sciendo

www.degruyter.com/view/j/remav

THE AGRICULTURAL LAND TRANSACTION PRICES AT THE BACKGROUND OF PROPERTY INTENDED FOR INVESTMENT PURPOSES IN POLAND

Maria Hełdak[1]
Department of Spatial Management
Wrocław University of Environmental and Life Sciences, Poland
e-mail: maria.heldak@upwr.edu.pl

Agnieszka Stacherzak[2]
Department of Spatial Management
Wrocław University of Environmental and Life Sciences, Poland
e-mail: agnieszka.stacherzak@upwr.edu.pl

Katarzyna Przybyła[3]
Department of Spatial Management
Wrocław University of Environmental and Life Sciences, Poland
e-mail: katarzyna.przybyła@upwr.edu.pl

Szymon Kupczak[4]
Wrocław University of Environmental and Life Sciences, Poland
e-mail: 111191@student.upwr.edu.pl

Lesia Kucher[5]
Department of Global Economy
State Biotechnological University, Ukraine
e-mail: kucher@btu.kharkov.ua

Abstract

Since Poland's accession to the European Union in 2004, a steady increase in transaction prices of agricultural property has been observed. Also in other countries, mainly in Eastern and Central Europe, there has been an ongoing increase in the prices of agricultural land. The situation on the agricultural land market is influenced not only by the market mechanisms, but also by the political decisions, including the restrictions in land properties turnover. The purpose of the study is to analyse the agricultural land market in Poland and to determine the relationship of average land prices for housing, service and industrial purposes against the average prices of agricultural land in 2004-2019. In the course of the study, price changes on the discussed market were assessed as well as the forecasts and simulations concerning the prices of agricultural property and land intended for the selected investment purposes were prepared. It was established that the increase in agricultural property prices over the recent dozen or so years is inadequate to the increase in the average gross salary in Poland and the average income from work at individual farms. However, the increase in prices is almost parallel to the increase in average transaction prices of property intended for housing purposes.

Key words: *agricultural land prices, agricultural land market, agricultural property, undeveloped property*.

JEL Classification: *Q15, R28, R51*.

Citation: Hełdak, M., Stacherzak, A., Przybyła, K., Kupczak, S. & Kucher, L. (2022). The agricultural land transaction prices at the background of property intended for investment purposes in Poland. *Real Estate Management and Valuation, 30*(3), 30-44.

DOI: https://doi.org/10.2478/remav-2022-0019.

1. Introduction

The problems referring to Polish property market are addressed in numerous studies. The agricultural property market seems to be an interesting topic in the context of legal and economic determinants exacerbated by the epidemic situation and primarily in terms of property intended for investment purposes.

Agricultural land trading is an issue which has recently been attracting special attention. Since the moment of Poland becoming a member country of the European Union, agricultural land prices have been going up. Moreover, it has also been observed that along with the rising prices of farmland, the number of purchase – sale transactions has also increased. Higher interest in agricultural plots results from perceiving this type of property not only as a production factor, but also as a safe capital investment. Moreover, the option of using agricultural property for non-agricultural purposes attracts investors' attention, especially in the vicinity of developing agglomerations. The current stability of agricultural property market and the ongoing increase in prices has become an incentive for the land speculation phenomenon. Agricultural land is the area of interest for many investors, and its price per hectare frequently exceeds the financial capacity of individual farmers. The agricultural land market in Poland is influenced by the factors which can be divided into the following groups: market factors, norms and organizations, and agricultural policy (both national and the EU common agricultural policy) (Marks-Bielska, 2010; Marks-Bielska & Bieniek, 2018. The first group includes: demand, supply, price and income of the agricultural population. Among the norms and organizations, the following can be listed: legal norms, transaction costs, the attitudes of farmers, traditions and government institutions, including the National Support Centre for Agriculture, which oversees the management and turnover of land owned by the State Treasury.

The process aimed at continuous adaptation of Polish farms' efficiency to the requirements of market economy and bringing their level closer to that of the EU agriculture results in the agricultural property market being highly energized (Deluga, 2013).

In the centuries-old history of Poland, a number of legal restrictions were in force regarding the ownership structure of agricultural land, field layout, hence ultimately limiting agricultural land transactions. Contemporary state interventionism results rather from the need to counteract undesirable processes related to excessive concentration and use of land for non-agricultural purposes (Sobecki, 2015; Czyżewska, 2003). In Poland, the legal provisions regarding the agricultural property transactions are modified relatively frequently. When analysing the activities carried out by Polish state, a statement can be risked that currently the interventionism related to halting the agricultural land trading is far-reaching. In addition, since April 30, 2016, the tools restricting the agricultural land transactions were strengthened. This applies to the protection of farmland in Poland against its purchase by domestic and foreign buyers who do not guarantee the use of the acquired land for agricultural purposes in line with the public interest (The Act on sale suspension of the State Treasury Agricultural Property, 2016; The Act on the formation of agricultural system, 2003; The Act on the purchase of real property by foreigners, 1920, Stacherzak et al., 2019).

Certain tools were introduced to prevent excessive concentration of land as part of the state privatization of agricultural land by introducing the area criterion (up to 300 ha), which results from the definition of a family farm (Act on shaping the agricultural system). It results from the fact that weaker family farms require greater protection from the legislator. In particular, they require securing their existence stability which may be put to risk because of over liberal trading rules (Babuchowska & Marks-Bielska, 2012). Many authors address the problem of land grabbing (Andrea et al., 2021, Chilombo, 2021; Schoenberger et al., 2017; Schoneveld, 2017; Borras et al., 2012; Borras et al., 2011; Manahan, 2011; Von Braun & Meinzen-Dick, 2009). In Europe, it was limited due to the state interventionism, however, it affects primarily the countries established after the collapse of the Soviet Union (Brawner, 2021; Stacherzak et al., 2019; Visser & Spoor, 2010;).

The problem of increased interest in land acquisition also affects Ukraine as a result of the release of agricultural land circulation after July 1, 2021. The authors: Onegina and Vitkovskyi (2020) defined the function of the trend, which reveals the general direction of change in annual volumes of investment in agriculture, in 2014–2019, in Ukraine. The development of agricultural land trading in Ukraine was addressed, i.a., by Kovalova et al. (2021) and Ostapchuk et al. (2021). The authors proposed to improve the normative monetary evaluation of agricultural lands, which more accurately corresponds to prices for lands in Western countries and can be implemented in the formation of market circulation of agricultural land.

The need for legal regulations referring to transactions in this resource, so valuable for the country, is particularly important, but it is not always approached with understanding by investors, especially developers, who often converted agricultural land for construction purposes, previously purchasing it

at lower prices. It is one of the reasons for such a huge interest in purchasing agricultural land. Running a rational land management is particularly important as agricultural land used for non-agricultural purposes usually cannot be recovered for agricultural production. In Poland the agricultural land transactions are influenced by many factors, which in the investment context include, e.g.: the possibility of changing the intended use of agricultural land, usually purchased at lower prices for non-agricultural purposes, e.g., for building a house and, precisely, for speculative purposes (Stacherzak et al., 2019; Hełdak et al., 2017).

