility of obtaining above-average benefits (higher prices in this case), the New Institutional Economics and the theory of transaction costs allow us to look at the issue of market institutions from a different angle. In this context, the creation of a coordinated production and sales system (covering among others establishing durable long-term relationships with contractors, shortening the supply chain, creating integrated forms of distribution and developing vertical and horizontal integration) may be seen as an expression of efforts to improve the economic performance and maintenance of farms.

The creation of these coordinated forms of activity is of particular importance for small-scale family farms. In the case of large specialized units, the growing economies of scale are able to ensure lower production costs and higher prices of the offered products without the need to implement permanent market connections. Smaller actors inadequately participate in the distribution of added value created along the food supply chain. The economic surplus they obtain in the transaction process is not optimal in terms of the allocation criterion in input-output flows, as a significant part of it 'leaks' to other market participants, i.e., intermediaries, processors, wholesalers, retailers and, finally, consumers (Bárdos et al., 2003). This process results from imperfections in the structure of the agribusiness sector, which is reflected in

disproportions in bargaining power of individual participants in the marketing chain. This results in low bargaining power of farms in their relationship with downstream links in the marketing chain. Small farms have no market and bargaining power in their relationship with buying points (Berti & Mulligan, 2016). Small producers, as the initial link in the supply chain, have very limited opportunities to shape the terms of transactions (Pazaj & Dumi, 2015). Grosh (1994) outline the conditions that make contracting the form of market organization, which limits the lower power of small farms in market transactions. This type of situation is typical too for the countries of Central and Eastern Europe, including the economies analysed in this study; hence, it becomes important to define the importance of market integration in shaping the economic condition of farms as well as to find an answer to the question about elucidate the determinants of relations between farms and the market.

2. Methods

2.1. Spatial scope and data set

The choice of countries for the stud was dictated by their similarity in the structure of the agricultural sector. These countries are characterized by a fragmented agrarian structure, with prevalence of small family farms (see Table 1). This arrangement is the result of the historical past patterns and structures and the period of economic transition from a socialist into a market economy. Within one decade (1990s), millions of small farms had to adapt to the new market reality in which they were deprived of state supervision and forced to compete with multinational corporations. As a result of this process, a dual system of agriculture was created, with a relatively small number of strong, large-area enterprises and a substantial number of small-scale family farms. The latter, however, are of key importance for the functioning of rural areas, because in addition to their purely productive function (providing food), they create a number of public goods, both environmental and social (Czyżewski et al., 2021). Therefore, their viability is in the interest of the entire society, and proper economic conditions are essential for their sustainable development. One of the premises of this assumption is the strengthening of market integration.

In order to verify the assumptions made in the study, information was collected directly from farms. At the initial stage, it was necessary to define the family farm, but there is no clear concept in the literature. The most common criterion is the physical size of the unit, expressed in hectares of land used. However, such an

Table 1. Number of agricultural farms and utilised agricultural area in the analysed countries.

Specification*	Poland	Lithuania	Romania	Serbia	Moldova
Total number of farms (thous.)	1,406.0	150.3	3,422.9	569.3	369.7
Including smaller than 10 ha of UAA	1,050.0	78.8	3,225.0	501.0	239.0
	(75%)	(52%)	(94%)	(88%)	(65%)
Average farm size (ha of UAA)	10.5	19.6	3.9	6.1	6.8
Total utilised agricultural area (thous. ha)	14,539.6	2,947.2	13,413.7	3,486.9	2,496.6
Agricultural land (thous. ha) in farms smaller than 10 ha UAA	4,057	430.0	4,642	2,162	323.0
	(28%)	(15%)	(35%)	(62%)	(13%)

*Data for: Poland and Moldova—2017, Lithuania and Romania—2016, Serbia—2018.

Source: Authors' elaboration based on Statistics Poland (2018), Eurostat (2020), Statistics Lithuania (2018), Statistical Office of the Republic of Serbia (2018), National Bureau of Statistics of the Republic of Moldova (2018).

approach may be insufficient due to the diversification of production types of farms. Therefore, another classification criterion is the economic strength of a farm, expressed as its average annual production. For the purposes of European statistics (Eurostat, FADN), such a category is the so-called standard output (SO¹). In addition to the above-mentioned criteria, auxiliary variables are used, such as the share of own and hired labour (in the case of family farms, production is based on the labour of the farm members), the degree of self-consumption of the produced raw materials or the share of commercial production that goes to the market, farm management, the degree of production specialization, the amount of income from non-agricultural activities and others.

In this analysis, the two above-mentioned criteria were adopted: the size of the agricultural land area—up to 20 hectares of utilised agricultural area (UAA)—and the economic strength of a farm—defined by the SO, up to 25 thousand euros (in Moldova, only the first criterion was used due to the lack of data on SO). It was considered that such thresholds qualify a given unit to the category of small-scale family farms.² The analysis was performed on the basis of surveys conducted in 2018 in Poland and in 2019 in the rest of the countries of the sample: 1000 farms in Lithuania, 900 farms in Romania 710 farms in Poland and 550 farms in Serbia and 550 farms in Moldova. Data were collected in the form of direct interviews conducted by agricultural advisers or other specialized agencies. Questions concerned four areas—general farm features, environmental sustainability, economic and social sustainability and connections with the market. Pilot study was carried out in Poland prior to the main study in order to avoid misunderstanding during the actual survey. Finally, after the elimination of incomplete, incorrectly completed or contained outliers questionnaires, there were, 672 farms in Poland, 999 farms in Lithuania, 838 farms in Romania, 522 farms in Serbia and 544 farms in Moldova analysed.

