

Article

# The Price of Farmland as a Factor in the Sustainable Development of Czech Agriculture (A Case Study)

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**Abstract:** Each year, around 2% of the four million hectares of farmland in Czechia changes owners. However, after years of significant growth in prices, a slowdown in pace and demand is expected. Rising interest rates, a strengthening of the crown and legislative changes in 2018 have influenced the price of farmland. Yet the prices of farmland in Czechia are a third of those in the countries of Western Europe, and so it still represents an interesting opportunity for investors. Currently, land is bought primarily by the farmers who work it. In Czechia, 80% of farmers farm on hired land, and rent increases are starting to be an issue for many of them. The return on the investment in agricultural land is currently around 50 years for an owner and 25 years for a farmer working the land. As research has shown, the price of farmland is an important factor in the sustainable development of agriculture in Czechia, along with the greening of production and the fight against soil erosion and the effects of climate change.

**Keywords:** agriculture; Czechia; farmland; farmland price; funds; rent; subsidies; sustainability

## 1. Introduction

“Agriculture is one of the basic branches of the national economy. Sustainable agriculture involves obtaining healthy and quality foods, conserving natural resources and preserving biodiversity” [1]. The sustainable development of agricultural business on the land is essential given the need for food production for the world’s growing population. However, the area of land suitable for agricultural use is still declining in the Czech Republic. Escoto et al. draw attention to the interdisciplinary character of sustainability: “sustainability plays an important role in society by improving long-term quality of life, including future generations, seeking harmony between economic growth, social development and the protection of the environment” [2]. “Modern agriculture and modern small-peasant production have different requirements for agriculture sustainability” [3].

The need for sustainable development is caused not merely by environmental limitations, but also economic and social limitations resulting from increasing competitive pressure from the global economy, evidence of which are also developments in the European Union. A significant element that formed the social and economic priorities of the EU was the Lisbon Summit (March 2000). At the spring summit in Barcelona (March 2002), this concept was supplemented with the conclusions of the previous EU summit in Gothenburg (June 2001), which adopted the mostly environmentally focused Sustainable Development Strategy. The Lisbon Process thus acquired its current form, emphasizing the need for development and mutual balance of the social, economic and environmental pillars so that none of them would have priority over the others. “European policies have shown that the integration of

environmental instances in the planning process and the sustainable land development are major objectives" [4].

The publication of the Brundtland report in 1987 introduced the concept of sustainable development, placing "sustainability" as a unifying idea for all academic disciplines [5]. "In scientific literature with a focus on economics, the topic of sustainability has proven to be a relevant area of research in the last decade. Particularly in connection with the food industry, the issues of corporate social responsibility" [6]. Bernues et al. examine "the perceptions of farmers and nonfarmers regarding the relationships between agriculture and the environment in High Nature Value (HNV) farmland" [7].

To understand the need for sustainable agricultural development, one must realize that one third of the world's arable land has disappeared in the last 40 years. This was mainly caused by erosion and pollution. It can have fatal consequences, given the ever-increasing global demand for food. Researchers at the University of Sheffield say that arable land is disappearing much faster than the rate at which new land is emerging. An analysis of various studies over the last ten years has shown that the pace of decline is catastrophic. The changes may be irreversible unless there is a significant reassessment of agricultural practices. Continual plowing combined with the excessive use of fertilizers has led to soil degradation worldwide. Erosion is progressing up to 100 times faster than new soil formation. The formation of the upper 2.5 cm thick layer of soil takes 500 years [8]. Roughly two thirds of farmland in the Czech Republic is affected by varying degrees of erosion risk, including both water and wind erosion.

Huettel et al. deal with the price of farmland in their article and state that "land is undisputedly the most important production factor with limited overall supply that even continuously declines because it is successively taken out of production for recreation or ecological compensation areas, or because it is needed for buildings or street/motorway construction" [9]. However, "in the last decades, there have been large areas of agricultural land that were abandoned in Europe, producing significant social and environmental impacts" [10]. "Farmland abandonment has important impacts on biodiversity and ecosystem recovery, as well as food security and rural sustainable development. Due to rapid urbanization and industrialization, farmland abandonment has become an increasingly important problem in many countries" [11]. Burja et al. deal with the sustainable development of agriculture in Romania in their article and state that "land grabbing has become a priority topic in academic research and a political concern, due to interests in the dynamics of the phenomenon and its negative impact on the sustainable development of agriculture in rural areas. This phenomenon generates changes in production systems of agriculture with adverse environmental consequences, adversely affects socio-economic and cultural conditions and leads to lower overall efficiency in agriculture" [12]. "Conversion of farmland to non-farm uses significantly influences the spatial variability of farmland prices" [13]. As stated by Jadevicius, "land prices influence housing affordability, food security and the carbon infrastructure" [14]. "The historical behavior of farmland prices, rental rates and rates of return is examined by treating farmland as an asset with an infinitely long life" [15].

Farm plots in Czechia have one of the smallest areas in the European Union. This dates as far back as the Austro-Hungarian Empire, when land was not inherited only by the oldest descendant, but by all children equally. Over time, this approach resulted in the formation of many narrow plots of land. Under the socialist system, private agriculture was abolished in Czechoslovakia, unlike in other countries, and the ownership of agricultural land, thus, practically disappeared. Large agricultural cooperatives and state-owned farms were formed on hundreds of hectares of agricultural land [16].

After the socio-economic changes of 1989, the practice of farming on large plots of land remained in Czechia. Existing collective farms were transformed into private agricultural cooperatives. However, land ownership returned to the private hands of many of the original owners in the restitution process. Suddenly, there were hundreds of thousands of private landowners. At present, the people farming the land are in many cases not the landowners [17]. Small farmers constitute the majority of the farming sector in the European Union (EU) and are considered the cornerstone of EU agriculture [18,19]; the market position of the small-scale farmers is very weak [20]. Sustainable economic strategies and

risk mitigation frequently lead to diversification (e.g., agritourism) [21,22], which is subject to the knowledge and skills of the farmer and could affect their social identity.

