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Agricultural Land Market in Ukraine: Challenges of Trade Liberalization and Future Land Policy Reforms

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Abstract: After over 20 years of a strict moratorium on the turnover of agricultural land in Ukraine, an official market for this type of land has recently been established. The purpose of this study was to examine the functioning of the fundamental elements of this market from the moment of its introduction on 1 July 2021 until today, as well as to understand the possible directions for its further development. The analysis of the agricultural land market and the visualization of the obtained results were carried out using the PostgreSQL database, Python and SQL programming languages, and the QGIS and Metabase tools. It was found that the volume of the agricultural land market remains insignificant, as the total area of sold land during this period made up only 0.7% of the arable land area of Ukraine. Prices for land plots remained at the level of their normative monetary value and are still relatively low, which indicates the significant undercapitalization of agricultural land as a production factor. The stability of agricultural land prices under the influence of various factors also indicates their relative virtuality, which, taking into account the further lifting of restrictions on the size of land plots to be sold as of 1 January 2024, requires the use of appropriate land policy instruments in order to fully utilize the multipurpose role of land in the achievement of the Sustainable Development Goals, which should be based on a human-rights-based approach to rural development, food security, and land policy.

Keywords: land ownership; property; normative monetary value of land; land price; land plot; land policy; human rights; rural development; monitoring; data quality

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1. Introduction

One of the most controversial issues in Ukrainian society since the country regained its independence is the agricultural land market. This economic phenomenon is still new for Ukraine, as the market for agricultural land was launched in Ukraine only on 1 July 2021, as a result of lifting the long-term moratorium on the turnover of agricultural land. This moratorium had been in effect for over 20 years, since the adoption of the Land Code of Ukraine in 2001. Prior to its adoption, there had been a preceding ban on the turnover of land plots, established as early as 1990. Out of the 15 former Soviet Union republics, only 4 still adhere to the previous socialist policy of exclusive state ownership of agricultural land—Tajikistan, Turkmenistan, Uzbekistan, and, to some extent, Belarus [1].

Land is among the most limited resources in the global perspective and its efficient and sustainable utilization and distribution is crucial [2–4]. Therefore, the meaning of the concept of the agricultural land market is much deeper and is determined by understanding land and natural resources as a whole [2,3]. Agricultural land is more than just a production factor in agriculture; it is a public good that is characterized by non-exclusivity in the context of ensuring national food security [4]. This is based on the principle that everyone can receive its benefits simultaneously and no one is excluded. According to the concept of

welfare economics, when there is a market failure, welfare can be increased by government intervention in markets [5]. If land is considered a public good, as indicated in [6], state intervention could and should be considered. It has been proven [7] that markets do not observe universality or equality, and they are unaccountable and ineffective.

In this context, the role of the state is to integrate a human-rights-based approach into market regulation. This makes it possible to guarantee equal opportunities in the management of and access to land resources and the material benefits obtained from them by all members of society [6]. For this, the human-rights-based approach is a conceptual framework for the process of human development that is normatively based on international human rights standards and operationally directed to promoting and protecting human rights [8]. As mentioned by Cheshire et al. [5], the general assumption is that the better the agricultural land is protected from conversion to other types of land use, the higher its value would be. It should be understood that economists interpret the regulation of the land market in their own way, understanding it as a set of measures, instruments, and policies aimed to influence the market. Meanwhile, in practice, such regulation consists of managing land use using certain zoning or planning instruments (for example, the restriction of the supply of land for urban development by imposing containment boundaries and greenbelts or setting minimal sizes of land plots). This type of activity is market regulation, as it determines the use of economic resources according to rules and regulations; land prices and the land market are interdependent, but their influence is limited and regulated through planning decisions [5].

According to Wallace and Williamson, land markets can either be formal or informal, and both types of markets operate in any country [2,3]. Only the informal agricultural land market was functioning in Ukraine until July 2021, with the formal agricultural land market being introduced afterwards but still resembling most of the features of the informal land market. We believe this can be explained by the following points. For an effective formal land market, the government needs to establish relevant institutions. The first of these is the institution of property, as well as land registers and cadasters. There should also be balanced legal dispute resolution and financial systems [2,3]. Governments should have full information about all of the aspects of the land market, and officials should use this information to achieve the most desirable outcome from a societal perspective and not from the perspective of a narrow group of stakeholders (such as local communities or a group of companies) or even an individual. One of the most visible factors affecting the outcome of government intervention is the lack of complete information [4]. The role of the private sector and civil society in land administration and management consists of two aspects: One is the implementation of the interests of civil society in a safe environment through participation in land policy. The other aspect is that the private sector provides services to facilitate cost-effective land administration systems, particularly to facilitate access to legalization services and to minimize costs, and to contribute to the functioning of markets.