There are some stylized facts about the fluctuations of property prices. The first is that property prices are permanent from one period to the next, with the main reasons being credit rationing, uncertainty and transaction costs. The second fact is that permanent changes in property prices bring about both an economic prosperity and a downturn, e.g., in the housing market (Hełdak, 2017; Case & Shiller, 1990; Case & Shiller, 1989; Muellbauer & Murphy, 1997). The study addresses the problem of changes in property prices for both investment and agricultural purposes. Based on the publications addressing the agricultural land market, it can be observed that for over a dozen or so years (2004-2017) the highest prices for agricultural properties were recorded in the Netherlands (Sikorska, 2018; Zadura, 2008). It was primarily due to the small area of the country, opening to the global competition and the sprawl of urban areas. In the years 2006–2007, Ireland was the leader in terms of prices, also as a result of using agricultural land for the purposes of the developing industry and construction. In 2017, the cost per 1 hectare of agricultural land in the Netherlands was, on average, 59.5 thousand EUR, while in the same period in Poland it was approx. 9.79 thousand EUR per hectare. In this ranking, Poland was behind most of the European Union countries from the so-called old fifteen (except France and Sweden). Among the countries which joined the European Union structures in 2004, Poland remains the leader in terms of the average transaction price of agricultural land paid on the free market per 1 ha (Kupczak, 2020). The lowest value transactions were predominantly recorded in the countries from the former communist bloc countries with the centrally planned economy and the dominating state ownership (Latvia, Lithuania, Estonia).

The purpose of the study is to analyse the agricultural property market in Poland and determine correlations between average land prices for housing, service and industrial purposes in relation to the average prices of agricultural land in the period 2004-2019. In the course of the research, price changes on the discussed market were assessed as well as forecasts and simulations regarding the prices of agricultural property and land intended for the selected investment purposes were prepared.

2. Data and Methods

The relationship between transaction prices of agricultural land and transaction prices of property intended for construction purposes in Poland in the period after accessing the European Union structures was analysed. The research covers average transaction prices of agricultural land and the general situation of agricultural land on the European market as well as average transaction prices of land intended for residential housing, service and industrial development. Additionally, the number of transactions concluded on the free market and the area of sold property were analysed. The period of conducted analyses covers the years 2004 - 2019.

The source materials retrieved from the Statistics Poland database, the National Support Centre for Agricultural and the European Statistical Office (Eurostat) database were used in the study.

In the course of the conducted research, the following problem questions were formulated:

- What was the correlation between transaction prices of agricultural land and property prices for investment purposes in Poland in the years 2004-2019?
- Does the increase in agricultural property prices in the analysed period correspond to the increase in the average gross salary in Poland and does it depend on the inflation rate?

Research stages:

1. Literature overview and the formulation of the research purpose.
2. Developing the database of property transaction prices in the years 2004-2019.
3. Determining an average salary in the free market economy and the price index of consumer goods and services in the years 2004-2019.
4. Analysing results collected using the descriptive method, statistical methods and seeking correlations:
   - indicating average property transaction prices intended for agricultural purposes (EUR/m^2),
   - indicating average property transaction prices intended for single-family housing, service and industrial development (EUR/m^2),

- analysing differences between unit property transaction prices in city areas and outside city limits in Poland.

5. Identifying the dependence of transaction prices on:
   - average salary in Poland,
   - price change index of consumer goods and services (inflation) in Poland.
6. Providing answers to the formulated problem questions.
7. Conclusions.

The research used the average salary in Poland, announced annually by the President of the Statistics Poland in the form of a communication published in the Official Journal of the Republic of Poland "Monitor Polski" by the 7th working day of February each year. The inflation rate was adopted on the basis of the average annual consumer price index in Poland, also published in Monitor Polski by the President of the Statistics Poland.

In order to answer the research questions statistical analyses were carried out using IBM SPSS Statistics package, version 25 (IBM, Armonk, NY, USA). In order to establish the correlations between the average monthly income in Poland, the inflation rate and the prices of agricultural property, property intended for residential housing, production and service purposes, the Pearson correlation test was performed separately for cities and the areas outside city limits. Next, using Fisher's Z transformation, the correlation coefficients in both groups were compared.

The cross-tabulation analysis of differences in quality characteristics was performed using Pearson's chi-square test ($\chi 2$ test of independence) or Fisher's exact test, when the expected number was lower than five. For all analyses, the maximum permissible error class I $\alpha = 0.05$ was adopted, whereas $p \leq 0.05$ was considered statistically significant (Hae-Young, 2017; Moran & Solomon, 2007).

3. Empirical results

3.1. Characteristics of transactions of undeveloped land and agricultural purposes

The sale of agricultural land in Poland takes place on the free market and following a tender or non-tender procedure. With regard to agricultural property, the main forms of property trading are as follows: sale of property rights (free-market or tender/non-tender sale) and lease. The sale of property rights requires concluding a contract in the form of a notarial deed, and then an entry in the land and mortgage register (Hełdak et al., 2017; Hełdak, 2017; Hełdak, 2017a). Undeveloped land, designated for investment purposes, is sold mainly on the free market. Trading between natural persons is predominantly carried out in the form of a non-tender procedure. Only the State Treasury and local government units are obliged to organize tenders for the sale of property. Transactions in agricultural land turnover between farmers (natural persons) are usually characterized by a smaller area of purchased and sold property (Deluga, 2013). As it has been mentioned in the introduction, since April 30, 2016, the tools restricting the agricultural land transactions were strengthened. Any sale of agricultural land requires the approval of the Director of the National Support Centre for Agriculture (KOWR). In addition the KOWR use to exercise the pre-emption right and the right to acquire land, both being significant tasks delegated in 2016 to the KOWR Territorial Branches.

The value of sold undeveloped land property in thous. EUR, including transactions of undeveloped land intended for construction and agricultural purposes in the years 2004-2019 in Poland are summarized in the Table below (Table 1). The value of transactions and the average property transaction prices were converted into EUR, according to the EUR exchange rate of the National Bank of Poland on March 10, 2021 1 EUR is 4.5718 in Polish currency (PLN).

Table 1

Value, number and area of transactions of undeveloped land intended for construction and agricultural purposes in 2004-2019 in Poland. Exchange rate PLN 4.5718 on March 10, 2021

Year	Building land			Agricultural land		
	value in thous, EUR	Area in ha	Numer of plots	value in thous, EUR	Area in ha	Number of sales contracts concluded in the form of a notarial deed
2004	338611.40	no data	25259	559254.56	209695.90	87493

2005	503094.40	no data	24409	642394.68	182486.49	80858
2006	974532.20	no data	35988	851927.03	215589.47	84939
2007	1490851	no data	43795	1582330.81	1091111.00	104289
2008	1568886	9691.60	35776	1500463.71	147291.62	84763
2009	749449.45	7648.95	24315	1049050	127935.19	75160
2010	631418.50	7600.38	28385	1353010	157946.63	97085
2011	966462.70	9123.12	29173	1970793	194155.49	104191
2012	1287737	9953.06	29865	2709962	291680.32	109455
2013	1592622	14562.55	52666	2049367	210667.63	155411
2014	1872184	15353.18	58860	2240046	197210.65	161548
2015	2440351	22323.65	78818	3168833	242282.23	199105
2016	2543933	17738.87	52275	2376572	134865.40	100571
2017	2687689	18637.63	63659	2122935	89451.68	101945
2018	3188947	20388.70	70339	2553500	93037.16	112386
2019	2 808 409	19591.88	70 154	2521 117	883 69.04	110 548

Source: own study based on data from the Central Statistical Office [34], calculated at the exchange rate of EUR by NBP as of the 10.03.2021 *Source*: own study.