2.2. Methods: Composite indices of the economic condition and market integration of farms

The first stage of the research consisted of estimation of an index of the economic condition of farms separately from Moldova, Serbia, Romania, Lithuania and Poland. For this purpose, a set of four variables qualified for the synthetic measure was used: (1) annual income gained by a fully-employed family member in relation to the average annual per capita income in the national economy as published by the OECD (gap ratio) and (2) farmer's subjective assessment of the financial situation of the household (see Table 2). These variables were subjected to zero unitarization, and the de-stimulant (gap ratio) was converted into a stimulant. The unitarization of the variables was performed according to the following formulas:

– *stimulants*:

$$z_{ij} = \frac{x_{ij} - \min_i \{x_{ij}\}}{\max_i \{x_{ij}\} - \min_i \{x_{ij}\}}, \quad (i = 1, 2, \dots, n; j = 1, 2, \dots, m); z \in [0, 1] \quad (1)$$

Table 2. Elements of the synthetic index of economic condition of farms.

Elements of the index of economic condition

1. Annual income gained by a fully-employed family member in relation to the average annual per capita income in the national economy as published by the OECD (gap ratio)
2. Subjective assessment of the financial situation of the household made by the farmer
3. Subjective assessment of the investment capacity of a farm
4. Estimated market value of the farm (Moldova, Serbia, Romania, Lithuania) or estimated value of technical equipment of the farm (Poland)

Source: Authors' elaboration.

– *destimulants*:

$$z_{ij} = \frac{\max_i\{x_{ij}\} - x_{ij}}{\max_i\{x_{ij}\} - \min_i\{x_{ij}\}}, \quad (i = 1, 2, \dots, n; j = 1, 2, \dots, m); z \in [0, 1] \quad (2)$$

where $\min_i\{x_{ij}\}$ denotes for the minimum value of j feature, $\max_i\{x_{ik}\}$ denotes for the maximum value of j feature, i denotes for an object (in this case country).

Next, weights for particular coefficients were determined by the CRITIC method (Criteria Importance through Intercriteria Correlation). In the CRITIC method, weight coefficients are calculated on the basis of standard deviations and correlations between coefficients. This method assigns relatively higher weights to features characterized by a high rate of variability and a simultaneously low correlation with the other features. The weight coefficients were determined according to the following formulas:

$$w_j = \frac{c_j}{\sum_{k=1}^m c_k}, \quad j = 1, 2, \dots, m; \quad c_j = s_{j(z)} \sum_{k=1}^m (1 - r_{ij}), \quad j = 1, 2, \dots, m \quad (3)$$

where c_j denotes for measure of informational capacity of j feature, $s_{j(z)}$ denotes for standard deviation calculated out of the standardised values of j feature, r_{ij} denotes for the correlation coefficient between j and k features.

The sum of the coefficients should account to 1. Further, the multiplication of the determined standardized values of simple features by adequate weight coefficients was performed.

In the next stage, we calculated the Euclidean distances of particular units from the pattern and anti-pattern of development according to the following formulas:

$$d_i^+ = \sqrt{\sum_{j=1}^k (z_{ij}^* - z_{ij}^+)^2} - \text{distance from the pattern of economic condition} \quad (4)$$

$$d_i^- = \sqrt{\sum_{j=1}^k (z_{ij}^* - z_{ij}^-)^2} - \text{distance from the anti - pattern of economic condition} \quad (5)$$

Table 3. Elements of the synthetic index of farms' market integration.

 Elements of the index of market integration

1. Ratio of sold production to total farm production
 2. Distribution channels for agricultural products
 3. Durability of sales contracts
 4. Subjective assessment of farm's market position in sales transactions
 5. Type of relation with the market when purchasing means of production
 6. Subjective assessment of farm's market position in purchase transactions
-

Source: Authors' elaboration.

where

$$z_j^+ = (\max(z_{i1}^*), \max(z_{i2}^*), \dots, \max(z_{ik}^*)) = (z_1^+, z_2^+, \dots, z_k^+)$$

$$z_j^- = (\min(z_{i1}^*), \min(z_{i2}^*), \dots, \min(z_{ik}^*)) = (z_1^-, z_2^-, \dots, z_k^-)$$

We determined the value of q_1 synthetic feature according to the following formula:

$$q_i = \frac{d_i^-}{d_i^+ + d_i^-}, \quad (i = 1, 2, \dots, n) \quad (6)$$

The indexes range from 0 to 1. The higher value of the index is associated with better the economic condition of the farm.

In the second part of the research, we calculated an index of market integration for selected countries using the authors' own formula. The synthetic index covered the following elements: (1) the ratio of sold production to total farm production: a higher ratio raises the index value; (2) distribution channels for agricultural products with a few options of choice: through an intermediary; to processing plants; to a wholesaler or retail chain; in a marketplace; directly from the farm or through participation in fairs or the like—the fewer intermediaries, the higher the rating; (3) durability of sales contracts: sale without previously signed contracts; sale on the basis of short-term (financial year) contracts; sale on the basis of long-term or renewed contracts; sale within a producer group or cooperative; (4) subjective assessment of the farm's market position (bargaining power) in sales transactions: terms of the contract (price, date, place, etc.) are determined by the buyer; I (the farmer) mainly determine the terms of the contract; the terms of the contract are determined together; (5) type of relation with the market when purchasing means of production: without formal contracts; from regular suppliers without previously signed contracts; from regular suppliers on preferential terms or under previously signed contracts; (6) subjective assessment of the farm's market position in purchase transactions (as for point 4) (see Table 3). Points from 0 to 1 were awarded for each element, resulting in a total score ranging from 0 to 6 points. Afterwards, the index was scaled from 0 to 1.

