



Article

The Factors Affecting Farmland Rental Prices in Slovakia

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Abstract: Agricultural land is a limited natural resource with increasing economic value. This study analyses land rental relationships in Slovakia, including legal rental regulations, and identifies the impact of certain factors, such as the European Union Common Agricultural Policy (CAP) payments, and geographical and economic factors on land rental prices. From the results of econometric models, it was found that certain CAP payments have an effect on rental prices, mainly the single area payment scheme (SAPS), payments for agri-environmental-climate schemes (AECS), and animal welfare, which were found to have positive effects. Other important factors found to influence rental prices are economic indicators (such as total revenue share of total costs, share of revenue from agricultural production in terms of total revenue, share of production costs as a percentage of total costs, wages, and number of employees) and geographical factors (such as region or partial production areas). However, the distance of the farm from the district city (LAU 1) and the share of farmland affected by natural constraints do not considerably affect rental prices in Slovakia. Land consolidation is a statistically significant factor according to the models; however, its impact is almost zero. Knowledge of these factors constitutes important know-how, not only for policy makers but also for the actors operating in the land rental market (e.g., landlords, tenants, experts on land valuation, and real estate agents).

Keywords: land rental prices; land ownership; agricultural holdings; European Union Common Agricultural Policy; factors affecting the land rental prices; Slovakia

1. Introduction

Agricultural land is a limited natural resource and, as a result of its decline, is becoming an increasingly valuable economic asset. It follows that the agricultural land market is still a focus of many researchers [1–7], as well as national and supranational (EU) politicians, (e.g., [8] or the law-making process on land consolidation, including rental relationships in Slovakia). The agricultural land market is subject to significant policy interventions, related to ownership or tenure regulations, subsidy policies, and environmental regulations [9,10]. Most of the papers are related to the impact of policy interventions on the agricultural land market. Floyd examined the impact of the U.S. farm subsidy policy on the price of land and concluded that the distribution of income under the influence of the subsidy policy primarily depends on the elasticity of the supply of input and the elasticity of substitution between inputs [1]. Of key importance regarding the impact of policy is also the elasticity of output supply with respect to land used and the derived demand in terms of the elasticity of land with respect to output [11]. Moreover, in well-functioning land markets Common Agricultural Policy (CAP) payments are typically incorporated in land values or land rental prices and thereby

mainly benefit landowners [12–14]. However, land market imperfections did not affect these results. In Slovakia, the introduction of CAP payments had a significant impact on increasing rental prices [15]. The new CAP 2014–2020 resulted in less interest on the part of researchers, than the capitalization of decoupled payments in 2003. The CAP reform of 2013 not only changed the CAP budget but also the implementation of the single farm payment. Relatively small changes in the CAP may have a significant impact on the land market [16]. Further research confirmed that the CAP reform of 2013 has led to an increase in the capitalization of payments compared to the situation before the reform in EU-15 [7]. On the contrary, the reduction of the subsidy led to a fall in the price of the land [17]. The positive impact of agricultural policy on the increase of the price of land and land rental prices confirmed the result of much research [5,17–23]. In spite of this fact, in less productive new member states, the adoption of a flat rate did not affect the land rental income of landowners [24]. The research conducted in the Nitra Self-Governing Region showed that among the main factors affecting land markets can be included unsettled ownership relations, land fragmentation, and the presence of foreign agricultural holdings [25]. For example, a large fragmentation of land ownership negatively affects the land market and restricts the sale of agricultural land, which in turn increases land rent [26]. It leads to the creation of large production blocks and consequently to the homogenization of land use, with a negative impact on sustainable land use and biodiversity [27,28]. Moreover, the minimum size of land stipulated by law has led to increased co-ownership of land [29]. Therefore, land law is the second most important aspect to be considered in order to understand the functioning of the land market, including land rent [30]. There are five types of regulations concerning the land rental market, namely, price regulation, rent duration, quantitative regulations, (e.g., limitation of the amount of rented land, approval of a contract by a public authority), transaction costs, (e.g., form of the contract, its registration, costs and time associated with the enforcement of contractual rights, costs related to market imperfections), and other relevant regulations (e.g., legal succession in rent, pre-emptive rights of the tenant) [30,31]. When applying maximum rental prices, the full capitalization of subsidies is not possible [32]. Transaction costs in land markets prevent efficiency with regard to enhancing land exchanges [33], and reducing transaction costs in land rental markets could help realize significant additional productivity gains [34]. Traditional transaction costs are associated with notarial and registration fees, and real transaction costs are caused by imperfections in the credit market; transaction costs are caused by the restitution process due to the unfinished privatization of ownership rights, undetected owners' problems, co-ownership, lack of demarcation of land, and high costs associated with the removal of land [15,35].

There are also other factors with an impact on land prices and land rental prices, such as the technical infrastructure, distance from the city, land productivity, agricultural commodity prices, high inflation and economic uncertainty, size of farms, interest rates and taxes [36], road density, accessibility of water resources, and the use of contracts for deed financing [37]. A positive correlation was shown between land prices and the net income of farms, wheat yields, total population, and credit availability, while property tax, interest rates, and the debt-to-equity ratio showed a negative correlation to land price [38]. The growth in soil productivity and population density has led to an increase in land prices but the smaller the area of the parcels, the more rural the character of the region, and an increased distance from the city has resulted in a decline in land prices [39]. The land price is also affected by soil quality, structural changes and opportunities for non-agricultural activities [40] or the existence of a nuclear installation [41]. An examination of the dependence of land size on land price indicated that agricultural parcels of up to one ha were sold at a price which was 7.5 times higher than land with an area of more than five ha, mainly because they are used for construction purposes [42]. In Slovakia, there is some research focusing on the various factors affecting the price of land. The most significant impact on land prices correlated with the size of the land and population density, out of all the spatial and geographical factors that were investigated [6]. Other significant factors affecting the price of land included the extreme fragmentation of land ownership, unfinished land consolidation, and restitution processes, as well as problems related to undetected landowners, tax burdens, and the instability of

legislation [43]. The entry of foreign investors into the Slovak land market has had a huge influence on both the price of the land and land rental prices [44].

The aforementioned studies focus on the factors relating to land prices. However, there is a lack of research in Slovakia into the dependence of land rental prices on other factors, despite the fact that some factors have a greater impact on land rent than land transfer [17,45]. Moreover, in Slovakia, renting areas of farmland is very important, because approximately 90% of farmland is currently being rented [46]. Therefore, it is necessary to identify the factors, primarily the political factors and their impact on land rental prices, in Slovakia. The main objective of this paper is to identify the impact of the most important and current (mainly political and economic) factors affecting land rental prices in Slovakia. Knowledge of these factors is important, not only for policy makers but also for land rental market actors (e.g., landlords, tenants, experts on land valuation, and real estate agents).