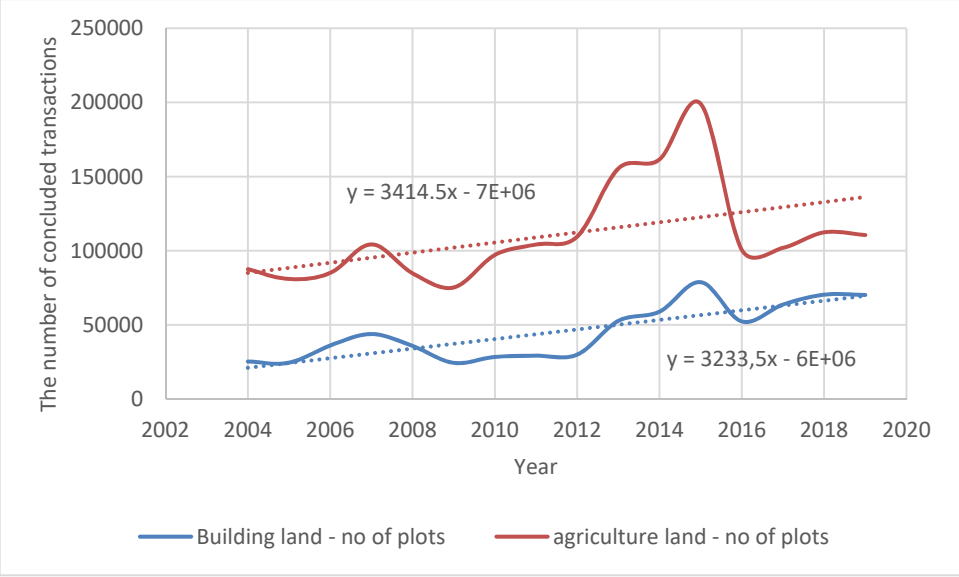


Fig. 1. The number of concluded transactions for investment purposes and for agricultural purposes in 2004-2019 in Poland. *Source*: own study.

The area of sold agricultural property in the analysed years in Poland is incomparably higher than the area of the sold investment land (Figure 1). The situation regarding the total value of sold investment land, which is several times higher than the value of sold agricultural land at a several times smaller area, is inversely proportional. Certain relationships can be found between the surface area and the achieved financial result (total value of the property sold in a given year). Having

analysed the trends in the value of property purchase – sale transactions in Poland in the years 2004-2019, it can be noticed that the upward trend continued since 2004 till 2008. Then, in 2009, the value of transactions decreased comparing to the previous year. After a slight – about 5% increase in the value of transactions in 2010, next a strong upward trend could be observed, i.e. until 2018. In 2019, a decline in the number of sold properties by approx. 1.9% was recorded and also a drop in the total value of concluded transactions by approx. 7.0% comparing to 2018. The decrease in the number of concluded transactions refers to all undeveloped land properties.

According to the report issued by Statistics Poland (2020), the average registered area of undeveloped agricultural property traded in 2019 was 0.80 ha, property intended for residential housing – 0.18 ha, property for industrial development – 1.00 ha, property for commercial and service development – 0.48 ha.

2018 was a record year in terms of the area of undeveloped land subject to the concluded transactions. With regard to construction land, a significant increase in the area of sold property was observed. A downward trend was recorded for agricultural land, however, in recent years the area of sold land remained stable showing a slight downward tendency visible in 2019.

3.2. Average transaction prices of land properties

The average values for purchase/sale transactions of undeveloped land were analysed taking into account the following land use:

- residential land,
- industrial land,
- land intended for commercial – service development,
- agricultural land (Table 2, Table 3).

Due to no access to the data covering the years 2004-2008, only average transaction prices in the period 2009-2019 were analysed, divided into a city and land outside city limits.

Table 2

Average transaction prices of undeveloped properties within city limits in Poland in the years 2009-2019 in EUR per 1 m²

Year	residential land	industrial land	commercial land	Other building land	agricultural land
2009	24,04	20,15	no data	12,57	0,82
2010	15,29	5,70	no data	14,07	5,32
2011	19,94	10,51	no data	19,20	9,47
2012	21,08	24,98	no data	27,42	9,83
2013	19,72	14,36	22,10	34,11	6,43
2014	19,43	11,08	25,76	35,45	6,98
2015	22,02	11,69	24,15	36,11	3,10
2016	20,58	11,61	25,87	43,97	10,22
2017	26,18	10,73	35,86	41,47	15,81
2018	28,60	10,84	38,29	48,35	15,45
2019	26,32	26,66	39,78	39,73	17,29

Source: own study based on data from the Central Statistical Office [34], calculated at the exchange rate of EUR by NBP as of the 10.03.2021

Table 3

Average transaction prices of undeveloped property outside city limits in Poland in the years 2009-2020 per 1 m²

Year	residential land	industrial land	commercial land	other building land	agricultural land
2009	8,40	2,78	no data	4,62	0,67
2010	8,85	3,43	no data	4,95	0,70
2011	6,93	4,72	no data	5,89	0,74
2012	8,67	7,09	no data	6,21	0,68
2013	6,30	4,54	7,70	4,06	0,80

2014	7,34	4,25	8,90	3,89	0,95
2015	6,28	2,16	6,78	3,88	1,15
2016	7,81	5,33	7,07	5,26	1,34
2017	10,37	10,86	19,76	5,00	1,60
2018	10,49	6,77	15,11	5,89	1,92
2019	12,92	11,92	17,65	6,05	2,00

Source: own study based on data from the Central Statistical Office [34], calculated at the exchange rate of EUR by NBP as of the 10.03.2021.

Average transaction prices of undeveloped properties per 1 m² in cities are clearly higher than outside their borders. An upward trend in unit transaction prices for industrial and service buildings was observed, along with price stabilization of the land intended for residential housing in cities. Unit prices of agricultural land maintained an upward trend throughout almost the entire period (Figures 2, 3).

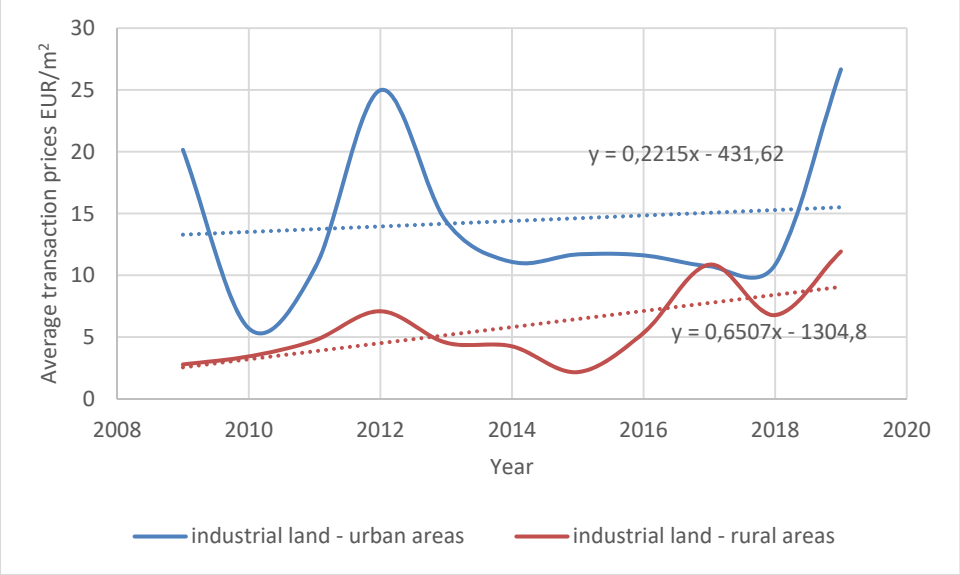


Fig. 2. Average transaction prices for 1 m² of undeveloped property intended for industrial development in Poland in 2009-2019. *Source*: own study based on the data provided by Statistics Poland.