2.3. Methods: Regression analysis of the market integration score

In the last stage of the research, a regression analysis was carried out in order to determine which economic and demographic factors impact the market integration of family farms from selected Central and Eastern European countries. We applied a double-bootstrapped truncated regression using Simar and Wilson (2007) algorithm, as the assumptions of the least squares estimation method for the dependent variable (market integration index) were not met (no normal distribution). Furthermore, the application of a double-bootstrapped truncated regression eliminates the problem of serial correlation that occurred in the research. A parametric bootstrap procedure is consistent with the assumed data-generating process. It indicates estimated standard errors and confidence intervals that are not biased due to correlated estimated scores (Badunenko & Tauchmann, 2018). In the study, the explanatory variables were defined as follows:

- Total value of annual production in euros per farm
- Total farm area in ha of UAA³
- Labour input in annual work units (AWU)⁴ per farm
- Specialization of production (crop production, animal production, mixed production⁵)
- Age of farm owner/manager
- Level of farmer education (no education, primary or secondary education, vocational or general education, higher education)

The collinearity of variables was assessed based on the variance inflation factor (VIF). None of the variables in the models for the same country exceeded the critical VIF value of 10, and therefore it was concluded that the reasoning may be based on the estimated models. As a result, we obtained the answer to the question of which economic and demographic factors influence the market integration of family farms in Moldova, Serbia, Romania, Lithuania and Poland.

Finally, it should be added that scientific development in spatial econometrics has proved that traditional methods can lead to biased results in geographically related data modelling due to spatial effects (Anselin, 1998). Spatial correlation corresponds to the interdependence of spatially determined observations of their relative location. Estimating five models for each country separately allowed spatial correlation and related errors to be avoided.

3. Results

The first part of this section discusses the results of the correlation analysis between the market integration index and the index of economic condition for small-scale family farms in the analysed countries. The correlation coefficients between these two indicators indicate a positive connection in all countries, and the calculated *p* values prove the statistical significance of these results. The strongest correlation occurs in Poland, followed by Moldova and Lithuania. The lowest result (three times lower than in Poland) was recorded in Romania (Table 4). The case of Romania means that

Table 4. Correlation coefficients between index of economic conditions and index of market integration of farms and their significance.

Country	Correlation coefficients	<i>p</i> -value
Poland	0.4507	<i>p</i> < 0.001
Lithuania	0.3560	<i>p</i> < 0.001
Romania	0.1501	<i>p</i> < 0.001
Serbia	0.2953	<i>p</i> < 0.001
Moldova	0.4062	<i>p</i> < 0.001

Source: Authors' elaboration.

in some farms, the relatively high index of market integration translates to a lesser extent into economic results due to the small influence of agricultural producers on the price level in sales transactions (Davidova et al., 2009). Moreover, Romanian farms are predominantly peasant type with a small area of agricultural land and generally with one or two animals (Dumitru et al., 2020). A significant part of the food produced is used for family self-supply, so linkages to the market for these entities are weaker. Nevertheless, some of the surveyed producers use informal sales channels (as also pointed out by Moellers & Birhala, 2014), which in practice leads to improved transaction conditions, although the official integration index is relatively low. Nevertheless, a general conclusion can be drawn that for small-scale farms in Central and Eastern Europe, market integration is a stimulus for their economic situation. Such a conclusion may be supported by the research of other authors, including Pendleton and Howe (2002). Such a strong causal link between market integration and economic results might be explained by the fact that under market conditions, the opportunities to influence the course of transactions, including price levels, are relatively low for smallholder farms, resulting in a relatively low share of surplus distribution in the supply chain (Le Vay, 2008). A coordinated system of integration may help to improve their position in the supply chain, which is reflected in higher margins of the farm (Palmioli et al., 2020).

It is worth supplementing the above conclusions with an answer to the question about the determinants of links between farms and the market (descriptive statistics are presented in Table 5), which was the second aim of the article. In the regression analysis, the market integration index was adopted as a dependent variable. The highest average value was noticed in family farms in Poland, followed by Romania, and the lowest result was obtained in Lithuania.

Among the explanatory variables, the value of average annual production ranged from less than 6.5 thousand euros in Serbia and Lithuania to over 12 thousand euros in Poland. This arrangement of the order corresponds to the arrangement for the market integration index, a measurable manifestation of which is introduced in the regression analysis presented below. In the case of farm area, the highest size was recorded in Poland (13.1 ha of UAA) and then in Lithuania (10.5 ha of UAA). The smallest areas of agricultural land were observed in Moldova and Serbia (5.2 and 4.2 ha, respectively). Such numbers are consistent with the overall results for the agricultural sector in the studied countries (see Table 1); Serbia and Moldova have the most fragmented agrarian structure, while in Poland and Lithuania the land is more concentrated. In contrast, the labour force, expressed by the Annual Work Unit per

Table 5. Descriptive statistics of the variables used in the regression analysis.