2. Methodology and Materials

2.1. Case Study Description

Slovakia occupies a total area of 4,903,407 ha, of which agricultural land represents 48.52% [47]. The share of agricultural land of the total area of the regions (NUTS III) of Slovakia ranges from 40% to 50% in most regions. However, in the Trnava and Nitra regions, as in the most famous agricultural regions, agricultural land makes up approximately 70% of these areas. On the contrary, in the Žilina region, similar to other regions with the poorest agricultural conditions, agricultural land accounts for just 35% of this area (Figure 1).

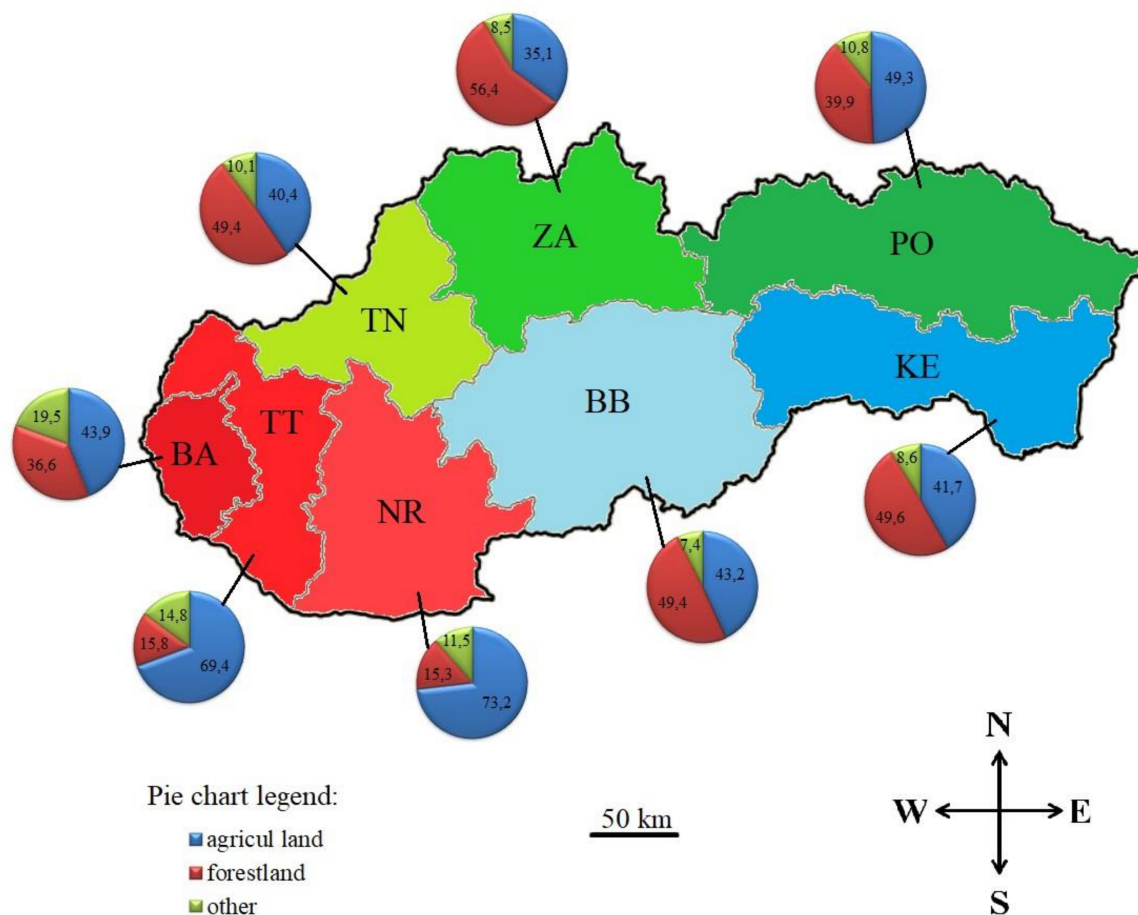


Figure 1. Share of agricultural land on the total area of a particular region (NUTS III) in 2019 (%). Source: own calculations on the basis of data from Statistical Yearbook on Land Fund in the Slovak

Republic, 2019. (Explanation of remarks: NUTS III regions of Slovakia are the Bratislava region (BA), the Trnava region (TT), the Trenčín region (TN), the Nitra region (NR), the Žilina region (ZA), the Banská Bystrica region (BB), the Prešov region (PO) and the Košice region (KE). Moreover, in further analysis we sorted the NUTS III regions into three groups by the soil–climatic conditions; the first group consists of regions marked by red color and called South-western regions of Slovakia; the second group consists of regions marked by blue color and called Southern regions of Slovakia; and the third group consists of regions marked by green color and called Northern regions of Slovakia).

Agricultural land includes arable land, permanent grasslands, permanent cultures (vineyards, hops, and fruit groves), and gardens. Arable land and permanent grasslands occupy the largest share of agricultural land in Slovakia (approximately 95%). The remaining 5% are permanent crops (orchards, hop gardens, vineyards) and gardens. There are no significant differences among the regions (NUTS III) in terms of the structure of agricultural land. The share of arable land and permanent grasslands amongst the total agricultural land of the regions ranges from 89% in the Bratislava region to 97% in the Žilina region. In Slovakia, agricultural land occupies 2,379,101 ha and is unevenly distributed across the country. Most of the agricultural land is situated in South-western regions of Slovakia (35.41% of all agricultural land in Slovakia). The share of agricultural land in each region (NUTS III) of Slovakia is documented in Figure 2.