This situation was exploited by many speculators, who began trading in restitution claims and acquired large areas of agricultural land. Small owners did not realize the value of the agricultural land and considered the ownership of a field or a meadow a burden rather than an asset. Therefore, they often accepted the rather unfavorable land lease offers of agricultural cooperatives. At the time, and often even today, lease fees were around CZK 3,000 (approximately USD 130.8) per hectare per year. The average state subsidy received by a farmer in Czechia for cultivated land is up to CZK 10,000 (approximately USD 436) per hectare per year [23]. This is where the stagnation of the relatively low agricultural land prices in Czechia begins. Findings suggest that family labor input and farm location are important factors driving up farmland rental prices [24].

However, farmers are still responsible for most of the land trade, even though in recent years the number of Czech and foreign investors aware of the opportunity to make a profit has also increased. Therefore, the market price of agricultural land is still growing in the Czech Republic. However, the price of agricultural land is increasing in other countries as well. These countries include the US, where “between 2000 and 2010, inflation-adjusted U.S. farmland values increased by over 80%” [25], and Tanzania, where “real land prices rose significantly between 2009 and 2013 by 5.67% per year” [26]. However, higher farmland prices may not benefit current landowners if potential renters or buyers cannot afford to rent or purchase farmland at a high price [27].

It is worth considering the question of whether the low liquidity of the land is a problem. If someone owns five or more hectares of consolidated land, selling this land will not be a problem for this owner. However, the question remains as to what price can be obtained per hectare of land [28].

To promote the sustainable development of favorable prices for high-quality agricultural land, new rules were adopted for farming agricultural land in the Prague Metropolitan Area. They mainly involve the division of large fields into small fields with a maximum size of 5 ha. They also concern the creation of grassy borders, the planting of fruit and deciduous trees in tree avenues, the adjustment of crop rotation procedures in favor of higher diversity and giving preference to crops whose cultivation does not increase soil erosion.

The growth of the market price of agricultural land due to its scarcity (caused by its use for construction and other purposes) presents another problem. Farmland abandonment occurs extensively worldwide, in both developed and developing countries [29–32]. Since the 20th century, approximately 385–572 million km<sup>2</sup> of farmland has been abandoned [33]. Baumann et al. [34], Queiroz et al. [35] and Li and Li [36] believe that the phenomenon of farmland abandonment has mainly occurred in developed countries, such as in Europe, the United States, Australia and Japan. However, in recent years, farmland abandonment has also occurred in developing countries [37–39].

The purpose of this study is to express the sustainable development of farmland prices in Czechia and to analyze the causes and impacts of this development on land ownership structure under the conditions of the local economy.

## 2. Materials and Methods

The market price of farmland (The average annual exchange rates valid in the given year according to the Czech National Bank were used to convert the Czech koruna to the US dollar. Specifically, the following years were used: 2019 (22.934 CZK/USD), 2017 (23.382 CZK/USD), 2016 (24.432 CZK/USD) and 2004 (25.701 CZK/USD). A uniform exchange rate of 27 CZK/EUR was used to convert the Czech koruna to the euro and was valid for the entire period of currency intervention of the Czech National Bank in 2012–2017) is the price that can be achieved on the market between a voluntary buyer and a voluntary seller when both sides act based on an informed decision, reasonably, without coercion and also with sufficient presentation of the offer on the market. Prices achieved in transfers in which one of the parties (usually the seller) is significantly disadvantaged when negotiating the sale are not considered market prices.

Description methods (especially for describing the development of farmland prices) and a comparative analysis (of the farmland prices in Czechia and other countries of the European Union) were used primarily in this paper. Correlation and regression analyses were used to specify the development of farmland prices.

Using advanced statistical methods from the domain of time series analysis adaptive approaches, the long-term development tendencies of the price of farmland over the 2004–2018 period have been described. Holt's exponential smoothing was chosen for forecasting the expected level of agricultural land prices.

In the case of the Holt smoothing procedure, two smoothing constants,  $\alpha$  and  $\gamma$  are being estimated, from the (0; 1) interval. The  $\alpha$  constant is used for smoothing of the time series level (St), the  $\gamma$  constant for the (Tt) trend quantity balance.

$$\alpha_{Holt} = \alpha(2 - \alpha); \gamma_{Holt} = \frac{\alpha}{2 - \alpha} \quad (1)$$

The  $\alpha$  parameter adjusts the level of adaptation and it means the higher its value, the faster the method reacts on changes in the data. The  $\gamma$  parameter defines the levels of smoothing of the local linear trends.

Real economic criteria should form the basis for decision making based on the appropriate trend function type. Finding the appropriate trend function type is then mostly dependent on the analysis of empirical data. The paper offers a criterion based on the comparison of sums of squares of deviations of the empirical time series values from the smoothed ones—Mean Absolute Percent Error MAPE [40]. Statistical computations have been performed in the STATISTICA software, version 13, environment.

A total of 30 farmers from the Mýto u Rokycan cadaster (West Bohemia) and several selected investors were surveyed with a research question concerning the sale or purchase of agricultural land at its current market price in Czechia.