Specification	Country	Mean	Standard deviation	Min	Max
Index of farm market integration (range 0–1)	Moldova	0.476	0.126	0.080	0.835
	Serbia	0.467	0.124	0.083	0.870
	Romania	0.522	0.146	0.123	0.887
	Lithuania	0.400	0.163	0.042	0.834
	Poland	0.663	0.132	0.280	0.987
Index of farm economic condition (range 0–1)	Moldova	0.424	0.097	0.170	0.886
	Serbia	0.577	0.192	0.101	0.899
	Romania	0.580	0.157	0.256	0.876
	Lithuania	0.355	0.119	0.087	0.789
	Poland	0.606	0.095	0.312	0.953
Total value of annual production (euro/farm)	Moldova	7,645	5,162	150	19,800
	Serbia	6,424	5,334	680	21,600
	Romania	9,646	8,677	120	24,300
	Lithuania	6,499	4,438	100	25,000
	Poland	12,124	6,629	580	24,500
Total farm area (ha of UAA)	Moldova	5.2	3.0	0.1	15.9
	Serbia	4.2	2.8	0.1	20.0
	Romania	8.6	7.9	0.5	17.1
	Lithuania	10.5	5.9	1.0	20.0
	Poland	13.1	6.1	1.5	20.0
Labour input (annual work units/farm)	Moldova	1.55	0.98	0.13	12.62
	Serbia	1.66	0.86	0.25	5.00
	Romania	1.48	0.72	0.16	7.50
	Lithuania	1.10	0.62	0.06	3.75
	Poland	1.57	0.67	0.12	3.96
Age of farmer	Moldova	46	13.6	20	77
	Serbia	54	13.1	21	85
	Romania	47	12.4	20	81
	Lithuania	48	13.7	19	77
	Poland	49	10.8	22	67
Level of education		No education, primary or secondary education	Share of Vocational or general education	Higher education	Total
	Moldova	30.7	25.9	43.4	100.0
	Serbia	51.6	43.6	4.8	100.0
	Romania	15.8	66.1	18.1	100.0
	Lithuania	3.3	51.1	45.7	100.0
	Poland	6.0	79.3	14.7	100.0
Farm specialisation type		Crop production	Share of Animal production	Mixed production	Total
	Moldova	73.9	20.0	6.1	100.0
	Serbia	38.8	8.4	52.8	100.0
	Romania	51.8	13.6	34.6	100.0
	Lithuania	44.6	16.5	38.8	100.0
	Poland	45.5	21.0	33.5	100.0

Note: For Poland 2018, for rest of the countries 2019.

Source: Authors' calculations based on data from the survey.

farm, was the highest in Serbia. The lowest value was noticed in Lithuania, although it must be acknowledged that the differences in the size of labour inputs between countries were not relatively high (ranging from 1.1 to 1.66). Slightly higher labour inputs in Serbia and Moldova than in Lithuania or Romania may result from the crop structure in these countries. A large part of the cultivation is related to vegetables, fruits, berries and flowers (Stratan et al., 2020). These avenues of agricultural production are considered labour intensive (European Parliament, 2020), as is

livestock production, which is relatively high in Poland compared to other analysed countries.

There were small differences in terms of the average age of a farm manager, which ranged from 46 in Moldova to 49 in Poland. Only in Serbia was the average age of a farmer a bit higher, at 54. In contrast, a very large variation between countries occurred in terms of education level. The farmers from Serbia had the lowest level of education; 52% of those in this sample belonged to the 'no education, primary or secondary education' group, and less than 5% possessed a higher education. The highest share of farmers in this study with higher education was in Lithuania and Moldova, at about 45% in both countries. In Lithuania, the percentage of people with 'no education, primary or secondary education' was the lowest. In turn, farmers with vocational or general education dominated in Poland and Romania.

As for the 'farm specialization' variable, farms with mostly crop production predominated in four out of five surveyed countries. In Moldova, the percentage of such farms reached almost 74%, in Romania it exceeded 50% and in Poland and Lithuania it was approximately 45%. In Serbia, this share was below 40%; farms with mixed production made up the largest segment in this country. The lowest representation of farms concerned specialization in animal production (from 8% in Serbia to 21% in Poland). An exception was Moldova, in which the smallest group consisted of farms with a mixed type of production (6%).

Table 6 shows the results of the regression analysis of models estimated for the studied countries. The variables used in the models explain from 11% (Moldova) to 26% (Lithuania) of the common variability of the market integration for family farms. The values of the coefficients of determination R^2 and adjusted R^2 are given in the lower part of the table. It should be emphasized that the obtained values are not high but are typical for models estimated on the basis of disaggregated data—such as microeconomic surveys of farms—and also for the majority of complex studies in the field of social sciences.

The volume of production is the first of the analysed explanatory variables. In all countries, it is statistically significant, and the signs of the coefficients are positive. In this sense, it can be said that it is a universal variable. A positive sign means a positive impact of the increase in the production scale on the level of market integration of family farms. It is interesting that a similar relationship was not observed for farm area. It might be assumed that the higher scale of production will be related to the increase in the acreage of agricultural land, hence the area of UAA will also have a significant impact on the dependent variable. However, this was not confirmed for any of the countries, and moreover, for four countries a negative sign of the relation was obtained. On the other hand, farm specialization in animal or plant production turned out to be a statistically significant variable. Thus, higher specialization leads to a strengthening of integration with the market of small-scale family farms, as evidenced by the positive signs of regression coefficients. Labour input as an explanatory variable was statistically significant for two countries—Romania and Lithuania, while in the other three cases no such relationship was found. Thus, it can be thought that it is not a decisive element for the position of the farmer in the food supply chain. Finally, in terms of demographic variables, age

Table 6. Results of the regression analysis for the analysed countries.