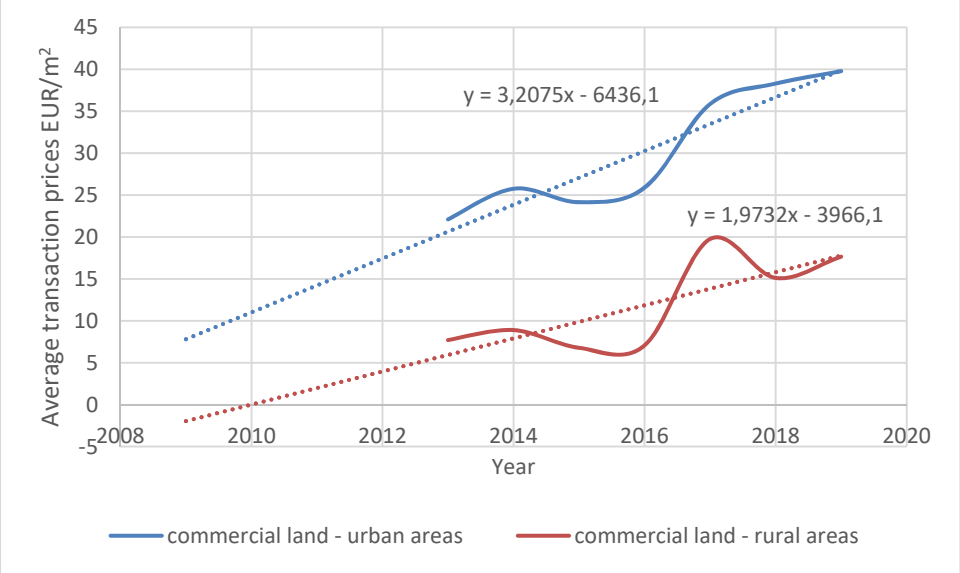


Fig. 3. Average transaction prices for 1 m² of undeveloped property intended for commercial development in Poland in 2009-2019. *Source*: own study based on the data provided by Statistics Poland.

In the last 3 years (2017-2019), the prices of investment land went up sharply, both in cities and outside their limits. After Poland's accession to the European Union, an increase in average transaction prices for 1 ha of agricultural land was also noticeable, which remained the consequence of relatively easy changing the agricultural land function into construction purposes.

An increased demand on the investment property market is observed, but also on the agricultural property market offering a great potential and the possibility of alternative land use. Ultimately, the cost of purchasing agricultural land presenting investment potential is much lower than that of a building plot and therefore more accessible for a wider group of people.

The countries where the prices of agricultural land are similar to those recorded in Poland include France and Sweden, while in Poland the price growth rate is much higher. The trend for changes in the average transaction prices of agricultural land in Poland and average transaction prices for 1 m² of undeveloped property intended for residential housing purposes in Poland in 2009-2019is presented in Table/Figure below (Figure 4).

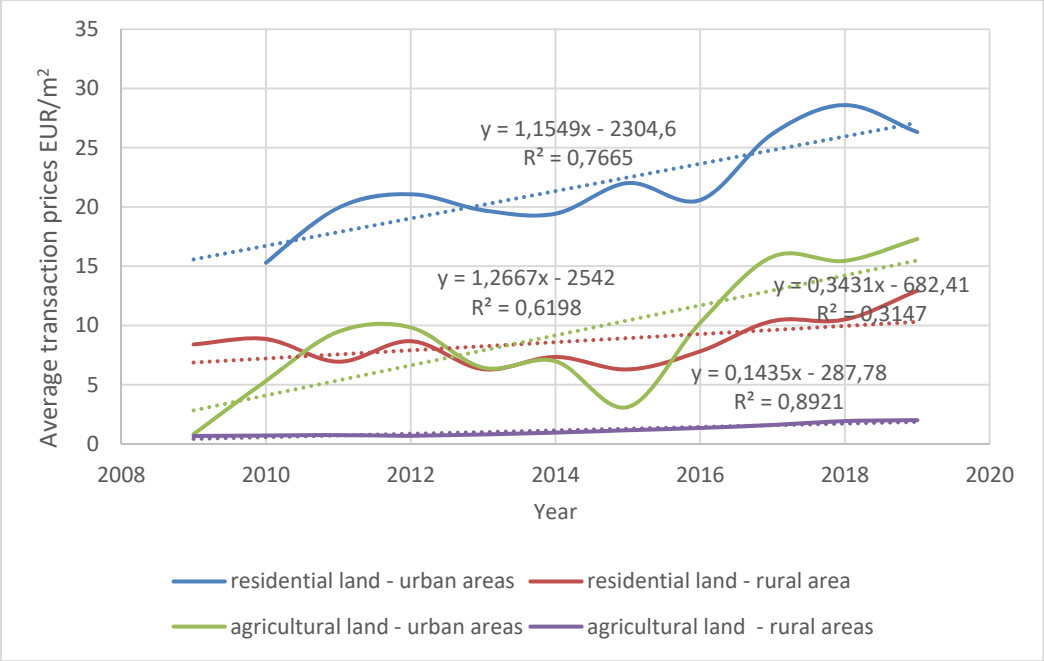


Fig. 4. Average transaction prices for 1 m² of agriculture land and undeveloped property intended for residential housing purposes in Poland in 2009-2019. *Source*: own study based on the data provided by Statistics Poland.

According to Marks-Bielska R. and Lizińska W. (2015), the main trends in the development of agricultural land markets in Europe are influenced by the situation in such countries as: the Netherlands, Ireland, Great Britain, Germany. The analysis conducted by the authors covering data showing changes in agricultural land prices in 2004-2013, in the group of selected EU-15 countries, indicates that the level of agricultural land prices in 2013, compared to 2004, oscillated from 107.1% in Spain up to 171.3% in Great Britain. In turn, Laskowska E. (2014) stated that the highest average price of agricultural land was recorded, for many years, in the Netherlands (from over EUR 30,000/ha in 2005 up to almost EUR 50,000/ha in 2012), which results from the relatively low agricultural land resources.

As pointed out by Hełdak M. et al. (2017), after Poland's accession to the European Union, there has been a noticeable increase in the average transaction price per 1 ha. Integration with the European Union contributed to higher activity on the property market in Poland. In 2018, the average price of farmland went up almost eightfold compared to 2004. The increase in prices was influenced by many factors, including the aforementioned ones, but also the limitations in agricultural land transactions.

5. Discussion

The expected increase should therefore be proportional to the increase in an average salary. The regulations restricting the sale of agricultural land did not contribute to the decline in agricultural land prices. Despite difficulties in purchasing agricultural property, neither sharp decline in the number of concluded transactions nor any paralysis in agricultural land trading were observed. Additionally, the current economic situation and further increase of inflation in Poland will contribute to the continued growth in the prices of agricultural land.