Ensuring sustainable development, particularly by supporting an effective and efficient land market, is seen as an important government activity through the establishment and maintenance of the land administration system, which includes cadastral surveys to identify and subdivide land, and land registry systems to support easy land transactions [3]. Ukrainian agrarian economists note that the land market should, first of all, become an instrument capable of unleashing the agrarian potential of the country, stimulating investment in rural economy and contributing to the growth of the standard of living in rural areas [9]. The dynamic turnover of land property is defined as a prerequisite for the normal functioning of the economy [10]. The introduction of an agricultural land market is considered [11] an institutional completion of the complex reforms in Ukraine regarding both the land and agrarian sectors. As noted in [12], the agricultural land market should have a clearly defined, legally established purpose of operation for strengthening and developing the agricultural sector. The land market is considered a complex mechanism for regulating land relations related to social, legal, socio-economic, and ecological aspects of appropriating, using, and reproducing land resources, developing agricultural produc-

tion, and improving the welfare of landowners [13]. The moratorium restricted Ukrainian landowners regarding their development options and legal protection of their property. Therefore, the main significance of the moratorium was not legal, but economic, since it protected the interests of large agrarian enterprises, which profit from the use of land on lease terms and providing cheap access to land resources [14].

Syrotenko [15] believes that the moratorium negatively affected Ukraine's openness and readiness to cooperate with other countries, and limited its potential for European integration. The lifting of the moratorium on the turnover of agricultural land was considered a primary prerequisite for the fulfillment of the right to land ownership and the right to private ownership of land shares (i.e., land plots, typically called "pai" in the Ukrainian language). Those opposed to the lifting of the moratorium on the turnover of agricultural land pointed out that in Ukraine, there is no legislative framework for effective regulation of the agricultural land market, the role of the state in regulating the economic circulation of land has not been defined, and the land inventory and zoning by types (subtypes) of land use, taking into account the land's suitability for agriculture and the value of other natural resources, has not been completed. Moreover, the creation of the State Land Cadaster System has not been completed, with the land registry being canceled, and with the State Land Bank and land exchanges not being created [16]. Zhurakovska [17] believes that the lifting of the moratorium in current conditions will not help rural communities with neither additional resources nor additional income. Reaping the possible benefits from the land tax requires the implementation of land accounting, especially that of the leased land [17], which still has not been introduced to the needed extent.

Today, the most compelling argument for extending the moratorium is Russia's military aggression against Ukraine, and non-governmental organizations emphasize this challenge [18,19]. The war between Russia and Ukraine, initiated on 24 February 2022, has affected all spheres of public life. The land market was closed from February to May 2022, and all land transactions were blocked. The government of Ukraine determined that access to state registers, including the State Register of Rights to Real Estate, as well as the entry of information (or changes thereto) regarding objects of the State Land Register into this register and the use of such information, should be performed taking into account certain features. This includes access to and the publication of information concerning the State Land Register, particularly through the public cadastral map, which is part of the register's software [20,21]. Such access-related features will be valid throughout the period of the war with Russia and within one month from the date of its termination or cancellation. In order to ensure food security and guarantee the aforementioned right to land ownership [22], the access to a number of state registers and the State Land Cadaster has been simplified, although it will continue to be characterized by certain peculiarities.

Thus, there are two polar approaches to the agricultural land market—free or with restrictions (up to a complete moratorium on the turnover). This paper contributes to this discussion and is dedicated to studying the process of liberalization of the agricultural land market in Ukraine, as well as understanding how this market functions in wartime conditions and what the price trends are for agricultural land plots designated for commercial agricultural production.