Y-market integration index		Coefficient	Bootstrap standard error	P
Annual production (euro/farm)	Moldovia	3.76e – 06	7.07e – 07	0.000
	Serbia	9.80e – 06	8.16e – 07	0.000
	Romania	6.21e – 06	7.02e – 07	0.000
	Lithuania	1.79e – 05	1.00e – 06	0.000
	Poland	9.08e – 06	6.50e – 07	0.000
Total farm area (ha of UAA)	Moldovia	0.00014	0.00180	0.937
	Serbia	–0.00159	0.00186	0.393
	Romania	–0.00026	0.00062	0.680
	Lithuania	–0.00063	0.00087	0.473
	Poland	–0.00010	0.00077	0.894
Annual work units per farm	Moldovia	0.00078	0.00525	0.882
	Serbia	–0.00551	0.00568	0.332
	Romania	0.01320	0.00689	0.055
	Lithuania	0.02287	0.00728	0.002
	Poland	–0.00264	0.00745	0.723
Farm specialisation—crop production	Moldovia	0.02841	0.01880	0.131
	Serbia	0.01536	0.00942	0.100
	Romania	0.04559	0.01087	0.000
	Lithuania	0.01776	0.00994	0.074
	Poland	0.03882	0.01097	0.000
Farm specialisation—animal production	Moldovia	0.07675	0.02166	0.000
	Serbia	0.06734	0.01708	0.000
	Romania	0.58117	0.01490	0.000
	Lithuania	0.02830	0.01612	0.079
	Poland	0.03651	0.01342	0.007
Age of farmer	Moldovia	–0.00036	0.00039	0.355
	Serbia	0.00017	0.00037	0.657
	Romania	0.00008	0.00042	0.852
	Lithuania	0.00007	0.00031	0.821
	Poland	0.00047	0.00037	0.210
Farmer education—no education, primary or secondary education	Moldovia	–0.01280	0.01376	0.455
	Serbia	–0.03219	0.01011	0.001
	Romania	–0.03111	0.01412	0.028
	Lithuania	–0.00041	0.02968	0.989
	Poland	–0.04415	0.01998	0.027
Farmer education—higher education	Moldovia	0.01796	0.01223	0.142
	Serbia	–0.00620	0.01839	0.736
	Romania	0.00878	0.01381	0.525
	Lithuania	0.00264	0.01019	0.796
	Poland	0.04247	0.01075	0.000
Constant	Moldovia	0.42105	0.02725	0.000
	Serbia	0.41633	0.02191	0.000
	Romania	0.41261	0.02265	0.000
	Lithuania	0.27504	0.02177	0.000
	Poland	0.50650	0.02704	0.000
Model adjustment		Number of observations	Rsq	Adjusted Rsq
	Moldovia	544	0.1157	0.1025
	Serbia	522	0.2162	0.2040
	Romania	838	0.1822	0.1743
	Lithuania	999	0.2638	0.2578
	Poland	672	0.2541	0.2451

Source: Authors' calculations based on data from the survey.

^aFor farms specialization mixed type of production was adopted as a reference variable. For farmer education vocational and general education was adopted as a reference variable. The bold values denote for significance at $p < 0.1$.

was not statistically confirmed, while in terms of education a certain relationship can be observed—a low level of education in Poland, Romania and Lithuania weakened the market integration index.

4. Discussion

As for the influence of the production scale similar conclusions can be found in the literature for the European countries and for the other regions in the world. For example, Kedaitiene and Hockmann (2002) substantiate the positive relationship between the production scale and market integration in Lithuania and point to the importance of costs related to the sale of agricultural products. Larger batches of foodstuffs enable to sell agricultural products closer to the final consumer, while smaller farms tend to use the services of intermediaries. This may be treated as a result of the fact that processors and traders are looking for producers who will continuously provide them with a large supply of agricultural raw materials. Therefore, crucial issue to create permanent and formal contacts in the supply chain, is a minimum volume of produce delivered (Gani & Hossain, 2015). White and Gorton (2011), while analysing the agricultural sector in Moldova, Armenia, Georgia, Russia and Ukraine, indicated that during the transformation period, various forms of contracting between farms and food industry enterprises were developed. Higher dynamics were seen in case of larger entities, while small-scale farms more often used spot type transactions. The lower level of integration of small farms with the market is also due to the inability to meet a number of requirements imposed by the food industry and trade, related to the size of one-off deliveries, veterinary and sanitary safety standards, certificates, monitoring of the production process and so forth. Difficulties related to the lack of capital for the purchase of means of transport and storage infrastructure are also mentioned (Bachev, 2012). A positive impact of the production volume on the farms' market integration was also demonstrated in Romania, Bulgaria (Jámbor, 2013) and Poland (Gołębiewska, 2012). These results were confirmed also in case of the African continent by, among others, Kangile et al. (2020) and Oparinde and Daramola (2014).

Apart from the production scale, the degree of production specialization unequivocally determines the level of market integration. The results of our analysis indicate that farms specializing in animal or crop production participate more actively in market processes than farms of a mixed type (mixed type is the reference variable). This is evidenced by the positive signs of the parameters and confirmed by statistical significance (except for Moldova in crop production). The importance of specialization in shaping the links between farms and the market was described by, among others, Gołębiewska (2012) and Kahan (2013). They prove that for producers from mixed (diversified) type of production, ties with the environment were the weakest. At the same time, the strengthening of ties with the market forces a reorientation towards specialized production, which can be explained by the efforts of farms to reduce the risk of sale. Food businesses are interested in the supply of larger, homogeneous batches of goods and in establishing such permanent contracts with farmers in this regard (Djuric et al., 2018).

The results of the regression analysis for the variable 'holding area' are interesting. Theoretically, it may be assumed that the larger the farm area, the greater the production scale and the stronger the market interconnection (Key et al., 2000). However, such a relationship was not confirmed in any of the analysed countries. The 'farm area' variable turned out to be statistically insignificant, and in four out of five cases, its sign was negative. Therefore, it may be concluded that in the case of small family farms, it is not the area of the farm that matters, but the volume of production and

level of specialization. Moreover, it should be emphasized that due to the subjective scope of the study (small-scale family farms), the range of the 'farm area' variable was stated up to 20 ha. It is therefore uncertain whether the same results would have apply to medium and large farms.