European integration and the implementation of Common Agricultural Policy instruments have led to changes in the structure of farms and prices of agricultural property (Latruffe et al., 2018; Kocur-Bera, 2016; Střeleček et al., 2010; Latruffe & Mouël, 2006). If the trend recorded in the years 2004-2019 remained at the same level in the country in the coming years, 1 m² of agricultural land would cost approx. EUR 1.70. In 2030, the price per 1 ha (m²) specified based on linear regression (LINEST function) would amount to EUR 3.9 in rural areas and EUR 30.00 in city (urban areas). The correlation coefficient in both cases is close to one, thus the data are strongly correlated with each other, i.e. dependent on each other. If, in the future, prices continued to grow rapidly from year to year, they would be appallingly high and inadequate to the level of agricultural production profitability.The analysis showed a strong and positive correlation between the average monthly income in Poland in areas outside city limits and the average unit price of land intended for residential housing, production and service development, as well as the average price of agricultural land – the higher the average monthly income, the higher the average unit prices of land (Table 4, Figure 5-8).

Table 4

Pearson's correlations between the average monthly income in Poland in cities and the areas outside city limits and the average unit price of land

Specification	Average monthly income in Poland [EUR]					
	Areas outside city limits		Cities			
	r	*p*	*r*	*p*	*Z*	*p*
Average unit price of land intended for residential housing	**0.68**	0.023	0.05	0.879	1.53	0.125
Average unit price of land intended for production development	**0.75**	0.009	0.21	0.534	1.49	0.135
Average unit price of land intended for service development	**0.78**	0.038	**0.95**	0.001	-1.04	0.296
Average price of agricultural land	**0.97**	<0.001	**0.83**	0.002	1.80	0.072

Note: r – correlation coefficient (empirical); p – significance level; Z – normal distribution, the result of the Z test. Source: own study.

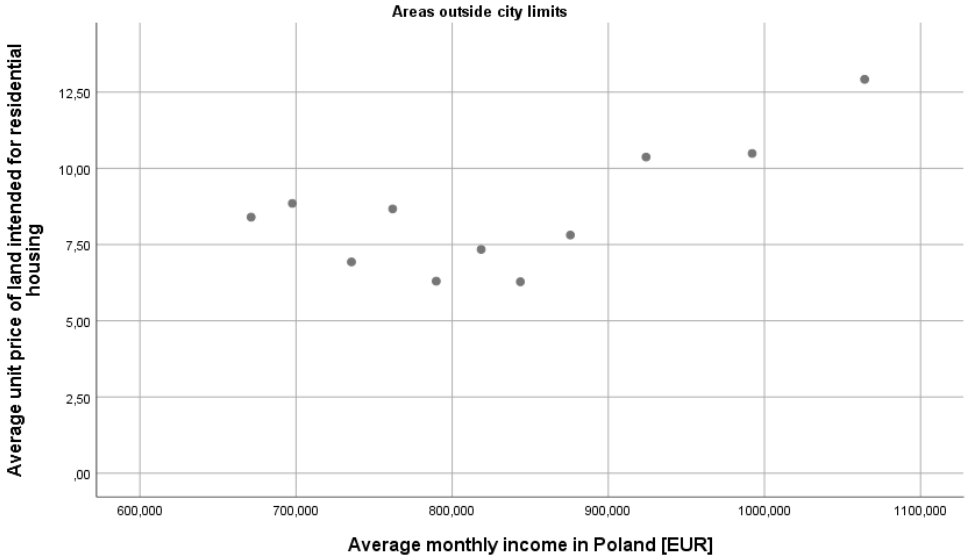


Fig. 5. Scatter plot: average unit price of land intended for residential housing in areas outside city limits vs. average monthly income in Poland in years 2009 – 2019 [EUR]. *Source*: own study.

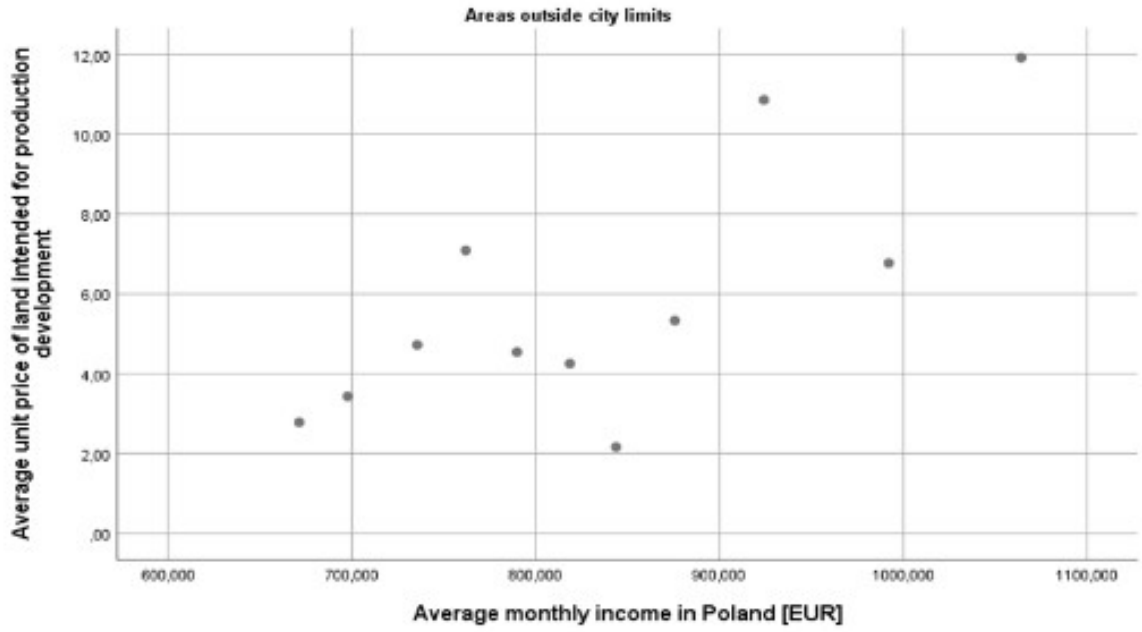


Fig. 6. Scatter plot: average unit price of land intended for production development in areas outside city limits vs. average monthly income in Poland in years 2009-2019 [EUR]. *Source*: own study.