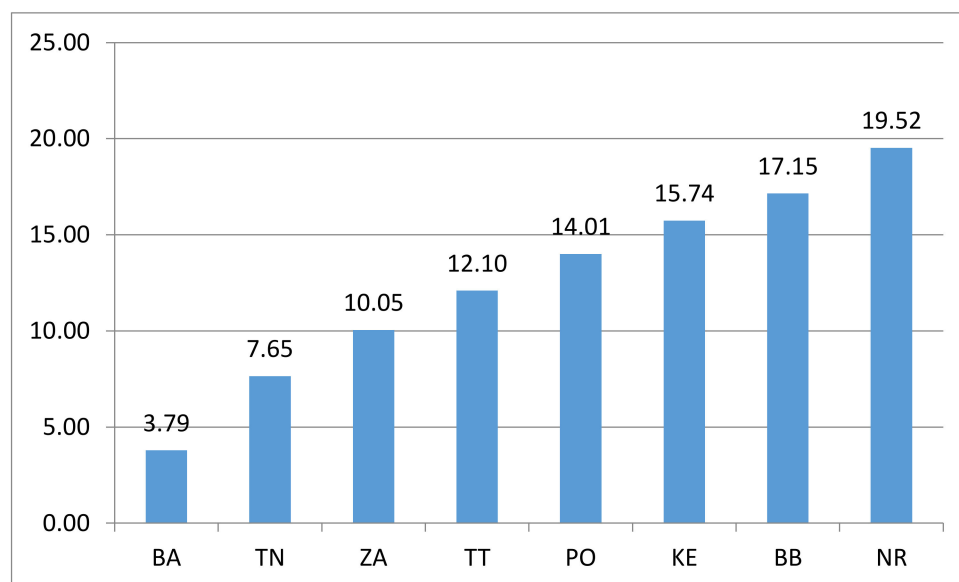


Figure 2. Share of agricultural land of particular regions (NUTS III) in total agricultural land in the SR in 2019 (%). Source: own calculations on the basis of data from Statistical Yearbook on Land Fund in the SR, 2019. (Explanation of remarks: the Bratislava region (BA), the Trnava region (TT), the Trenčín region (TN), the Nitra region (NR), the Žilina region (ZA), the Banská Bystrica region (BB), the Prešov region (PO) and the Košice region (KE)).

Most of the agricultural land is privately owned. Slovakian nationals, as well as legal entities, including foreigners, are able to own agricultural land without any quantitative restrictions. The state (the Slovak Republic) owns 153,221 ha of arable land and permanent grasslands (6.78% of the total acreage of arable land and permanent grasslands in Slovakia). Private owners, including self-governments, own 77.51% of arable land and permanent grasslands in Slovakia; of this percentage, Slovakian nationals own approximately 62%, companies around 18%, self-government approximately 16%, and the Church around 4% (statistical data are missing; the structure of private ownership has been estimated based on calculations of data from the Statistical Yearbook of the Slovak Land Fund, 2018, and summary data from documentation of the Ministry of Agriculture and Rural Development of the Slovak Republic). Ownership of the remaining percentage (15.71%) of arable land and permanent

grasslands is not documented. It is land of unknown owners. This land cannot be subject to a land transaction, e.g., a sale or donation, because the owner is unknown. This land, together with the state land, is administrated by the Slovak Land Fund as a legal entity, established by law. As this land cannot be sold, it is usually rented; consequently, land rent is very important in Slovakia. The land of unknown owners causes difficulties in the land market and this land is unevenly distributed across the country. Figure 3 documents the share of land of unknown owners amongst the total area of agricultural land (NUTS III).

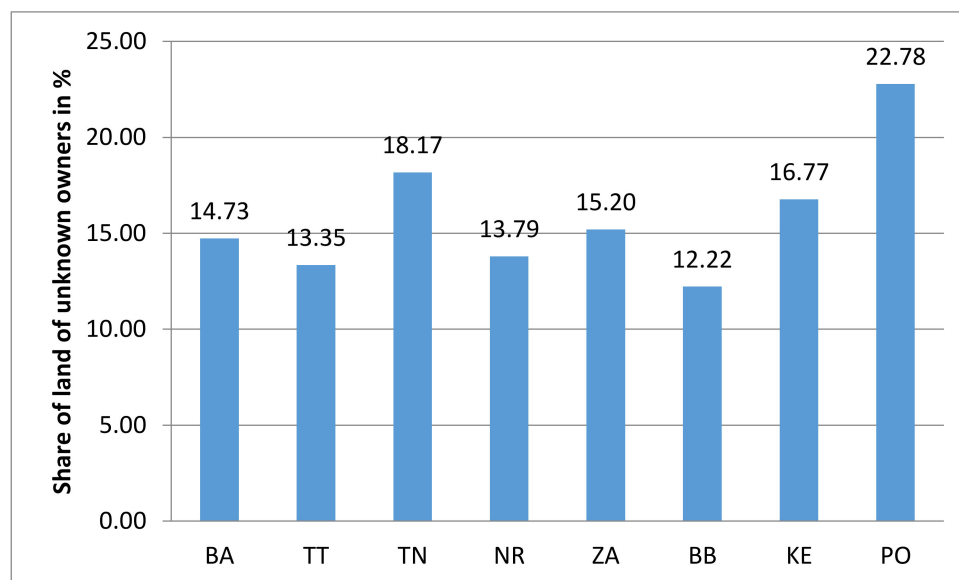


Figure 3. Share of land of unknown owners in the total area of agricultural land in the Slovak regions in 2018. Source: own calculation on the basis of data from Slovak Land Fund, 2018. (Explanation of remarks: the Bratislava region (BA), the Trnava region (TT), the Trenčín region (TN), the Nitra region (NR), the Žilina region (ZA), the Banská Bystrica region (BB), the Prešov region (PO) and the Košice region (KE)).

Another reason for the high share of land rent in Slovakia is due to large-scale land fragmentation and fragmentation of land ownership. This means that there is technical fragmentation, characterized by a large number of land plots with a small acreage, legal fragmentation characterized by a large number of co-owners of a small area of land, and operational-economic fragmentation, characterized by a high dispersion of land plots having the same owner in the area of a municipality, and an inappropriate land shape for efficient management and accessibility of the land.

According to the explanatory memorandum to Act No. 504/2003 Coll. on land rent, Slovakia has 12.5 million land plots with an average size of 0.45 ha, with an average number of 12 to 15 co-owners per area of land. These facts indicate that even the owner's will to incur high transaction costs for set-aside does not allow the owner to access his own land; instead replacement land for use under a sub-rental contract is acquired, thereby increasing the share of rented land. This fact is exacerbated by the aforementioned problem of unknown owners. In addition, for a rental contract to be signed, it is sufficient to obtain the consent of the owners who have more than a 50% share in the co-owned land, whereas a purchase contract requires the consent of all co-owners of the plot of land. Therefore, the vast majority of agricultural land in all regions is subject to rental agreements. Based on data sheets of the Ministry of Agriculture and Rural Development of the Slovak Republic for the years 2012–2016, approximately 79% of agricultural land in Slovakia was subject to rental agreements. Figure 4 shows the share of rented land amongst the total area of land.