Building lasting and strong relationships with the market requires the agricultural producer to develop a number of additional activities related to supply chain management. There is a need to decide on what inputs to use and where to get them, what quantities to sell and when, where and to whom to sell the products and at what prices, how to garner premium prices, which marketing channels to use (Kahan, 2013). Therefore, it is justified to adopt the hypothesis that higher labour input occurs in farms that are highly integrated with the market. In contrast, in farms with weaker contacts with their surroundings, a lower share of labour input used in agricultural activity may result from higher employment outside the farm. However, in the case of the authors' research, a positive and statistically significant relationship between AWU and market integration was obtained only for Romania and Lithuania. In the other three countries, the relationship was statistically insignificant.

Among the two demographic variables, the level of market integration for the 'no education, primary or secondary education' group is lower than that of the 'vocational and general education' group for all analysed countries, while for three countries the coefficient was statistically significant (Serbia, Romania and Poland). Further, raising qualifications to the level of 'higher education' was significant only for Poland. Thus, it may be stated that acquiring at least vocational or general education is one of important factors enhancing farmers' participation in market processes. In addition, farmers should seek knowledge on operating more effectively in the whole supply chain. It is not enough for farmers to learn on the job from their daily experience. Farmers should therefore not only be good workers but also entrepreneurial and innovative (Kahan, 2013). It is emphasized that for agriculture in developed and developing countries, the level of education and human capital is strongly associated with higher levels of marketing productivity and faster adoption of new technologies (Turkalj et al., 2015).

In turn, the second demographic variable in the model, the farmer's age, was statistically insignificant for all cases. In this situation, it is difficult to find unambiguous results even in the literature. Some authors claim that older and more experienced farmers tend to make better production decisions, including these of a marketing nature (Abdullah et al., 2007; Hailua et al., 2015). Additionally, older managers might have long-term relationships with their clients and preferential access to credit due to the availability of land and other assets. In contrast, other results show that young-age-headed farms are more eager to participate in the market than old-age-headed entities (Kangile et al., 2020). Age has therefore a negative impact because young people might have a longer planning horizon and might be more willing to take risks related to market transactions (Zegeye et al., 2001).

5. Conclusion

The conducted research shows that the market integration of small-scale family farms in selected countries of Central and Eastern Europe improves their economic

condition. Therefore, efforts should be made to strengthen the market position of agricultural producers in the food supply chain. The results of the regression analysis show a positive impact of production scale and specialization on the level of market integration. Specialization also allows the size of the activity to increase without the need to enlarge the area of the farm, which in the conditions of high prices of agricultural land and limited capital is particularly important for small-scale farms. Due to the same direction of the impact for all the surveyed countries and the confirmed statistical significance, these two variables—scale of production and specialization—can be considered universal. Accordingly, institutional support should be directed in a way that promotes the development of farms towards higher production of a given type of crop or animal husbandry. For Poland, Romania or Lithuania, these may be special tools under the common agricultural policy, for example linking a portion of direct payments with a specific production structure or dedicated instruments of the rural development program. In the case of Serbia and Moldova, this would be supported by the national budget. The data also show that raising the education of the farm manager to a certain level (vocational or general) leads to the strengthening of market ties. Hence, it is important to launch programs that increase farmers' knowledge, especially in terms of the benefits of market integration. Additionally, farmers require knowledge of farm business management to be successful in market-oriented farming. Training and courses could be organized by some agricultural advisory centres, agricultural unions or representatives of academic centres. Such activities can be combined with a show of good practices, showing the economic success of farms involved, for example, in short supply chains, direct sales, combining agricultural production with processing, etc.

Apart from the indirect impact, support policies should directly strengthen the integration processes in the agricultural sector. Some of the solutions are already present nowadays, such as financing the activities of agricultural producer groups and farmers' organizations (e.g., in Poland). Another proposal is introducing the greater transparency of contracts between farmers and recipients of foodstuffs. It might also be a wise idea to create a standardized contract template (at the national level) which would include elements protecting both parties of the transaction.

From the point of view of the recommendations proposed, the direction of support for the new EU common agricultural policy 2023–2027 seems right. In addition to food security and safety, social and environmental issues, the nine key objectives include strengthening market orientation and increasing farm competitiveness, as well as improving the farmers' position in the value chain. The legal framework is among the planned interventions takes into account, among others, a Directive on Unfair Trading Practices in business-to-business relations in the food supply chain proposed by the European Commission in 2018, and adopted by the Council and the European Parliament in 2019. This solution tends to protect small and medium-sized suppliers in the food supply chain and is obligatory to implement for all member states. Equally important is the issue of market transparency. The CAP budget provides for increased spending on research and innovation in the area of the food economy, including the creation of modern solutions for small and medium-sized family farms. Their application is aimed at increasing the added value and marketisation of

activities, balancing the financial flows in the farmer-supplier and farmer-receiver transactions. Actions are intended to create a 'new' image of the smallholder farmer, more competitive, cooperative and aware of his position in the supply chain. However, the successful implementation of the solutions will depend not only on the size of the budget for this purpose, but above all on changes in the mentality of farm owners.

Notes

1. SO—Standard Output, the average five-year production of the crop or animal expressed in thousands of euro per one year in the region's average production conditions.
2. Farms with an economic size of up to EUR 25,000 are treated as small in the Eurostat methodology. There are 8.5 million such entities in the EU (European Commission, 2011; Eurostat 2020).
3. Utylised agricultural area.
4. Annual work unit (AWU) is a unit of agricultural labour input, meaning full-time equivalent.
5. Specialization in crop or livestock production means that at least 2/3 of a farm's output comes from a given production type (crops or animals).