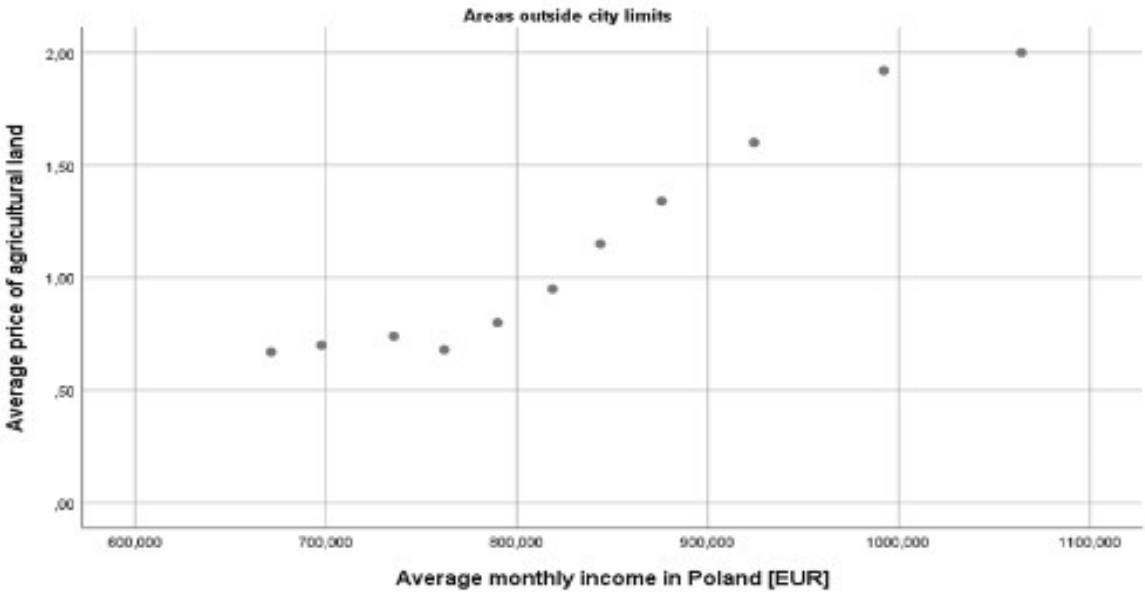


Fig. 7. Scatter plot: average price of agricultural land in areas outside city limits vs. average monthly income in Poland in years 2009-2019 [EUR]. *Source*: own study.

Regarding the areas in the city, significant correlations (positive and strong) were observed between the average monthly income and the average unit price of land intended for service development and the average price of agricultural land (Figure 8). The analysis using Fisher's Z transformation did not show any significant differences for the coefficients in cities and in the areas outside the city limits. According to Hae-Young (2017), Fisher's exact test is practically applied only in

analysis of small samples but actually it is valid for all sample sizes. While the chi-squared test relies on an approximation, Fisher's exact test is one of exact tests. Especially when more than 20% of cells have expected frequencies < 5, we need to use Fisher's exact test because applying approximation method is inadequate. Fisher's exact test assesses the null hypothesis of independence applying hypergeometric distribution of the numbers in the cells of the table.

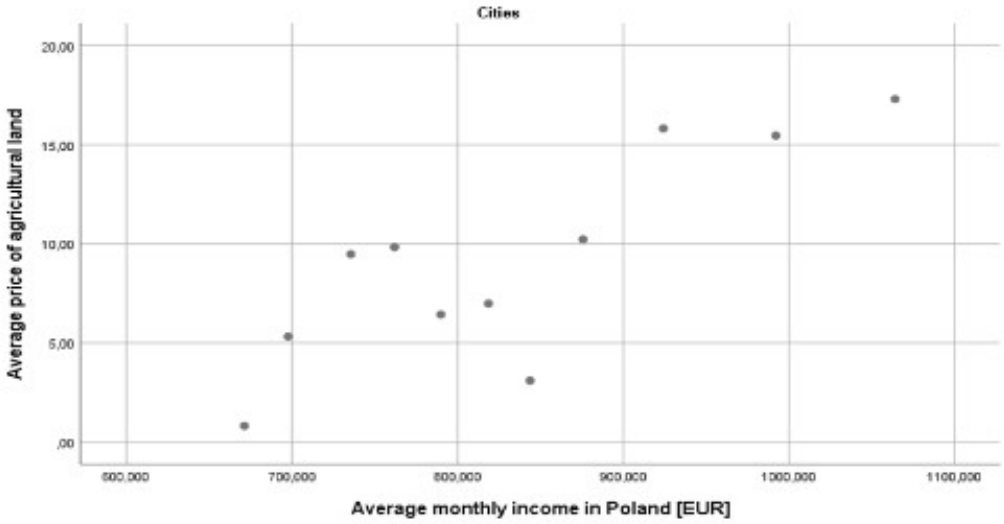


Fig. 8. Scatter plot: average price of agricultural land in city vs. average monthly income in Poland in years 2009-2019 [EUR]. *Source*: own study.

Probably the increase in prices of the discussed property will still be visible, however, the pace of this increase will not be as galloping as before, but proportional to the increase in the average gross salary. Based on linear regression, the rise in average gross salary in the years 2021-2030 was calculated, and then based on this increase the forecast prices of agricultural land and other investment land were calculated.

Regarding the correlations between the consumer price index, strong and positive correlations were recorded with the average unit price of land intended for service development both in cities and in the areas outside the city limits. In terms of the remaining prices the relationships turned out to be irrelevant. The differences between the correlation coefficients in both groups also proved to be insignificant (Table 5, Figure 9,10).

Table 5

Pearson's correlations between the consumer price index in cities and the areas outside city limits and the average unit price of land

Specification	Consumer price index at the base of the previous year = 100					
	Areas outside city limits		Cities			
	r	*p*	*r*	*p*	*Z*	*p*
Average unit price of land intended for residential housing	0.29	0.381	0.27	0.419	0.05	0.962
Average unit price of land intended for production development	0.21	0.540	0.34	0.309	-0.28	0.777
Average unit price of land intended for service development	**0.90**	0.005	**0.82**	0.023	0.46	0.649
Average price of agricultural land	-0.29	0.396	0.10	0.775	-0.78	0.435

Note: r – correlation coefficient (empirical); p – significance level; Z – normal distribution, the result of the Z test. Source: own study.

It should be noted that the figures present hypothetical changes in agricultural property prices, because it is impossible to determine precisely how the agricultural property and investment land market will be developing in the future.

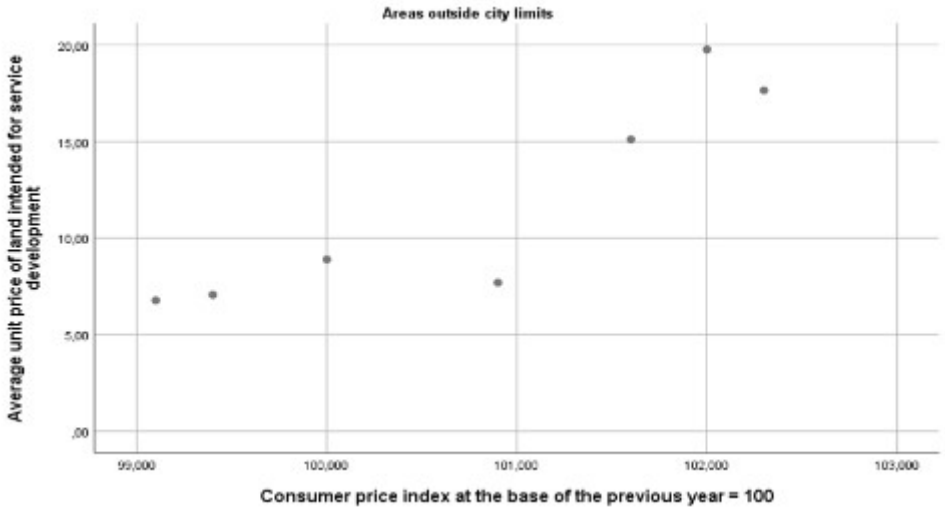


Fig. 9. Scatter plot: average unit price of land intended for service development in areas outside city limits vs. consumer price index in Poland in years 2013-2019 [EUR]. *Source*: own study.