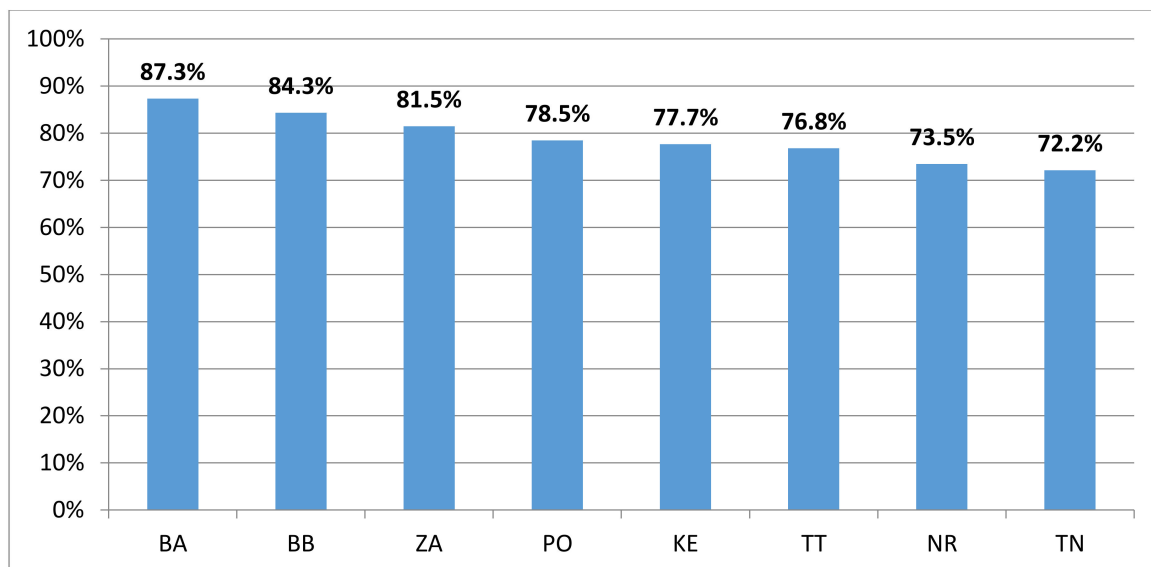


Figure 4. Share of rental land in the total area of land in the Slovak regions (NUTS III) in 2018. Source: own calculation on the basis of data from Slovak Land Fund, 2018. (Explanation of remarks: the Bratislava region (BA), the Trnava region (TT), the Trenčín region (TN), the Nitra region (NR), the Žilina region (ZA), the Banská Bystrica region (BB), the Prešov region (PO) and the Košice region (KE)).

The highest share of rented land as a percentage of the total farming area was recorded in the Bratislava, BanskáBystrica, and Žilina regions (over 80%). On the contrary, the lowest share was recorded in the Trenčín and Nitra regions (72–74%). Figure 4 shows that there are no significant differences in the share of rented land among the regions (the difference between the Trenčín region and the Bratislava region is 15 percentage points (p. p.). Until the implementation of land consolidation in the individual cadastral territories of Slovakia, it was not feasible to expect that the share of land used by the owners would increase significantly; therefore, the rental legislation would continue to play an important role in regulating the agricultural land market.

2.2. Farmland Rental Regulation in Slovakia

The rental regulations governing farmland have also had an impact on farmland rental prices. An Act relating to land rent regulated the minimum rental prices; contracting parties were free to stipulate rental prices, however, regulations declared that rental prices should be at least 1% of the land value stipulated by the government decree (Decree of the Ministry of Agriculture and Rural Development no. 38/2005 Coll.) which regulated the land value for the purposes of land consolidation. In this document, land value is still evaluated in Slovak crowns and land value ranges from 20,000 Slovak crowns (664 EUR) to 120,000 Slovak crowns (3,983 EUR) per one ha of land. The minimum rental prices range from 6.64 EUR per one ha of land to 40 EUR per one ha of land per year according to the soil quality. As stated in the Green report of the Ministry of Agriculture and Rural Development of the Slovak Republic [48] the average rental price was 50.26 EUR per one ha of land per year in 12 observed districts (LAU 1), and ranged from 22.45 EUR per one ha per year in Northern regions of Slovakia to 125 EUR per one ha of land per year in Southern regions of Slovakia.

Agricultural land is mainly cultivated by agricultural holdings, such as agricultural cooperatives and business companies; individual farmers cultivate the smallest share of agricultural land. These individual farmers are often interested in renting more plots of land; however, there is a shortage of land on the market. Most of the agricultural land is rented to agricultural holdings for a period of years and they are not interested in giving up their land for the benefit of potential competitors. Individual farmers are willing to pay higher rental prices to receive one more hectare of agricultural land. Therefore, there are usually significant differences in the rental prices among certain

agricultural businessmen [49]. Higher shares of rented land coincide with lower rental prices [50]. Moreover, according to the legal regulation governing land rent, the original tenant has a prior right to conclude the new rental contract after the expiration of the old one. The conditions of the tenant's prior right to conclude a new rental contract are governed by § 13 para. 2 of the Act 504/2003 Coll. as follows: if the tenant duly fulfils his obligations under the contract within the specified time, he has the prior right to conclude a new rental contract on the land that the tenant has used up to now, at common rental prices. At the same time, the Act lists exhaustive situations when the tenant does not have a prior right, even if he has fulfilled his duties properly and on time, if: (1) the landlord's business is in agriculture; (2) the tenant has a close relationship with the landlord; (3) the tenant is a legal person of which the landlord is a member or partner; (4) it is a land which, according to Act no. 220/2004 Coll. on the protection of agricultural land, is intended for non-agricultural purposes; or (5) ownership of the land has been transferred. It follows that the law gives the tenant the right to request the establishment of a new rent with the landlord for the land he has previously used, in the case of persistent interest on the part of the tenant to rent the land and in the event of the proper and timely performance of the tenant's obligations. The tenant can request to sign the new contract at the earliest after one year and at the latest, two months before the expiration of the old contract. The last condition is that the landlord may intend to rent the land to another party. This corresponds to the landlord's obligation to conclude a rental agreement with the previous tenant, if the tenant so requests. In addition, the Act guarantees the prior right for rental prices at the common rate. Rental prices at the common rate are defined by § 1 par. 3 of the Act on land rent. It is the amount of rent per one ha of agricultural land, which is published annually by 30th June for the previous year by the relevant district office for each cadastral territory and actually represents the rental price determined by the district authority as the average rental price for the rent of agricultural land in that cadastral territory. The common rental prices stipulated by certain district offices in the regions of Slovakia are documented in Figure 5.