Disclosure statement

The authors declare no conflict of interest.

Funding

This research was funded by the Polish National Agency for Academic Exchange under the program of International Academic Partnership, agreement no. PPI/APM/2018/1/00011/U/001 and by National Science Centre in Poland, grant no. 2016/21/B/HS4/00653.

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Data availability statement

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References

Abdullah, R., Fazli, A., Riaz, A., Sajjad, C., Abbas A, A., Wagar, I., Adegbola, P., & Gardebroek, C. (2007). The effect of information sources on technology adoption and

- modification decisions. *Agricultural Economics*, 37 (1), 55–65. <https://doi.org/10.1111/j.1574-0862.2007.00222.x>
- Anselin, L. (1998). GIS Research infrastructure for spatial analysis of real estate markets. *Journal of Housing Research*, 9(1), 113–133. <https://doi.org/10.5555/JHOR.9.1.E523670P713076P1>
- Bachev, H. (2012). *Farm diversification and market inclusion in East Europe and Central Asia*. MPRA Paper 38683. Retrieved May 5, 2019, from <https://mpra.ub.uni-muenchen.de/38683/>
- Badunenko, O., & Tauchmann, H. (2018). *Simar and Wilson two-stage efficiency analysis for Stata*. FAU Discussion Papers in Economics 08/2018. Retrieved April 15, 2020, from <https://www.econstor.eu/bitstream/10419/179503/1/1023793822.pdf>
- Bárdos, K., Fertő, I., & Szabó, G. (2003). The effect of transaction costs on the structure of total supply chain in Hungarian beef sector. Third Annual Workshop – Economics of Contracts in Agriculture. The Royal Agricultural and Veterinary University of Copenhagen.
- Berti, G., & Mulligan, C. (2016). Competitiveness of small farms and innovative food supply chains. The role of food hubs in creating sustainable regional and local food systems. *Sustainability*, 8(7), 616. <https://doi.org/10.3390/su8070616>
- Binswanger, H. P., & Rosenzweig, M. R. (1986). Behavioral and material determinants of production relations in agriculture. *Journal of Development Studies*, 22(3), 503–539. <https://doi.org/10.1080/00220388608421994>
- Czyżewski, B., Matuszczak, A., Czyżewski, A., & Brelik, A. (2021). Public goods in rural areas as endogenous drivers of income: Developing a framework for country landscape valuation. *Land Use Policy*, 107, 104646. <https://doi.org/10.1016/j.landusepol.2020.104646>
- Davidova, S., Fredriksson, L., & Bailey, A. (2009). Subsistence and semi-subsistence farming in selected EU new member states. *Agricultural Economics*, 40, 733–744. <https://doi.org/10.1111/j.1574-0862.2009.00411.x>
- Djuric, I., Götz, L., Svanidze, M., & Glauben, T. (2018). Agricultural market integration in the commonwealth of independent states: What are the main driving forces and challenges? In G. Egilmez (Ed.), *Agricultural value chain*. Intech Open.
- Dumitru, E. A., Badan, D. N., Petre, I. L., & Bratulescu, A. M. (2020). Analysis of agricultural holdings in Romania in terms of size. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 20, 193–198.
- European Commission. (2011). *EU Agricultural Economic Brief: What is a small farm? Brief 2*. Retrieved May 21, 2020, from https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/agri-economics-brief-02_en.pdf
- European Parliament. (2020). The EU fruit and vegetable sector: Main features, challenges and prospects. Retrieved October 24, 2020, from [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635563/EPRS_BRI\(2019\)635563_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/635563/EPRS_BRI(2019)635563_EN.pdf)
- Eurostat. (2020). Retrieved April 10, 2020, from <https://ec.europa.eu/eurostat/data/database>
- Fałkowski, J. (2015). Economic effects of reorganising an agro-food supply chain: Some evidence from Poland. *Journal of Organizational Change Management*, 28(5), 704–723. <https://doi.org/10.1108/JOCM-04-2014-0085>
- Gani, A., & Hossain, E. (2015). Market participation decision of smallholder farmers and their determinants in Bangladesh. *Ekonomika Poljoprivrede*, 62(1), 163–179. <https://doi.org/10.5937/ekoPolj1501163G>
- Gołębiewska, B. (2012). *Diversification of farm connections with the environment [Zróźnicowanie powiązań gospodarstw rolniczych z otoczeniem]*. Retrieved May 15, 2019, from <https://www.farmer.pl/finanse/podatki-rachunkowosc/zroznicowanie-powiazan-gospodarstw-rolniczych-z-otoczeniem,33804.html>
- Grosh, B. (1994). Contract farming in Africa: An application of the new institutional economics. *Journal of African Economies*, 3(2), 231–261. <https://doi.org/10.1093/oxfordjournals.jae.a036805>
- Hailua, G., Manjureb, K., & Aymut, K.-M. (2015). Crop commercialization and smallholder farmers livelihood in Tigray region, Ethiopia. *Journal of Development and Agricultural Economics*, 7 (9), 314–322.