To confirm the validity of theoretical knowledge about the price of agricultural land in economic practice, the following hypotheses were formulated:

**Hypothesis 1.** *The reason for the significant and steady increase in the price of agricultural land in the Czech Republic in the last fifteen years has been the short supply of land from land owners, who expected future growth in capital income from the subsequent sale of the land or an increase in lease fees.*

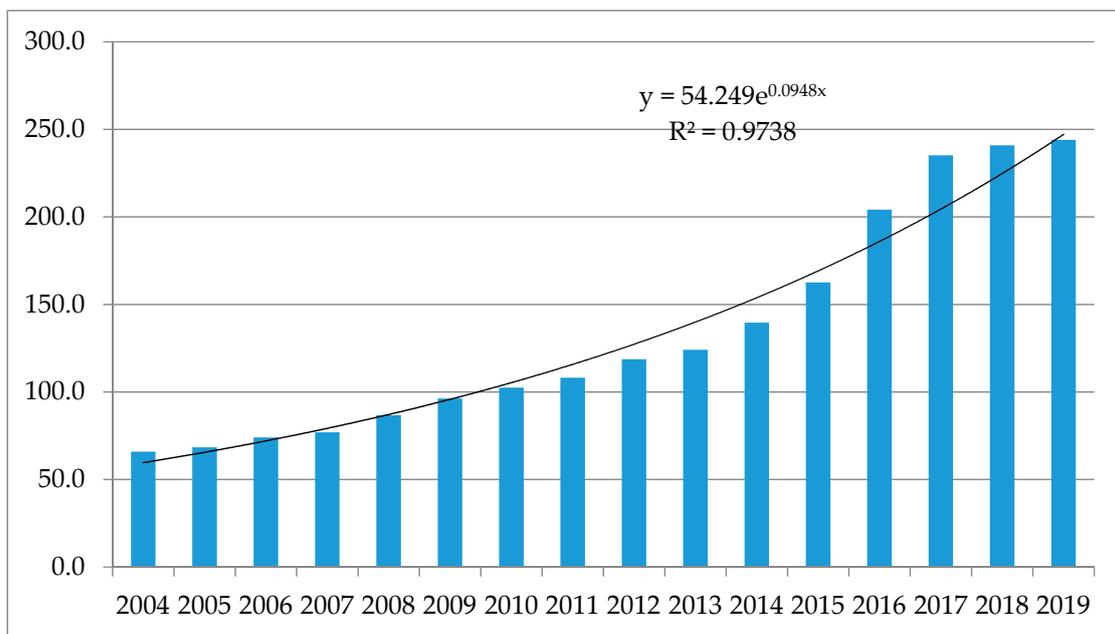
**Hypothesis 2.** *The rise in the price of agricultural land in the Czech Republic has also been caused by the lack of state regulation of the local land market, which has resulted in speculative purchases of land by non-agricultural investors. Thus, farmers have lost the opportunity to purchase land essential for food production.*

### 3. Results

#### 3.1. Value and Price of Agricultural Land in Czechia

The value of agricultural land in Czechia has risen significantly, along with its price. According to data from Farma.cz, the average price in 2016 increased by 25.54% Year-Over-Year (YOY) to CZK 204,100 (USD 8353.8) per hectare. This was the highest YOY increase in land prices in the past 13 years [17]. Twelve years previously, farmland could be bought for CZK 66,000 (USD 2568) per hectare, on average. This means that the price has tripled since 2004 (see Figure 1).

It is anticipated that the price of farmland will increase further in the coming years (see Figure 2). However, when selling, farmland owners ask prices that the investors would only get return on after several generations. Therefore, the market is slowing down. The average market price of farmland increased by 15.2% YOY in 2017, to CZK 235,100 (USD 10,055) per hectare. Thus, the growth rate has slowed, compared to the increase of more than 25% in 2016. The value of land in the Czech Republic reached CZK 940 billion (USD 40.2 billion) [17].



**Figure 1.** The market price of farmland in thousand CZK per hectare [17].



**Figure 2.** Land price development in the Czech Republic, including long-term forecasts (thousand CZK per hectare).

Rising interest rates, a strengthening crown and legislative changes influenced the price of farmland in 2018. A further slowdown is anticipated in 2019; the increase in price should not exceed 10% according to the company Farmy.cz, which specializes in the sale of agricultural property [17]. The hunger for farmland has driven its price so high that farmers and investors have lost interest in its purchase. The increase in interest rates, which makes loans more expensive, has also played an important role, and so have lower crop yields [28].

In the most fertile locations, prices reach up to CZK 30 (USD 1.3) per square meter (CZK 300,000 per hectare), according to the market actors. According to the figures of the company Argo 21 [41],

farmland is currently most expensive in the Haná and Vyškovsko regions. Conversely, prices are lowest in the Liberec and Moravian-Silesian Regions.

In terms of regions, the highest market prices are achieved in the most fertile areas of Haná; in particular, in the area surrounded by the cities of Olomouc, Přerov, Vyškov and Prostějov. Above-average prices are also achieved in the border areas of western and southern Bohemia, despite the fact that the land there is of average creditworthiness. In these areas, the influence of interested parties from Germany (the states of the former Federal Republic of Germany) and Austria is already evident. In the northern areas, the effect of the proximity to the border is negligible.

A higher concentration of biogas plants in the region, and their need to ensure a sufficient amount of the necessary commodity, contribute to high competition on the demand side and, consequently, above-average land prices in some areas.

The increase in the farmland prices is due to subsidies to Czech agriculture of approximately CZK 10,000 (USD 436) per hectare of farmed agricultural land. This leads to increased interest in farming on land and, at the same time, to increased interest of farmers, as well as other potential investors, in its purchase.

A further slight decrease in the supply of agricultural land for sale can be expected in 2021. For smaller owners today, a change in the owner's current life situation and the current need for funds have long been the primary impetus for the sale of agricultural land. Most owners are already well aware of the growing value of their land and have no incentive to sell it immediately. Offers of larger agricultural land units are, and will remain, circumstantial, and are usually realized within the framework of transfers of commercial companies.