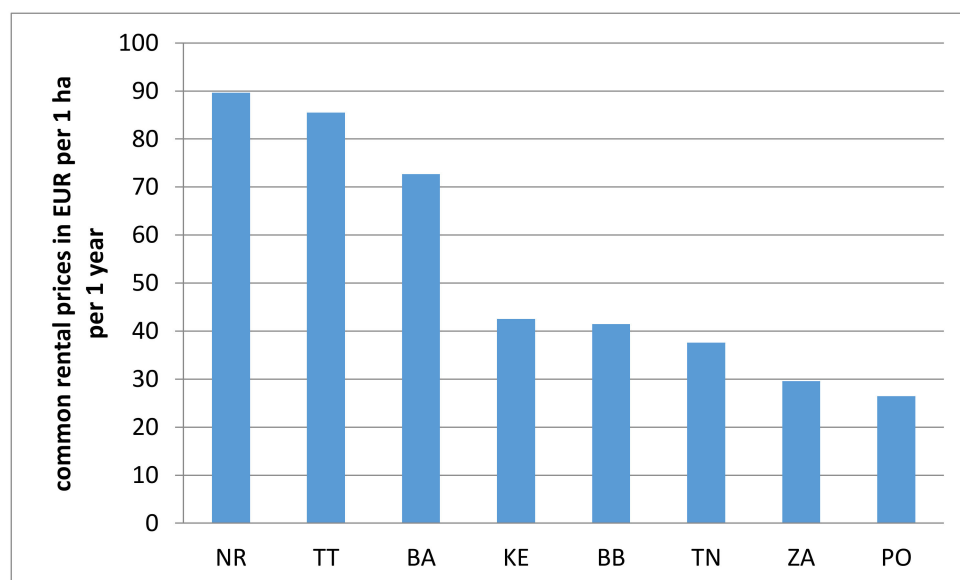


Figure 5. Common average rental prices stipulated by the particular district offices in the regions of Slovakia in 2018. Source: own calculation on the basis of data from Slovak Land Fund, 2018. (Explanation of remarks: the Bratislava region (BA), the Trnava region (TT), the Trenčín region (TN), the Nitra region (NR), the Žilina region (ZA), the BanskáBystrica region (BB), the Prešov region (PO) and the Košice region (KE)).

Should there be a third party willing to offer a higher rental price for the agricultural land, the landowner cannot accept the proposal if the original tenant applies his prior right at the common

rate. The landlord is therefore not in a position to rent the land to a third party who would be willing to pay higher rental prices, which ultimately affects average rental prices and the common annual rental prices, which only adapt very slowly to market conditions. Thus, the law maker has a significant impact on the free creation of market rental prices and the actual development of the rental market of agricultural land. Moreover, the introduction of the prior right has restricted the owner's right to dispose of the land, since he cannot freely decide how to dispose of the land or to whom to entrust the right to use the land, after the end of the rental agreement.

2.3. Database Preparation

This study used the data collected by the Ministry of Agriculture and Rural Development of the Slovak Republic concerning agricultural holdings in 2015 and 2016. The database used is the same as that used for the Farm Accountancy Data Network (FADN). The Ministry of Agriculture and Rural Development of the Slovak Republic is responsible for data collection from agricultural holdings. It collects the data from the 1500–1600 agricultural holdings per year throughout the country, which cover approximately 70% of all arable land in Slovakia (in Slovakia there are usually only mixed farms with both plant and animal production). From this database we only received data on 913 agricultural holdings, due to data protection. However, only 450 of them, representing approximately 21% of arable land in Slovakia, were sufficiently complete to be used in econometric models. The rest of the data had to be excluded for various reasons, described below in Section 2.5.

2.4. Statistical Analysis

The statistical tools used for the data evaluation were the descriptive statistics (mean and standard deviation presented in Table 1) and econometric modeling. The econometric modeling consists of the multiple linear regression model expressed as:

$$Y = \alpha + \beta x + \varepsilon \quad (1)$$

where y represents the farmland rental prices per hectare of agricultural holding as a dependent variable, α is the intercept, x is a vector of the independent variables (described below) in the model, with particular regression coefficients expressed as vector β (expressing by how many percentage points the farmland rental prices would change if a particular factor increased by one percent), and ε represents residuals distributed independently and identically. However, considering the different units of variables included in the model, we chose the log–log model, thus reducing the interval range of each explanatory variable. Moreover, logarithmic data transformation helps us to reduce the problem of heteroskedasticity and non-normality of residues. We preferred the model transformation rather than excluding more data from the models. In addition, the results of log–log models are better interpreted.

The models were created by the GRETTL program. It is an econometrics package, including a shared library, a command-line client program, and a graphical user interface. In the models, multicollinearity and residue normality were checked by the tests available in GRETTL. Multicollinearity is tested by variance inflation factors (VIF) and normality of residual is tested by Chi-square. The Breusch–Pagan test and the White test, also available in the GRETTL program, were used to check the heteroskedasticity of the models. As a result of heteroskedasticity, only 420 agricultural holdings were integrated into the first model and 444 agricultural holdings were integrated into the second model.

We chose actual and available political, geographical, and economic indicators as the independent variables of the models. The first group consisted of particular CAP payments. The aforementioned studies have described CAP subsidies as one of the important factors affecting the price of land and land rental prices [7,15,16]. However, there is no study in Slovakia that focuses on the impact of particular CAP payments (e.g., single area payment scheme (SAPS), greening, and agri-environmental-climate schemes(AECS)) on the land rental market, mainly land rental prices. It is important to know which payments are reflected in land rental prices at the time of negotiation of the new CAP policy for

the next programming period. The payments should help the farmers and should not be transferred to landowners. Of course, it is also necessary that landowners receive an adequate rent for their land, but this should be secured by other market factors and not by CAP payments, in order that this subsidy benefits the farmers.

The second group consisted of land consolidation and the share of land with natural constraints (ANC land). Land consolidation has been a topical political issue in recent years in Slovakia, due to large land fragmentation, which prevents effective land transactions and ensures that most of the land is rented. The Slovak government developed plans for the realization of land consolidation in certain land cadastres. However, some cadastres had already undergone land consolidation before 2016; therefore, we are interested in the impact on land rental prices in these areas.

Since 2015, the Slovak Republic has implemented a new designation of areas with natural and other specific constraints as follows: mountain areas, areas facing significant natural constraints, and areas affected by specific constraints. We are interested in the impact of the new regionalization on land rental prices relating to ANC areas.

The third group of independent variables is related to geographical factors. These are distance from the district city (LAU 1), region (NUTS III) and type of production area. The distance from the city included in the studies cited above [36,37,39] usually depends on the administrative regionalization of a country. A region (NUTS III) represents the administrative regionalization of Slovakia. However, we decided to group regions with similar soil–climatic conditions and, therefore, eight regions (NUTS III) were classified into three groups: South-western regions, Northern regions, and Southern regions. Moreover, we wanted to compare the dependence of land rental prices on regions with the results of dependence on production areas. Slovakia is divided into five production areas; each of them is characterized by a certain crop and their height above sea level. The maize production area is concentrated in South-western and Southern regions, up to 200 m above sea level. The sugar beet production area is linked to the maize production area in the higher regions of the Danube highlands and at the edges of the South Slovak Basin and Košice Basin, up to 300 m above sea level. The potato production area covers the lower and middle areas of the highlands of Northern regions, up to 500 m above sea level. The potato–oat production area covers the lower foothill areas and high-lying basins up to 600 m above sea level. The mountain production area of Northern regions of Slovakia is typified by a cold and humid climate with a shorter growing season and is located over 600 m above sea level. We expected that the better soil–climate conditions and better crop-growing conditions correlated with higher land rental prices.