- Hayami, Y., & Otsuka, K. (1993). *The economics of contract choice – An agrarian perspective*. Clarendon Press.
- Hayami, Y., & Ruttan, V. W. (1985). *Agricultural development: An international perspective*. John Hopkins University Press.
- Hobbs, J. (1997). Measuring the importance of transaction costs in cattle marketing. *American Journal of Agricultural Economics*, 79(4), 1083–1095. <https://doi.org/10.2307/1244266>
- Jámbor, A. (2013). Country-specific determinants of horizontal and vertical intra-industry agri-food trade: The case of Bulgaria and Romania. *Applied Studies in Agribusiness and Commerce*, 7(4–5), 69–75. <https://doi.org/10.22004/ag.econ.187510>
- Kahan, D. (2013). *Market-oriented farming: An overview*. FAO.
- Kangile, R. J., Mgeni, C. P., Mpenda, Z. T., & Sieber, S. (2020). The determinants of farmers' choice of markets for staple food commodities in Dodoma and Morogoro, Tanzania. *Agriculture*, 10(5), 142. <https://doi.org/10.3390/agriculture10050142>
- Kedaitiene, A., & Hockmann, H. (2002). *Milk and milk processing industry in Lithuania: An analysis of horizontal and vertical integration*. IAMO Discussion Papers 44. Retrieved October 5, 2019, from <https://ideas.repec.org/p/zbw/iamodp/14930.html>
- Key, N., Sadoulet, E., & De Janvry, A. (2000). Transactions costs and agricultural household supply response. *American Journal of Agricultural Economics*, 82(2), 245–259. <https://doi.org/10.1111/0002-9092.00022>
- Le Vay, C. (2008). Agricultural co-operative theory: A review. *Journal of Agricultural Economics*, 34, 1–44.
- Moellers, J., & Birhala, B. (2014). Community Supported Agriculture: A promising pathway for small family farms in Eastern Europe? A case study from Romania. *Landbauforschung*, 64, 139–150. https://doi.org/10.3220/LBF_2014_139-150
- National Bureau of Statistics of the Republic of Moldova. (2020). Retrieved May 5, 2019, from <http://statistica.md>.
- North, D. C. (1990). *Institution, institutional change and economic performance*. Cambridge University Press.
- Oparinde, L., & Daramola, A. (2014). Determinants of market participation by maize farmers in Ondo State, Nigeria. *Journal of Economics and Sustainable Development*, 5, 69–77.
- Palmioli, L., Grando, S., Di Iacovo, F., Fastelli, L., Galli, F., Proserpi, P., Rovai, M., & Brunori, G. (2020). Small farms' strategies between self-provision and socio-economic integration: Effects on food system capacity to provide food and nutrition security. *Local Environment*, 25(1), 43–56. <https://doi.org/10.1080/13549839.2019.1697869>
- Pazaj, E., & Dumi, A. (2015). Economic coordination contracts and their role in integration of farmers markets. *Academic Journal of Interdisciplinary Studies*, 4(1), 435–444. <https://doi.org/10.5901/mjss.2015.v4n1p435>
- Pendleton, L. H., & Howe, E. L. (2002). Market integration, development, and smallholder forest clearance. *Land Economics*, 78(1), 1–19. <https://doi.org/10.2307/3146919>
- Simar, L., & Wilson, P. W. (2007). Estimation and inference in two-stage semi-parametric models of production processes. *Journal of Econometrics*, 136(1), 31–64. <https://doi.org/10.1016/j.jeconom.2005.07.009>
- Statistical Office of the Republic of Serbia (SORS). (2018). *The survey on the structure of agricultural holdings* (pp. 1–2). Belgrade: Statistical Office of the Republic of Serbia. Retrieved May 5, 2019, from <http://publikacije.stat.gov.rs/G2019/PdfE/G201918010.pdf>
- Statistics Lithuania. (2018). *Results of the farm structure survey 2016* (pp. 8–88). Vilnius: Lietuvos Statistikos Departamentas. Retrieved May 5, 2019, from <https://osp.stat.gov.lt/statistikos-leidiniu-katalogas?pubEditionInGroup=29740>
- Statistics Poland. (2018). *Statistical yearbook of agriculture* (pp. 26–197). Warsaw: Central Statistical Office. Retrieved May 5, 2019, from <https://stat.gov.pl/en/topics/statistical-yearbooks/statistical-yearbooks/statistical-yearbook-of-agriculture-2018,6,13.html>
- Stratan, A., Ignat, A., Lucasenco, E., Tirigan, S., & Poczta-Wajda, A. (2020). Small farms in the Republic of Moldova. In S. Sebastian & S. Maican (Eds.), *Small farms in the paradigm of*

- sustainable development: Case studies of collected Central and Eastern European countries.* Marszałek Publishing House.
- Thapa, G. (2009). *Smallholder farming in transforming economies of Asia and the Pacific: Challenges and opportunities.* Discussion Paper prepared for the side event organized during the Thirtythird session of IFAD's Governing Council, 18 February 2009. International Fund for Agriculture Development (IFAD).
- Turkalj, D., Biloš, A., & Kelić, I. (2015). Integration of Croatian farmers in the EU information society – Issues and implications. *Ekonomski Vjesnik; Osijek*, 28, 41–52.
- White, J., & Gorton, M. (2011). A comparative study of agrifood chains in Moldova, Armenia, Georgia, Russia, and Ukraine. In J. F. M. Swinnen (Ed.), *The dynamics of vertical coordination in agrifood chains in Eastern Europe and Central Asia.* World Bank.
- Williamson, O. (2000). The new institutional economics: Take stock. *Journal of Economic Literature*, 38(3), 595–613. <https://doi.org/10.1257/jel.38.3.595>
- Wyrzykowska, B. (2004). Rodzaje powiązań integracyjnych w agrobiznesie. *Zeszyty Naukowe SGGW - Ekonomika i Organizacja Gospodarki Żywnościowej*, 53, 57–76. <https://doi.org/10.22630/EIOGZ.2004.53.14>
- Zegeye, T., Tadesse, B., & Tesfaye, S. (2001). Determinants of adoption of improved maize Technologies in major growing region of Ethiopia. *Second National Maize Workshop of Ethiopia*, 39.