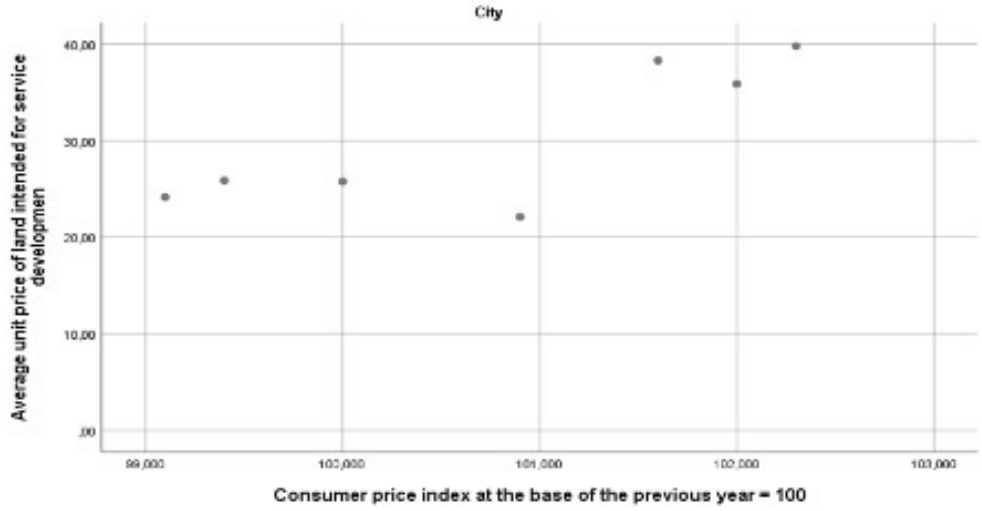


Fig. 10. Scatter plot: average unit price of land intended for service development in city vs. consumer price index in Poland in years 2013-2019 [EUR]. *Source*: own study.

5. Conclusions

Based on the conducted analysis, the following conclusions were formulated:

1. The main factors which influenced the increase in agricultural property prices in the years 2004-2019 include: limited supply of land for private trading; persisting and favourable for Polish farmers price differences between Poland and the EU Member States; the possibility for farmers to obtain relatively favourable preferential loans to purchase agricultural property from the Agricultural Property Agency with the option of spreading the payment out into instalments; into – further restrictions, priority in the acquisition of agricultural land by farmers running a family farm; the right of buyout; and the general upward trend in agricultural land prices in Europe and worldwide.
2. The increase in the average price of land intended for residential housing, production and service development as well as the increase in the average price of agricultural land is related to the increase of monthly income in the analysed years in Poland. The highest percentage increase

in transaction prices was observed for service and agricultural land located in cities and also industrial and service land outside the city limits. Probably the increase in prices of the discussed property will still be visible, however, the pace of this increase will not be as galloping as before, but proportional to the increase in the average gross salary.

3. The analysis of correlations between the consumer price index and the average unit prices of land showed strong and positive relationships only with regard to land intended for service development, both in cities and in the areas outside city limits.Unit prices of agricultural land remain lower than the prices of investment land, however, this difference, especially in cities, shows a declining trend in the subsequent years, reaching the price of EUR 17.29 per 1 m2 of agricultural land in 2019, along with the price of land intended for residential housing purposes amounting to EUR 26.20 per 1 m2. Agricultural land, predominantly in cities, is still purchased mainly for investment purposes and less frequently for speculative reasons.
4. The market for agricultural property and investment land should be monitored both in cities and outside their limits. The Authors plan to perform in-depth analysis of the trends, taking into account transaction prices of agricultural land and the land intended for residential, service and industrial development in the selected European Union countries as well as average earnings and the inflation rate. In addition, the current economic situation and the consequences of the sanitary situation caused by the COVID-19 pandemic provide grounds for conducting further research covering the changes in prices of agricultural land as well as the land for investment.

6. References

Andrea, P.; Varrotti, S. &, Gras, C. (2021). Network companies, land grabbing, and financialization in South America. *Globalizations* 2021**,** 18:3, 482-497. DOI: 10.1080/14747731.2020.1794208

Babuchowska, K. & Marks-Bielska, R. (2012). Rola i miejsce Agencji Nieruchomości Rolnych w kształtowaniu struktury agrarnej w woj. warmińsko-mazurskim (The role and place of the Agricultural Property Agency in shaping the agrarian structure in the province Warmia-Masuria Province), [w:] Przemiany w rolnictwie i na obszarach wiejskich z udziałem Agencji Nieruchomości Rolnych na przykładzie województwa warmińsko-mazurskiego, pod red. R. Kisiela i R. Marks-Bielskiej, Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego, Olsztyn 2012, s. 33-35. (in Polish)

Borras, S.M. Jr.; Hall, R.; Scoones I.; White, B. &, Wolford, W., (2011). Towards a better understanding of global land grabbing: an editorial introduction. *The Journal of Peasant Studies,* Vol. 38 , Iss. 2,2011 DOI: 10.1080/03066150.2011.559005

Borras, S.M. Jr.; Franco, J.C.; Gómez, S.; Kay, C. &, Spoor, M. (2012). Land grabbing in Latin America and the Caribbean. *The Journal of Peasant Studies,* 2012, 39, no. 3–4: 845–872. doi: 10.1080/03066150.2012.679931

Brawner, J. A. (2021). Landed value grabbing in the *terroir* of post-socialist specialty wine. *Globalizations*, 2021, 18:3, 390-408, DOI: 10.1080/14747731.2020.1738101

Case, K. E. & Shiller, R. J. (1989). The efficiency of the market for single-family homes, *The American Economic Review*, No 79 (1), 1989, s. 125–137;

Case, K. E. & Shiller, R. J. (1990). Forecasting prices and excess returns in the housing market, *Real Estate Economics*, No 18(3), 1990, s. 253–273.

Central Statistical Office of Poland (GUS), Warszawa, 2020. Available online at: http://www.gus.pl/

Chilombo, A. (2021). Questioning the narrative of land marginality in large-scale land acquisition deals: case study of Nansanga Farm Block in Zambia, *Journal of Land Use Science*, 2021, 16:2, 188-204, DOI: 10.1080/1747423X.2021.1882599

Czyżewski, A. (2003). Interwencjonizm w polityce krajów wysokorozwiniętych (Interventionism in the politics of highly developed countries), w: Makroekonomiczne problemy agrobiznesu w Polsce w okresie przedakcesyjnym, A. Czyżewski (red.), Wydawnictwo Akademii Ekonomicznej w Poznaniu, 2003, Poznań, Poland. (in Polish)

Deluga, W. (2013). Rozwój rynku nieruchomości rolnych w Polsce (Development of the agricultural real estate market in Poland), [w:] Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, Tom: 15 Zeszyt: 5, 2013, s. 55. (in Polish)

European Statistical Office, Retrieved from. 2021. Retrieved from: www.ec.europa.eu/eurostat.

Hae-Young, K. (2017). Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. Restor Dent Endod. 2017 May;42(2):152-155. English. doi: 10.5395/rde.2017.42.2.152

Hełdak, M. (2017a). Changes in transaction prices of real estate and agricultural land in Poland in years 2004-2015. International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM; ISSN 1314-2704; 2017; Vol. 17, Issue 53, s. 95-102. DOI: 10.5593/sgem2017/53/S21.010; 201742.