The last group of independent variables is related to the economic conditions of farmers, such as the share of revenue amongst total costs, the share of revenue from livestock production in terms of total revenue from agricultural production, wages, number of employees, the share of production costs (material and energy) amongst total costs, and the share of revenue from agricultural production set against total revenue due to the higher predictability of the models. Their important impact on land rental prices was evident.

The descriptive statistics of the independent variables are shown in Table 1. Data are from 2016 unless otherwise stated. We have taken into account the CAP payments for 2015 to find out the impact on land rental prices in 2016, because we assumed that the CAP payments paid at the end of a particular year have a greater impact on land rental prices the next year, than the CAP payments paid at the end of the year when land rental prices were calculated.

We prepared two models. We focused on the interpretation of the parameters of the first model specification in the results, while the second model was used to compare the results and to confirm or refute the results of the first model. In the second model, we merged some independent variables. We merged SAPS and greening payments into one variable and the payment of the rural development program (ANC, AECS, ECO, and WELFARE) into one variable. Moreover, some of the independent variables (investment subsidies and number of employees) were excluded, increasing the significance

of other independent variables (mainly economic variables, and distance from the district city or certain production areas).

Table 1. Descriptive statistics of the independent variables of agricultural holdings in 2015–2016.

Variable	Description	Unit	Mean	Standard Deviation
SAPS	Single area payments 2015	EUR	89,429.000	140,159.000
Greening	Payments for sustainability and care for natural resources 2015	EUR	33,736.000	61,350.000
ANC	Area of Natural Constraints scheme payments 2015	EUR	22,002.000	45,285.000
AECS	Agri-environmental-climate schemes 2015	EUR	4678.000	20,388.000
ECO	Payments for organic agriculture 2015	EUR	6150.000	29,013.000
WELFARE	Payments for animal welfare 2015	EUR	2017.000	12,899.000
Investment subsidies	Payments for investments 2015	EUR	19,384.000	83,359.000
Distance from the district city	Distance of the agricultural holdings from the district city (LAU 1)	km	12.500	14.300
Share of ANC land	Share of Area of Natural Constraints in total land area	%	0.420	0.470
Total revenues share in total costs	Share of total revenues in total costs	%	1.100	0.200
Share of revenues from livestock production	Share of revenues from livestock production in total revenues from agricultural production	%	0.300	0.400
Share of revenues from agricultural production in total revenues	Share of revenues from agricultural (crops and animal) production in total revenues	%	0.500	0.300
Share of production costs in total costs	Share of production costs (material and energy) in total costs	%	0.450	0.230
Number of employees	Total number of employees	-	14.000	26.000
Wages	Total wages per agricultural holdings	EUR	135,056.000	274,602.000
Dummy variables:				
Production areas	Maize production area–benchmark			
	Sugar beets production area			
	Potatoes production area			
	Potato–oat production area			
	Mountain production area			
Dummy variable:				
Land consolidation	Land consolidation–unrealized in the location of an agricultural holding - benchmark			
	Land consolidation–realized in the period 1990–2016			
Dummy variable:				
Region (NUTS III)	The South-western regions of Slovakia (composed of the Bratislava region (BA), the Trnava region (TT) and the Nitra region)–benchmark			
	The Northern regions of Slovakia (the Trenčín region (TN), the Žilina region (ZA) and the Prešov region)			
	The Southern regions of Slovakia (the BanskáBystrica region (BB) and the Košice region (KE))			

2.5. Uncertainties and Shortcomings

In Slovakia, it is difficult to retrieve consistent data on the land fund and data on the agricultural land market, including land rent. State and private institutions that collect agricultural data are not linked to one other. We used the database of the Ministry of Agriculture and Rural Development of the Slovak Republic, which contains data on agricultural holdings in Slovakia, and the same data are also provided to European and international databases. However, we had to exclude many farms because of incomplete or inconsistent data, (e.g., agricultural sales were higher than the total sales or the subsidies granted were the only non-zero indicator of the farm). Based on the detected discrepancies, we had to exclude a large number of farms from further analyses. In addition, some of these as outliers were excluded during the econometric modelling. Land consolidation was finally carried out in a small area of Slovakia. At present, the Ministry of Agriculture and Rural Development of the Slovak Republic is commencing land consolidation in another 168 cadastral areas. Therefore, further research will be necessary after the realization of land consolidation in the new cadastres. We highlighted that land consolidation has a significant impact on land rental prices; however, the magnitude of its impact will need further research.

3. Results and Discussion

The results of the two estimated models are presented in Table 2. The dependent variable is the land rental price. The models explain almost 60% of the variability in land rental prices (adjusted R-square). Many studies confirm that the agricultural policy has a positive impact on the growth of land prices as well as land rental prices [18–23]. However, experts recommend that it is better to rely on land rent, rather than land transfer [17]. There are several reasons for this. Firstly, rental prices can be objectively monitored on the market, while the land price often represents the subjective opinion of the owner. Secondly, rental prices are less influenced by urbanism and non-agricultural factors. In the case of short-term contracts, rental prices reflect the value of agricultural activities on land. In the case of long-term contracts, subsidies may have a less significant impact on land value than other non-agricultural factors [45].