The purpose of this study is to examine the functioning of the fundamental elements of the agricultural land market in Ukraine from the moment of its introduction on 1 July 2021 until today, as well as to understand its possible further development paths based on a human-rights-based approach. For this, the aspects taken into account include the following: the current state of the rights to agricultural land ownership; the availability of reliable and updated statistical information on land, land use, and land ownership; the impact of the Russian military aggression against Ukraine. The main researched elements include an analysis of agricultural land market regulations in Ukraine; an analysis of the ownership structure of agricultural land; an analysis of the agricultural land structure; an agricultural land market analysis; and assessment of the impact of the Russian military aggression against Ukraine on the agricultural land market. Within this study, we focus on a

particular segment of the agricultural land market being classified in Ukraine as "01.01—for commercial agricultural production" (according to the official state Classifier [23]).

2. Materials and Methods

Analysis of the legislation concerning the introduction and functioning of the agricultural land market in Ukraine was carried out based on data from the information system "Legislation of Ukraine" maintained by the Parliament of Ukraine [24]. Particular legal acts related to the functioning of the agricultural land market and the use of agricultural land were analyzed based on information obtained from the official websites of the state bodies that adopted these acts: namely, the Cabinet of Ministers of Ukraine; the Ministry of Agrarian Policy and Food of Ukraine; the State Service of Ukraine for Geodesy, Cartography and Cadastre; and the State Statistics Service of Ukraine.

The data used within the study were taken from the "Monitoring of Land Relations" portal of the State Service of Ukraine for Geodesy, Cartography and Cadastre [25]. Its purpose is to provide details on completed transactions involving agricultural land plots, for which it uses information from the State Land Cadaster. Based on data from the State Land Cadaster and the State Register of Real Estate Rights and Encumbrances, complex information on the value of each land plot, the form of ownership, the date of registration of land plot ownership, and the registration number of the ownership was presented for analysis. The particular data output file "Land Relationship Monitoring Data" was used to retrieve the data for the period between 1 July 2021 and 18 November 2023. From this dataset, using the Microsoft Excel software (Version 2111), cells were manually selected with the cost, normative monetary value, and selling prices, which were obtained based on sale contracts of agricultural land plots designated for commercial agricultural production under private ownership (classified as code 01.01 in the Classifier [23]). Then, the "Summary table" function was used to calculate the total number of contracts, the average value, the price, and the normative monetary value for the months from 1 July 2021 to 24 February 2022 (from the date of introduction of the agricultural land market). A graph was created for the period after 24 February 2022, showing the data on the number of registered contracts and corresponding characteristics.

In addition, the PostgreSQL database and the Python and SQL programming languages were used. In the QGIS software v.3.36.0, the data were spatially linked to the map of Ukraine according to the object classification of the Ukrainian administrative–territorial system. QGIS and Metabase were used to analyze and visualize the obtained data. Through the visualization of geospatial information, the total amount of sold agricultural land area by districts before and after 24 February 2022 was displayed. The resulting map was colored using the gradient method, where the red color indicated the maximum amount of land sold over a certain period of time by corresponding districts.

To visualize the quantitative indicator of transactions, we sorted land plots and corresponding transactions by administrative regions of Ukraine. This was possible using the cadastral number and the KOATUU (acronym for "Classification of objects of the administrative-territorial system of Ukraine") code attributed for each land plot on the index cadastral map. Accordingly, the entire dataset was divided into two groups: Group 1 reflects the period before the Russian invasion of Ukraine, and Group 2 shows data after this event. Within the districts, the number of transactions was aggregated to determine the impact of the invasion on market activity.

The main data limitation was the lack of reliable and updated statistical information regarding the land area in Ukraine divided by regions, landowners, land users, land use, and economic activity. This is due to the fact that as of 1 January 2016, the state statistical reporting on the quantitative accounting of land was discontinued [26]. No new reporting scheme has been introduced. In addition, access to the full functionality of the State Land Cadaster is limited due to the ongoing war, with the current cadaster containing information as of 9 August 2021 and only on 66% of the land plots in Ukraine [27].

3. Results

3.1. Agricultural Land Market Regulations in Ukraine

The introduction of the agricultural land market in Ukraine is part of the land reform process, and this process has several stages [28,29]. The current stage began on 1 July 2021 according to the law of Ukraine "On Amending Certain Legislative Acts of Ukraine Concerning the Conditions of Circulation of Agricultural Land" [30]. Before this law came into force, the turnover of agricultural land for commercial agricultural production (land use code 01.01) was forbidden in Ukraine, as there was a moratorium on the turnover of agricultural land. This was primarily due to its special value, as well as the attempt of the legislator to protect the interests of rural residents and small land owners—i.e., farmers—to stimulate the development of rural areas.