### 3.2. Comparison of Farmland Prices in Czechia and the European Union

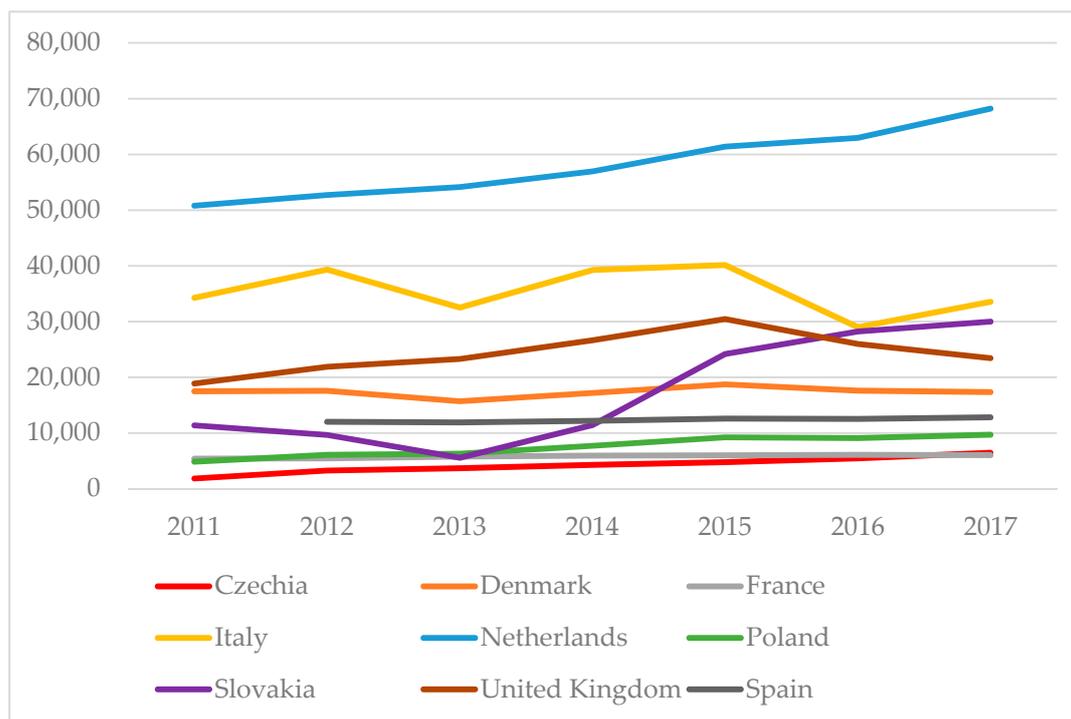
A statistical analysis of the development of the price of agricultural land in the Czech Republic (see Figure 1) and predictions of its further development (see Figure 2) showed that the market price of agricultural land in the Czech Republic has been rising at a slow but steady pace over the past thirteen years and is approaching the prices in Western European countries. "The lease fees of most types of land that can be used for agricultural purposes are also increasing; no reduction can be expected. The main reason is the fact that the price of agricultural land in the Czech Republic is lower than that in Slovakia or Germany, for example" [42].

It is difficult to determine how high the price of land will rise; it will also depend on the region in which the land is located, the quality of the land, and the prices of agricultural production. In addition to the creditworthiness and size of the land, the land price is also largely determined by the local competition among farmers, and by whether the land is included in a land block in the Land Parcel Identification System (LIPS), for which farmers can receive subsidies [43]. The necessity of state support for agriculture, including financial support, aimed at stimulating growth in its efficiency, is determined by the characteristics of the agrarian sector [44].

However, in recent years the price of land increased, primarily due to European subsidies. A fairer distribution of money is anticipated in the new subsidy period, which starts in 2021. Nevertheless, together with other factors, the approaching new period makes the farmland market unstable, thus influencing the price of land. For farmers, the decisive factor will be the results of negotiations on the European budget and Brexit. It is agricultural policy that demands the largest expenditure in the European Union budget [18].

Figure 3 below shows the development of agricultural land prices in selected countries of the European Union, acquired from available data by Eurostat.

As is clear from Figure 3, another reason for the increased interest of foreign investors in acquiring land in the Czech Republic is the fact that in some western European countries (Spain, Greece) the price of farmland was more than double that in the Czech Republic, while in others (the Netherlands) it was ten times higher. For example, in 2016 the prices of farmland in Czechia were one third of those in Western Europe; even in neighboring Slovakia, land was sold for four times as much.