3.1. CAP Payments

The results of econometric models show that CAP payments are capitalized in rental prices by a small proportion. The first model shows that if SAPS payments are increased by one percentage point, land rental prices will increase by 0.028 percentage points (p. p.). If agri-environmental-climate payments or investment subsidies are increased by one percentage point, this will result in an increase in inland rental prices of only 0.03 p. p. The higher impact on land rental prices was recorded by the animal welfare payments (WELFARE), up to 0.09. The second model, in which we have arranged CAP payments into two groups by source of funding, shows that decoupled direct payments from the first pillar European Agricultural Guarantee Fund—EAGF) are more capitalized, compared with the CAP payments from the second pillar (non-project measures financed by the Rural Development Programme from the European Agricultural Fund for Rural Development—EAFRD). Based on these findings, we can state that payments, which are statistically significant (mainly SAPS, AECS, and WELFARE payments) and are reflected in the land rental prices, lead to an increase in land rental prices. However, a large percentage of these payments will remain in the hands of the farmers. Moreover, capitalization of direct payments is lower in countries where more land is used by corporate farms, reflecting a stronger bargaining position of corporate farms and unequal access to subsidies in these countries [51]. This is also the case in Slovakia, where large farms use most of the farmland. Another reason for the slight capitalization of CAP payments reflected in rental prices is due to the fixed rental prices being expressed as a flat rate during the term of rental contract, which is at least five years by law. In practice, rental contracts are usually agreed for a period of 10 years. If a land rental contract contains a fixed rental price, then payments under subsidies must be directed entirely to the farmer and the landowner is not entitled to receive any payment. In the case of contracts with a negotiated share-based annuity, based on land yield, the subsidy may be distributed between the landowner and the tenant [49]. In addition, the SAPS payments have been applied for 15 years and are quite a stable amount, hence they have already been capitalized in the total number of rental prices. Therefore, the overall impact of the capitalization of CAP payments on rental prices will only be visible if there is a change in the amount of these payments. However, relatively small changes in the CAP policy may have a significant impact on the land market [16]. The CAP reform 2013 has led to an increase in the capitalization of payments compared to the situation before the reform in EU-15. On average, 27% of decoupled payments have gone to non-farming landowners through higher rental prices in the EU in the post-reform period, increasing from 18% in the pre-reform period [7], and the reduction of the subsidy has led to a fall in the price of the land [17]. On the other hand, the adoption of the CAP reform in 2013 did not affect the land rental income of landowners in less productive, new member states [24]. The capitalization of CAP payments in land rental prices depends on the type of payments, changes in policy subsidies, duration of the rental contract, type of agreed land rental prices (fixed or based on land yields), negotiating power of landowners and tenants, and production that varies not only among the countries' regions but also among farms in the same region. It is also too complicated to create a common policy for all EU member states.

Table 2. Econometric models with dependent variable of land rental prices.

Variable	Model 1	Model 2
SAPS	0.028 ***	0.034 ***
Greening	−0.006	
ANC	0.007	
AECS	0.039 ***	0.019 **
ECO	0.019 *	
WELFARE	0.091 ***	
Investment subsidies	0.037 ***	-
Distance from the district city	−0.027	−0.074 *
Share of ANC land	−0.002	−0.008
Total revenues share in total costs	1.098 ***	0.948 ***
Share of revenues from livestock production	0.015	0.043 ***
Share of revenues from agricultural production in total revenues	0.287 ***	0.298 ***
Share of production costs in total costs	−0.248 ***	−0.279 ***
Wages	0.091 ***	0.072 ***
Number of employees	−0.045 ***	-
Land consolidation		
Unrealized	benchmark	Benchmark
Realized	−0.0003 ***	−0.0003 ***
Region		
The South-western regions of Slovakia	benchmark	
The Northern regions of Slovakia	−0.649 ***	−0.806 ***
The Southern regions of Slovakia	−0.632 ***	−0.698 ***
Production areas		
1—maize	Benchmark	
2—sugar beet	−0.266	−0.155
3—potato	−0.165	−0.136
4—potato-oat	−0.343	−0.483 *
5—mountain	−0.477 **	−0.685 ***
Intercept	10.516 ***	9.680 ***
R-squared	0.597	0.449
adjusted R-squared	0.575	0.428
Test of normality	1.174 (<i>p</i> -value = 0.556)	0.149 (<i>p</i> -value = 0.928)
LM statistics by Breusch–Pagan	31.252 (<i>p</i> -value = 0.091)	21.519 (<i>p</i> -value = 0.159)
LM statistics by White	299.108 (<i>p</i> -value = 0.057)	150.575 (<i>p</i> -value = 0.237)

* *p*-value at 10%; ** *p*-value at 5%; *** *p*-value at 1%.

3.2. Land Consolidation

The second group of independent variables consisted of land consolidation and share of ANC land. The share of ANC land was not statistically significant and its impact on land rental prices was almost zero. It means that the appearance of ANC land in a farm does not affect the land rental prices of landowners. The indicator of land consolidation also highlighted similar results. The regression coefficient was almost zero but, unlike the share of ANC land, it was statistically

significant at 1% p -value. Large land fragmentation negatively affects the land market and restricts the sale of agricultural land, which in turn encourages land rent [27] because of the high transaction costs caused by the restitution process, due to the unfinished privatization of ownership rights, undetected owners' problems, co-ownership, lack of demarcation of land, and high costs associated with the removal of land [36]. These transaction costs are still typical of the Slovak agricultural land market, especially in terms of undetected ownership. Land consolidation seems to be the only solution with regard to the enormous fragmentation of agricultural land and land ownership relations. However, land consolidation has, so far, only affected about 12% of the territory of the Slovak Republic, despite the fact that the Land Consolidation Act has been in effect for almost 30 years. At present, the Ministry of Agriculture and Rural Development of the Slovak Republic is commencing land consolidation in another 168 cadastral areas. Given the aforementioned situation, we assumed a low statistical significance of the land consolidation variable in the model. The observed variable was included in the model in two variations. The group of observed units, where land consolidation has not yet been carried out, was identified as the benchmark. The second group consisted of the observed units, where land consolidation had taken place and had been implemented. The results of the models showed that the variable of land consolidation is statistically significant but its impact on land rental prices is almost zero. However, results also showed that land consolidation has a negative impact on land rental prices. The decrease in land rental prices will be related to the fact that following land consolidation, all rental agreements cease to exist and new rental contracts with owners of new reserved lands have to be concluded. The previous tenant has the prior right to rent these plots of land. This increases transaction costs and requires some time to negotiate new rental contracts and take new land for use. Therefore, we can expect rather a decrease in the rental prices of agricultural land after its realization. Moreover, there is also a loss of sub-rental contracts, which provided substitute land use prior to land consolidation and, therefore, the number of rental relationships and the amount of rented land was reduced overall on the day the decision was made to approve land consolidation. On the other hand, land consolidation was only carried out in the case of 15% of those farmers observed. Further research will be necessary after the realization of land consolidation in new cadastres.

3.3. Regional Aspects

The third group of independent variables relates to the distance from the district city (LAU 1), region (NUTS III), and type of production area. The distance between the agricultural holding and the district city was only statistically significant in the second model at 10%, with a negative regression coefficient, indicating that the increase in the distance of the agricultural holding from the district city tends to result in a decrease in land rental prices. A similar result in relation to the land price was identified in the research [37,39], where an increased distance from the city led to a decline in land prices. However, Slovakia is a relatively small country and the lack of a supply of land means that the availability of a plot of land is an interesting offer for farmers willing to pay the market rental prices, regardless of the distance from the district city.