Hełdak, M.; Stacherzak, A. &, Kucher, A. (2017). Analysis of the changes in transaction prices of agricultural land in Poland, Hradec Economic Days 2017, vol. 7, 2017, p. 287-295; Available online at: https://uni.uhk.cz/hed/site/assets/files/1046/proceedings_2017_1.pdf

Hełdak, M. (2017). Analysis of changes in transaction prices of undeveloped land in Poland, *Baltic Surveying*, 2017, No.2 pp.14-20

Kupczak, Sz. (2020). Rynek nieruchomości rolnych na obszarze wybranego powiatu. Praca inżynierska [Agricultural real estate market in the area of the selected poviat. Engineering work], maszynopis, Uniwersytet Przyrodniczy we Wrocławiu, Wrocław, 2020. (in Polish)

Kocur-Bera, K. (2016). Determinants of agricultural land price in Poland—A case study covering a part of the Euroregion Baltic. Cah. Agric. 2016, 25, 25004., https://doi.org/10.1051/cagri/2016013

Kovalova, O., Yarova, I., Mishenina, H., Pizniak, T., & Dutchenko, O. (2021). Evolution of improving the normative monetary evaluation of agricultural lands. Agricultural and Resource Economics, 7(1), 137-163. https://doi.org/10.51599/are.2021.07.01.08

Laskowska, E. (2014). Rynek gruntów rolnych w Polsce na tle rynku europejskiego [The Market of Agricultural Land in Poland in the European Market]. Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Światowego, 2014, vol.14(29), nr 3, s. 140-149. (in Polish)

Latruffe, L.; Le Mouël, C. (2006). How and to what extent support to agriculture affect farmland markets and prices: a literature review. Report for the OECD, Directorate for Food, Agriculture and Fisheries, 27 March 2006.

Latruffe, L.; Doucha, T.; Le Mouël, C.; Medonos, T.; Voltr, V. (2018). Capitalisation of the government support in agricultural land prices in the Czech Republic. *Agric. Econ. Czech. 2008,* 54 (10): 451– 460.

Manahan, M.A. (2011). Is Asia for sale? Trends, issues, and strategies against land grabbing. Kasarinlan: *Philippine Journal of Third World Studies* 2011, 26, no. 1–2: 466–81.

Marks-Bielska, R. (2010). Rynek ziemi rolniczej - uwarunkowania i tendencje rozwoju (Agricultural land market - conditions and development trends). Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie, Olsztyn, 2010. (in Polish)

Marks-Bielska, R. & Bieniek, A (2018). Ekonomiczne i środowiskowe aspekty obrotu ziemią rolniczą w Polsce (Economic and environmental aspects of agricultural land trading in Poland). *Studia Obszarów Wiejskich*, 2018, 50, s. 227-242. DOI:10.7163/SOW.50.14. (in Polish)

Marks-Bielska, R.; Lizińska, W. (2015). Kształtowanie się cen ziemi w Polsce z uwzględnieniem okresu przejściowego nabywania nieruchomości rolnych przez cudzoziemców (Shaping oh Land Prices in Poland with Regard to the Transitional Period of Agricultural Land Purchasing by Foreigners). Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich, 2015 102(3). Available online at: http://sj.wne.sggw.pl/article-RNR_2015_n3_s42/ (in Polish)

Moran, JL.; Solomon, PJ. (2007). Statistics in review Part I: graphics, data summary and linear models. Crit Care Resusc. 2007 Mar;9(1):81-90. PMID: 17352672.

Muellbauer, J. & Murphy, A. (1997). Booms and busts in the UK housing market, *The Economic Journal*, Vol. 107, 1997, s. 1701-1727.

Official Journal of the Republic of Poland "Monitor Polski" by the President of the Statistics Poland. The average salary in Poland. Available online at: https://www.zus.pl/baza-wiedzy/skladki-wskazniki-odsetki/wskazniki/przecietne-wynagrodzenie-w-latach

Official Journal of the Republic of Poland "Monitor Polski" by the President of the Statistics Poland. The average annual consumer price index in Poland. Available online at: https://www.infor.pl/wskazniki/glowny-urzad-statystyczny/183,Sredniroczny-wskaznik-cen-towarow-i-uslug-konsumpcyjnych-ogolem-w-2019-r-w-stosunku-do-2018-r.html

Reports from the activities of Agricultural Property Agency on the State Treasury Agricultural Property in 2003—2016 r. 2017, Public Information Bulletin.

Schoenberger, L.; Hall, D. &, Vandergeest P. (2017). What happened when the land grab came to Southeast Asia?, *The Journal of Peasant Studies,* 2017, Vol. 44, Iss. 4, 2017. doi: 10.1080/03066150.2017.1331433

Schoneveld, G.C. (2017). Host country governance and the African land rush: 7 reasons why large-scale farmland investments fail to contribute to sustainable development. *Geoforum*, 2017, 83, 119–132. https://doi.org/10.1016/j.geoforum.2016.12.007

Sikorska, A. (red.). (2018). Rynek ziemi rolniczej. Stan i perspektywy [Agricultural land market. Status and prospects]. Analizy rynkowe. nr 21. Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej, Państwowy Instytut Badawczy, Warszawa, 2018. https://www.ierigz.waw.pl/publikacje/analizy-rynkowe/rynek-ziemi-rolniczej/22953,2,3,0,nr-21-2018-rynek-ziemi-rolniczej.html (in Polish)

Sobiecki, R. (2015). Interwencjonizm w rolnictwie: dlaczego jest konieczny? (Interventionism in agriculture: why it is necessary ?) Kwartalnik Nauk o Przedsiębiorstwie, 2015/2. (in Polish)

Stacherzak, A.; Hełdak, M.; Hájek, L. &, Przybyła, K. (2019). State Interventionism in Agricultural Land Turnover in Poland. *Sustainability* 2019, 11(6) 1534, https://doi.org/10.3390/su11061534

Střeleček, F.; Lososová, J.; Zdeněk, R. (2010). The relations between the rent and price of agricultural land in the EU countries. *Agric. Econ. Czech. 2010,* 56 (12): 558– 568. Available online at: https://www.agriculturejournals.cz/publicFiles/130_2010-AGRICECON.pdf

The Act of 14 April 2016 on sale suspension of the State Treasury Agricultural Property and amending some laws (Journal of Law of 2016, item 585).

The Act of 11 April 2003 on the formation of agricultural system (Journal of Laws of 2020, item 1655).

The Act of 24 March 1920 on the purchase of real property by foreigners (Journal of Laws of 2017, item 2278).

Visser, O. & Spoor, M. Land grabbing in post-Soviet Eurasia: The world's largest agricultural land reserves at stake. *Journal of Peasant Studies* 2011, 38, no. 2: 299–323. doi: 10.1080/03066150.2011.559010

Ostapchuk, T., Orlova, K., Biriuchenko, S., Dankevych, A., & Marchuk, G. (2021). Defuzzification in the process of managerial estimating the value of agricultural lands. Agricultural and Resource Economics, 7(4), 62-81. https://doi.org/10.51599/are.2021.07.04.04

Onegina, V., & Vitkovskyi, Y. (2020). Investments and land reform in agriculture of Ukraine. Agricultural and Resource Economics, 6(4), 187-210. https://doi.org/10.51599/are.2020.06.04.10

Von Braun, J. & Meinzen-Dick, R. (2009). Land Grabbing' by foreign investors in developing countries: risks and opportunities. Washington, DC: IFPRI. IFPRI Policy Brief, 2009.

Zadura, A. (2008). Aktualne problemy rynku ziemi rolniczej w państwach europejskich [Current problems of the agricultural land market in European countries]. W A. Sikorska, T. Ciodyk, T. Zagórski, A. Zadura i B. Buks, Rynek ziemi rolniczej. Stan i perspektywy nr 11 (s. 42-48). Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej, Państwowy Instytut Badawczy, Warszawa, 2008. (In Polish)