**Figure 3.** Price per hectare of farmland in selected European Union countries in EUR [19].

### 3.3. Comparison of the Number of Farms and Average Farm Areas in Czechia and the European Union

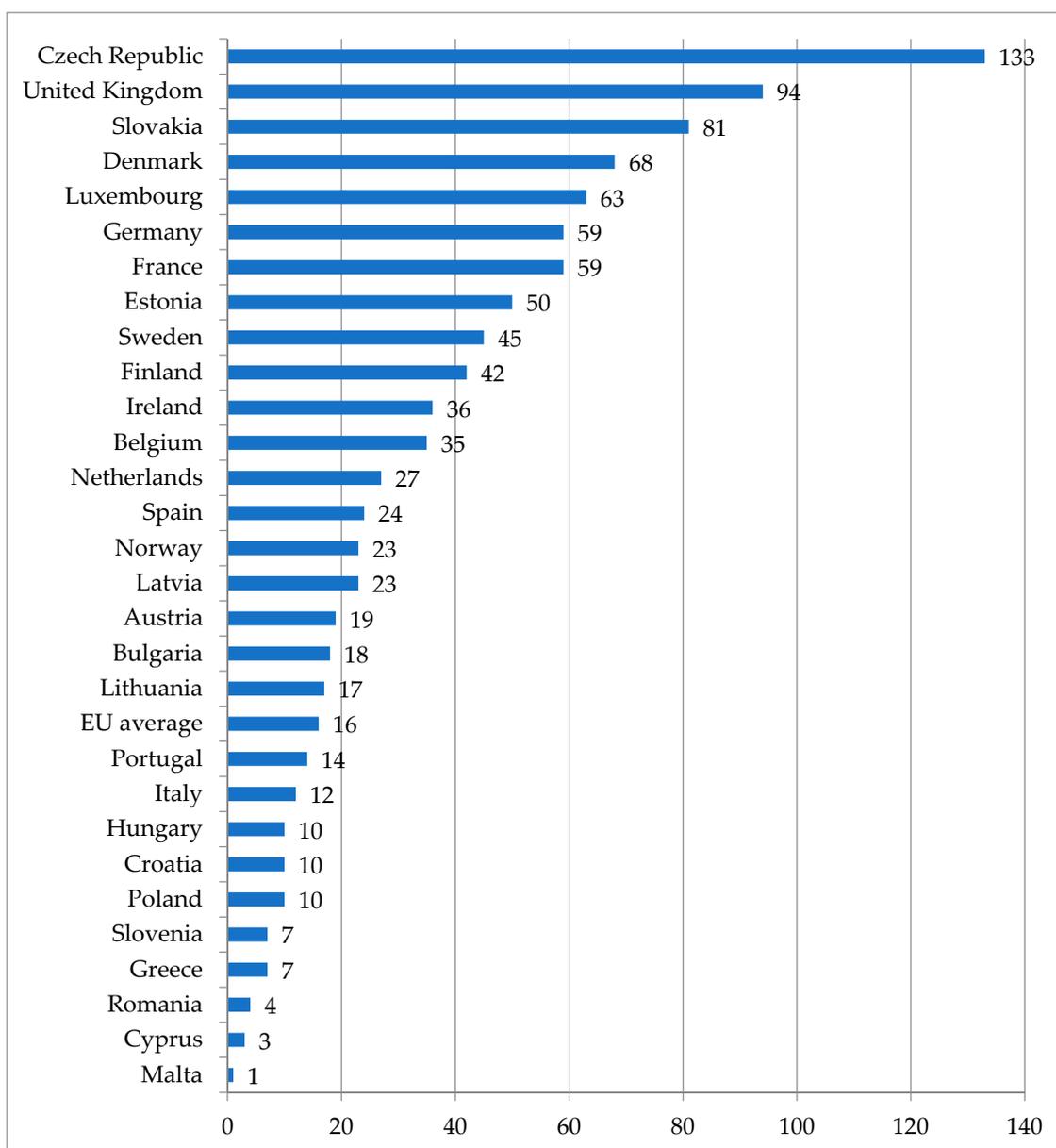
Czech agriculture is characterized by a very high average of land area per farm [45]. At present, farms in Czechia are the largest in the European Union (see Figure 4). Competition and economic pressure on smallholder farmers over 10 years has caused the average acreage of a Czech farm to increase by over two thirds, to 133 hectares. This is eight times the EU average (16 ha). Almost all EU states, with the exception of Cyprus and Sweden, have experienced an increase in average acreage. There are currently 10,800,000 agricultural farms in the EU, and the average farm acreage is 16 ha [19].

According to the Agricultural Association of the Czech Republic, smaller farmers (who do not achieve returns to scale) must either receive subsidies from the state or make a profit; this is a problem for small farms. The countries of the former federation are an exception not only in the EU, but also in the former Eastern Bloc, which, like Czechoslovakia at the time, underwent a period of agricultural collectivization after the Second World War. The reason why Poland, Romania, and Hungary are at the bottom in the average acreage of farms (Figure 4) is the fact that collectivization was either not as thorough or was abandoned in other countries.

Experts draw particular attention to the risks arising from the specific structure of agriculture in the Czech Republic, which has the highest average acreage of farms in the entire EU by a significant margin. This structure also brings with it negative effects, both in terms of the deterioration of the productive capacity of the soil and in the degradation of the land to a mere means of production.

Currently, there are 23,600 farms in Czechia, which is two fifths fewer than ten years ago. Another reason for the decrease in the number of farm holders is the age structure of the owners. Over half of all farm holders are over 55. There is no generation change. The owners are often of retirement age, and as they have no one to succeed them, they sell their companies.

Furthermore, the area of agricultural plots is among the smallest in the European Union, while the average field size is among the largest.



**Figure 4.** The average area of farms in Czechia and the European Union (in ha) in 2016 [19].

### 3.4. Investing in Farmland in Czechia

Since farmland prices rise quickly, it has become the subject of interest of not only farmers, but also, increasingly, of investors and speculators. Small investors most often purchase small fields and meadows, which they then consolidate into larger units. These units are purchased from the small investors by larger investor groups, for which it is not advantageous to purchase partial units. They can subsequently exchange the land or increase its value under land consolidation projects [16].

According to the Agrarian Chamber of the Czech Republic [46], self-employed people who would use the land for agricultural production lose this land unnecessarily, because they are not able to respond to competitors with more money who subsequently sell the land.