Production areas, with the exception of the mountain production area, have not had a statistically significant impact on the rental prices of agricultural land. Despite this, decreasing regression coefficients indicate that the highest rental prices are in the maize production area, which was designated as the benchmark production area. The most fertile soils of Slovakia are concentrated in these areas. It can be concluded that the productivity of land may have a positive impact on the level of rental prices, which is consistent with the conclusions reached by other researchers [36,39,40]. The statistical significance of land productivity also confirms the independent variable region in which the farm is located. The benchmarking variable became the group of regions with the highest rental prices and the best soil and climatic conditions, namely the Nitra, Trnava, and the Bratislava regions. This group was compared with the second group in the Southern regions of Slovakia (the Banská Bystrica and the Košice regions) and the third group, which included the Northern regions of Slovakia (the Trenčín, Prešov, and the Žilina regions). The results confirmed that land rental prices are

lower on average by 0.63 p. p. in Southern regions and by 0.65 p.p. in Northern regions compared with the benchmark region of South-western regions of Slovakia. The second model indicates an increase in the differences between land rental prices among the regions. Land rental prices are lower on average by 0.70 p. p. in Southern regions and by 0.81 p.p. in Northern regions compared to South-western regions. The regionalization of administration is a more important factor affecting land rental prices than the production areas, in which the statistically significant differences in land rental prices were only confirmed in the mountain production areas, compared with the maize production area, which is the most productive. The administrative regionalization of Slovakia at the NUTS III level is also provided in relation to agriculture.

3.4. Economic Indicators

The economic indicators should only improve the predictability of the models. However, certain interesting relationships were identified between the economic indicators on the one hand and land rental prices on the other.

According to the economic indicators, the increasing share of revenue from agricultural production set against the total revenue of the agricultural holding has a positive effect on rental prices. Should the share of agricultural revenue across all farm revenues increase by 1 p. p., then rental prices will increase by 0.29 p. p. Similarly, the growth of total revenues amongst total costs is positively reflected in the level of rental prices by up to 1.1 p. p. This result implies that active and efficient crop and livestock production has a positive impact on the level of land rental prices. This corresponds with the results of the study [38] where a positive correlation was found between the price of land, farm net income, and wheat yields. This finding contributes to the debate on CAP reform in terms of the importance of active farmers and their funding from CAP resources in the current and future programming periods. This is a means of how to increase land rental prices. The positive, economic performance of the farmer should also be reflected in the rental prices of the landowner. In such a case, both contracting parties are interested in the effective use of rented plots of land. However, most Slovak farmers should improve the effectiveness of their business [52] and most still suffer from the persistent difficulties from the transformation process after 1989. On the other hand, the increase in production costs as a percentage of the total costs manifests itself negatively with regard to the level of rental prices, decreasing up to 0.24 p.p. when increasing the share of production costs set against the total costs of the farm by one percentage point. However, labor costs are positively reflected in the level of rental prices. If wages increase by one p. p., rental prices will increase by 0.09 p. p. The costs of production factors indicate a positive correlation. The number of employees on a farm has a negative impact on rental prices. As a rule, farms with more employees pay lower rental prices to the owners of the agricultural land that they use. If we assume that the size of a farm is evaluated according to the number of employees, then a negative relationship between the size of the farm and the level of rental prices can be expected. The largest agrarian employers in Slovakia are agricultural cooperatives, which manage on average several hundred or several thousand hectares of land. Therefore, they have little interest in obtaining an additional unit of land [50]. Moreover, low competition in that area does not encourage higher rental prices, even though rental contracts are usually guaranteed for 10 to 15 years. In summary, economic factors contribute much more to the level of rent than CAP subsidies. This is a positive finding, since subsidies are intended to help farmers and they, and not the landowners, should benefit from such payments.

4. Conclusions

The agricultural land market is a focus of interest for many domestic and foreign researchers, as agricultural land is a limited natural resource with an increasing value. However, it is quite difficult to find a paper related specifically to land rental prices. Asian and African research into the land rental market focuses on the impact of land rent on the income of agricultural holdings [53–56]. American and European researchers focus mainly on the effects of direct payments or subsidies

in general on land prices, as well as land rental prices [12,14,17–20]. In Slovakia, there are no studies highlighting the factors affecting land rental prices, despite the fact that approximately 90% of agricultural land is rented and, therefore, knowledge relating to land rental market factors is important for both policy makers and stakeholders. Moreover, the impact of the factors observed usually differs among countries. It is not usually possible to use solely the results of studies from other countries. The studies carried out by each country are primarily important at the time of preparation and negotiation of new agricultural policy reform in the EU. However, this study is also limited by certain facts such as data availability, unwillingness to provide data, quality of data, consistency of data sources from various institutions, and small areas covered by land consolidation.

The results demonstrate that the most important factors for land rental prices are the economic indicators of the farm. Better economic indicators are also positively reflected in the level of rental prices, which are also closely linked to the active farmer's policy that the European Union is supporting. The active farmer's policy aims to exclude non-agricultural operators from receiving payments. The new CAP would thus support, in particular, those farmers who are actively involved in agricultural activity, which in turn could have a positive effect on economic indicators and also on land rental prices, thus bringing rental prices in line with those in other EU countries; however, they will not be constrained by the legislative rules of land rent currently set in Slovakia.

CAP payments are only slightly reflected in land rental prices, due to long-term rental contracts with fixed rental prices and due to the fact that CAP payments have been applied for 15 years and their rate of capitalization in terms of the land rental price were reflected mainly during the introduction of these payments. However, it is not desirable that payments to farmers end up in the hands of the landowners. It is preferable that payments which are not or only minimally capitalized in land rental prices should remain in the hands of the farmers in order that they are used for the purposes for which they were intended. For this purpose, the models demonstrated that it is better to analyze particular payments separately as independent variables, than to create common indicators of more particular payments. The impact of independent variables is more precise and undistorted for further evaluation and research.

Land consolidation in Slovakia is a significant factor but due to the small area of land remaining after land consolidation, the regression coefficient was almost zero. Therefore, further research will be necessary following the termination of land consolidation, at least in some regions of the country. Finally, certain geographical factors are important for land rental prices, such as regions where plots of land are situated and in areas of partial production. The administrative regionalization of Slovakia covers soil and climatic conditions. The results confirm that land productivity, soil quality, and climatic conditions are statistically significant factors in the land rental market. This information is important not only for national or regional policy makers but also for market actors when negotiating rental prices in their land rental contracts. However, future research will also enable a comparison of the current results with the impact of climatic changes in these regions on agricultural production and land rental prices.

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