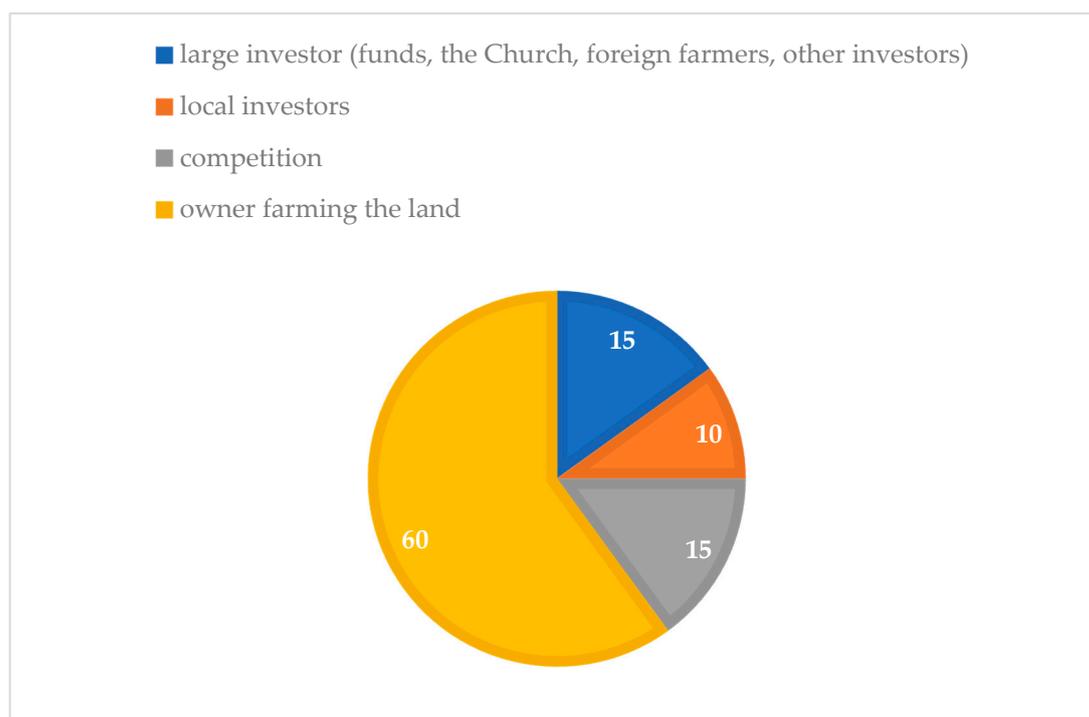
The expectation of the continued differentiation of land prices according to the quality and productive capacity of the land is a significant trend in 2020. With rising prices, investors will put more focused consideration into all circumstances that have a possible impact on the future value of purchased land. In addition to soil quality, the likelihood of future erosion threats and climate regions

will increasingly be considered. Given the high dependence of the current market price of agricultural land on the amount of subsidies, these lands will be a decreasingly sought-after investment.

Buyers of farmland are usually interested in parcels for sale that are close to their own farms. With a limited number of parcels for sale, this may lead to market power in local farmland markets [47]. We can thus observe, in recent years, relatively intensive efforts by farmers to purchase, or at least lease, the largest possible area of land in their areas of interest. They are willing to pay a price that usually significantly exceeds the stated creditworthiness of the land, especially if they are farming close to other larger cooperatives [43].

In recent years, we have also observed the increasing interest of landowners in environmentally friendly land use. More owners recognize the fact that using the land in the right way is more important and economically more advantageous for the owner in the long run than the short-term effect achieved by maximizing the lease fee. We can expect this beneficial trend to continue in 2021 and in the years to come.

Every year, around 2% of the four million hectares of farmland in the Czech Republic changes owners. After years of price increases, a slowdown in the pace of growth and a decrease in demand are anticipated. The following economic entities currently operating on the farmland market in the Czech Republic (see Figure 5).



**Figure 5.** Who buys farmland in Czechia (%) [17].

The estimated number of farmland owners in Czechia is 2.7 million [48]. Privately owned plots are small and often owned by more than one owner, which makes the purchase of farmland more complicated, as a prospective buyer must address more owners.

The return on investments in agricultural land is around 50 years for owners and 25 years for farmers who work the land (see Table 1). In Czechia, 80% of farmers farm on hired lands, and rising rents start to be an issue for many of them. The land must be farmed; there is no sense in just keeping the fields.

Czech fields are also interesting for investors from abroad. The interest of foreign investors is focused mainly on the purchase of larger ownership units or prospective investments in agricultural companies, and they are showing minimal interest in the purchase of land with an area of less than

5 ha. Due to the often unclear ownership structure of entities, it is not possible to express the share of foreign entities in transactions involving land or in land ownership in the Czech Republic [17].

**Table 1.** Return on investments in land—25 years for farmers, 50 years for owners (in CZK) [17].

Type of Land	Market Price Per Hectare	Market Tenure	Profit Including Subsidies	Return on Investment for Owner (Years)
High creditworthiness (e.g., Haná)	300,000 (USD 13,081)	6	12	50
Medium creditworthiness (e.g., South Bohemia)	200,000 (USD 8721)	4	8	50
Low creditworthiness (e.g., the Jeseníky region)	150,000 (USD 6541)	3	6	50

The price was affected by the easing of the crown's exchange rate, too, which has made the position of the foreign investors weaker. The greatest interest in Czech farmland is shown by German buyers who own fields in the borderland. Most commonly, this is because the investor from Austria or Germany builds a biogas station, for which they need biomass; often this is maize, which is grown in the Czech Republic. Moreover, over the past 10 years the price of farmland in the EU has grown also due to EU subsidies [49].

However, for many foreign investors there is a clear shift in the motivation to purchase land, from an interest in medium-term financial investment to an interest in long-term ownership and often the active use of the owned land for agricultural activities [17].

## 4. Discussion

### 4.1. Land Market Research in the Czech Republic

To verify the validity of the two established hypotheses, the authors collected specific knowledge about the land market from professional publications and from science articles in the Web of Science database and the Farmy.cz server; the authors also conducted their own research among landowners in a selected region of the Czech Republic in October 2019. This followed similar, earlier research conducted in September 2016.

The Mýto u Rokycan cadastral area in the Plzeň Region of the Czech Republic was chosen by the authors for their own research among owners of agricultural land, namely among those owners of agricultural land who lease their land to ZBIROŽSKÁ, a.s. The following questions were put to owners of agricultural land who acquired the land in restitutions or inherited it from their ancestors:

- Question no. 1: Are you considering the sale of your farmland given its current market price in Czechia?
- Question no. 2: Under what conditions would you be potentially willing to sell the land?
- Question no. 3: Do you consider the collected rents to be adequate
  - considering the current market price of the land?
  - considering the real payment possibilities of agricultural subjects (tenants)?

The answers of the thirty addressed farmland owners are summarized in the following Table 2.

The above research findings—though they concern a regionally restricted group of landowners—correspond with the conclusions published in professional publications and on the Farmy.cz website.

One of the addressed farmland owners in the Mýto u Rokycan cadaster area summarized: “The decision not to sell the land in Mýto u Rokycan is motivated by the fact that the price of farmland (with respect to its gradual depletion) will remain high in future. If I decided to sell it, it would only be if I needed money for another investment, for example to buy a flat”. The farmland is a suitable capital

estate which currently shows rather high appreciation (2%–3%) compared to the low annual interest rate of bank deposits (0.01%–0.8%) or the yield on state bonds (0.01%–1.8%) [50].

**Table 2.** Results of the survey among farmland owners.

Question	Question Content	Answer	No. of Answers
1	Acceptance of current land prices	No	30
2	Conditions of potential sale	Difficult life situation or unavoidable property sale	30
3a	Rent adequate considering market price of farmland	No	30
3b	Rent adequate considering possibilities of agricultural companies	No	20

Several important investors from the Czech Republic expressed their opinion on the price of farmland in a survey. The answers to the research question: “Do you consider purchase of the farmland when taking into account its current market price in Czechia?” were as follows:

- “Slowly, the interest of large investors who saw great potential in the price boom is decreasing. Now they focus on searching for high quality land and they are willing to pay the higher price only for this kind of land,” said Jiří Jaklín, the owner of Agro 21, a company that specializes in the trade in farmland. “If offers for fields of CZK 30 (USD 1.3) per square meter are accumulating on the internet and no one is showing any interest in them, something is wrong”.
- The company Chemagra, which has been very busy buying land in the past, is more cautious now in their acquisitions. “The sellers’ ideas are often unrealistic. There is no point buying fields for prices we would only get return on in several generations,” says the co-owner of the company, Walter Schrott.
- Large-scale concerns, like the owners of the Creditas Bank and Pavel Hubáček’s investment group Unicapital, also act with caution when buying farmland. In their portfolio they have 8500 hectares of land. Yet, they are still open to further acquisitions and keep buying but focus on areas where they are farming. The group owns, for example, extensive fields in the Bruntálsko region and in the foothills of Beskydy.
- Some investors wager on the growing popularity of organic food, which is more expensive than common agricultural produce. They are ready to invest in land suitable for a period of transition to organic farming. In practice this means two or three years of cleaning the soil of pesticide residues from conventional farming before starting the operation of an organic farm.

#### 4.2. Development of Agricultural Land Prices in Other Scientific Studies

Scientific articles by other authors also deal with the development of agricultural land prices and rental rates, for example the studies [14,15,25,26]. The authors of these studies basically agree on the need for sustainable agricultural development as a prerequisite for the sustainable development of agricultural land prices, regardless of which specific countries are dealt with in their articles.

Severová [51] and Zhang [38] also deal with the development of rental rates for agricultural land in recent years; Severová presents economic data on the purchase prices of agricultural land (including sales of land by the Support and Guarantee Fund for Farmers and Forestry) and rental rates in the Czech Republic in the period 2010–2014 (see Table 3), and Zhang presents specific data on rental rates for agricultural land in China.

In particular, the statistics on the development of prices and rental rates presented in the article “Investing in Farmland in the Czech Republic as a Growth Factor in Its Price,” by Severová et al. [51], show a strong correlation with the findings on the growth of agricultural land prices presented in our article. The Czech Republic and other countries that have gone through a stage of agricultural

collectivization or nationalization of agricultural land (including the aforementioned China) show similar tendencies in the development of agricultural land prices, as well as similar reasons for this growth.

**Table 3.** Purchase price and rent and subsidy development in the Czech Republic [51].

	2010	2011	2012	2013	2014
Purchase price/ha	86,228	102,550	115,856	119,535	128,295
Rent/ha	1421	1473	1630	1783	2000

However, while the market price of land in Czechia has increased in recent years, the officially set land price, published by the State Land Office and the Research Institute for Soil and Water Conservation, has decreased in several regions (Olomouc, Zlín, South Moravia, Moravian-Silesian, and Central Bohemia Region) [52].

#### 4.3. Evaluation of Hypotheses and Resulting Implications for the Sustainable Development

As is proved by the above analysis of farmland price development and the economic decision making of farmers in Czechia, it can be declared that the validity of both hypotheses defined in the methodology section was confirmed.

##### 4.3.1. Recommendations for Investors, Farmers and Agricultural Firms

The increase in the price of farmland was caused by demand, which was greatly encouraged by the option of financing that involved a very low interest rate. The willingness of investors to buy farmland is now discouraged by the growing interest rate. This will undoubtedly lead to long-term stabilization in the development of farmland prices and their gradual convergence with the EU average, which will also be beneficial for farmers and investors.

A fast return on investment can no longer be expected from investments in farmland. However, the purchase of agricultural land still pays off in combination with farming. It is necessary to farm the land (fertilize, sow, harvest), and then the creation of a profit that is at least a little interesting is feasible.

In order to achieve a higher quality of farmland management, farmers can be advised to alternate the use of farmland for growing crops and grazing.

##### 4.3.2. Recommendations for the Government

The price of farmland is influenced by government policy. Stagnation or a possible drop in prices cannot be excluded in the case of legislative interventions in the market in farmland; for example, the introduction of the pre-emptive right of farmers and the state, or the introduction of an information obligation for the sale of land, as proposed by members of the Czech Parliament.

##### 4.3.3. Recommendations for Landowners

Landowners should promote the principles of organic farming more rigorously as a guarantee of sustainable agricultural land prices in the future. They should combine new land consolidation projects with the return of traditional avenues, groves, uncultivated borders and field paths. This would create kilometers of dividing elements that would contribute to water retention in the landscape, encourage animals to return and also prevent the erosion of agricultural land. The use of chemicals should also be significantly reduced in the newly divided fields, and organically grown crops could be offered at higher prices than crops grown by conventional methods.

There is undoubtedly a strong correlation between the sustainability of agricultural production prices and the sustainability of agricultural land quality. There will be no interest in agricultural land that will be degraded by water and wind erosion, the long-term use of chemicals or other negative agricultural interventions.

The loss of soil from fields due to erosion cannot be completely prevented; nevertheless, for many years a large proportion of the population of Czechia has had a tool at its disposal to prevent this phenomenon at least partially, in the form of agricultural leases between landowners and tenants of the land, i.e., farmers. Unlike a lease agreement, an agricultural lease allows the landowner to require the farmer to farm in a way that does not reduce the value of the landowner's property. In this way, it is possible to defend against erosion even without specific laws, because there are about 2.7 million small landowners in the Czech Republic, i.e., practically every second person of working age.

There is little to be gained from the actual holding of farmland. An owner might lease their land to farmers, but the rent is relatively low. Rising interest rates are also reflected in the price of land. One more percentage point increase in the interest rate and farmers will have to seriously consider whether it is worth buying their land at, for example, CZK 25 (USD 1.09) per square meter.

#### 4.3.4. Research Implications

The higher market price of agricultural land due to its scarcity, which is caused by its appropriation for construction purposes as well as land degradation resulting from the use of pesticides, fertilizers, and so forth, will have to be addressed in future economic research. The decline in agricultural land as a result of these influences affects the market supply of agricultural land and thus the price of agricultural land in Czechia.

At present, agriculture is losing 15 hectares of agricultural land per day due to the construction of industrial buildings, transport infrastructure, and municipal construction, and the state is taking no action. It is a sort of tax on the development of the economy, but also an unspeakable waste that will undoubtedly have future societal ramifications, including the loss of land for agricultural production itself, and also in terms of the roles the land plays in the water cycle, the landscape, and the environment.

In terms of future scientific knowledge, the development of biotechnologies that free crops from their dependence on fertilizers can help to halt the loss of farmland.

## 5. Conclusions

The market prices of farmland in Czechia have been increasing annually over the past thirteen years due to the combination of a number of factors. In 2016 alone, prices in Czechia increased by a record 25.5%. The price of a square meter amounted to CZK 15 (USD 0.614), while in 2004 it was less than CZK 7 (USD 0.272). The total value of agricultural land in Czechia has risen to CZK 940 billion (USD 40.99 billion) in recent years.

Yet after years of growth, a decrease in pace is anticipated, together with a decrease in demand. The hunger for farmland has driven its price so high that farmers and investors have lost interest in its purchase. However, the purchase of agricultural land still pays off in combination with farming. It is necessary to farm the land (fertilize, sow, harvest), and then the creation of a profit that is at least a little interesting is feasible. "The specific system of processing the natural resources, which has evolved throughout centuries, has made the globe a large industrial center and an area of intensive agricultural exploitation—which both constitute considerable burden for the natural environment" [53]. Therefore, some investors wager on the growing popularity of organic food, which is more expensive than common agricultural produce. They are ready to invest in land suitable for a period of transition to organic farming. In practice this means two or three years of cleaning the soil of pesticide residues from conventional farming before starting the operation of an organic farm.

In recent years, the price of farmland was increased primarily due to EU subsidies. A fairer distribution of money is anticipated in the new subsidy period, which starts in 2021. The increase in the interest rate, which makes loans more expensive, also plays an important role. Worse crop yields, caused by climate change, also play their role. The price is also affected by the easing of the crown's exchange rate, which has made the position of foreign investors weaker. The foreign investors most interested in Czech farmland are Germans that own fields mostly in the borderlands. Moreover,

over the past 10 years the price of farmland in the EU has grown significantly in connection with EU subsidies. The reason is that in some western European countries (Spain, Greece) the price of farmland was more than double that in the Czech Republic, while in others (the Netherlands) it was tenfold. In neighboring Slovakia, land was sold for almost four times the price.

The market price of farmland is thus, one of the significant factors in the sustainable development of agriculture in the Czech Republic. Research has shown that the market price of farmland is influenced by many economic and social factors; however, the price should be acceptable to those who farm it. On the other hand, it is also necessary to introduce greener agricultural activities to sustain work on the land, such as reducing the use of pesticides, the gradual replacement of artificial fertilizers with natural ones or taking measures against soil erosion by wind and rain in the fields (tree protection zones). Effective legislative protection of quality farmland that prevents its use for construction and other non-agricultural purposes is also necessary. As is confirmed by the identical conclusions of the Paris Climate Conference, the following, in particular, can contribute to halting the loss of farmland:

- the capture of nutrients from wastewater,
- the development of biotechnologies that free crops from their dependence on fertilizers,
- alternating the use of farmland for growing crops and grazing.

Farmland in the Czech Republic must, therefore, carry out its mission—to fulfil its main task, i.e., the sustainable production of quality and safe food for the population. “The idea of sustainable farming entails farming production management which allows for the efficient use of natural resources in order to achieve financial profit, while respecting the laws of nature and meeting expectations of society at the same time” [54].

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