The Constitution of Ukraine establishes the special importance of land [31], where it is stated that land is the main national asset under special state protection. A similar statement is present in the 2001 Land Code of Ukraine [32], where the importance of agricultural land is also noted.

Ensuring the protection of the soil is described as the rational use of land, prevention of the unjustified extraction of agricultural land for non-agricultural needs, protection from harmful anthropogenic influences, and reproduction of and increase in soil fertility. The right to own land is guaranteed. Citizens, legal entities, and the state can acquire and exercise this right exclusively according to law. The state will protect the rights of all subjects of property and legal entities and the social orientation of the economy [31,32]. In the Ukrainian land legislation, a legal entity is a juridical or legally capable group of individuals that has defined rights and responsibilities regarding the ownership, use, and disposition of land parcels. Legal entities can be enterprises, organizations, institutions, or other juridical formations that have a recognized legal status.

When studying the agricultural land market in Ukraine, the principles of land legislation should also be considered, which also provides an opportunity to better understand the concept of land market legislation, which involves the following [32]:

- A combination of the features of the use of land as a territorial base, as a natural resource, and as the main factor of production;
- Ensuring equality between the rights of citizens, legal entities, territorial communities, and the state to the ownership of land;
- The noninterference of the state in exercising of rights of citizens, legal entities, and territorial communities to own, use, and dispose of land, except in cases provided for by law;
- Ensuring the rational use and protection of land;
- Guaranteeing the right to own land;
- Prioritizing environmental safeguarding requirements.

These principles contribute to ensuring the implementation of an integrated human-rights-based approach to rural development, food security, and land policy.

3.2. Ownership Structure of Agricultural Land

From 15 March 1991 to 1 January 2002, according to the 1990 Land Code of Ukraine [33], one of the goals of land reform in Ukraine was to ensure equal development of all forms of landownership. According to the current Land Code [32], land ownership in Ukraine can be private, communal, or state-owned (Table 1). The right to the collective ownership of land plots, which was established according to the 1990 Land Code of Ukraine [33] and had since ceased to apply, is preserved in the current Land Code. Ownership of a land plot extends within its boundaries to the surface layer (soil), water bodies, forests, and perennial plantations located thereon, unless otherwise provided by law and providing it does not infringe the rights of other persons. The ownership of a land plot extends to the space above and below the land plot surface to the height and depth necessary for constructing residential, industrial, and other buildings.

Table 1. Ownership structure of agricultural land in Ukraine as of 1 January 2016, in thousands of hectares.

Types of Land	Types of Ownership				Total
	State	Private	Collective	Communal	
Agricultural land	10,405.00	31,060.00	17.40	25.50	41,507.90
Of which arable land	5082.40	27,433.80	9.10	16.00	32,541.30

Source: The state statistical reporting on land accounting (form No. 6—land).

The moratorium on the turnover of agricultural land was set as follows. According to the 2001 Land Code of Ukraine [32], for the period until 1 January 2005, it was forbidden to register land share rights in legal entities' statutory funds. Citizens and legal entities owning land plots for non-commercial and commercial agricultural production, as well as citizens of Ukraine as owners of land shares, had no right to sell or otherwise alienate their land plots and land shares until 1 January 2005, except for mines, their inheritance, and when land was confiscated for public needs. This moratorium continued until 2020, when, as already mentioned, in connection with the introduction of amendments to selected legislative acts of Ukraine [30], the agricultural land market began to function from July 2021. At this point, it is important to note what a land plot (pai) is to better understand the peculiarities of Ukrainian legislation and its fundamental basics in terms of land description.

According to the 2001 Land Code of Ukraine [32], in the course of the land reform, during the privatization of land belonging to state and communal agricultural enterprises, institutions, and organizations, land was transferred free of charge to employees (and pensioners) of these enterprises, institutions, and organizations, with a land share dedicated for each individual. The area of land transferred to private ownership was the difference between the total area of land permanently used by agricultural enterprises, institutions, and organizations and the area of land remaining in state or municipal ownership (Forest Fund, Water Fund, Nature Reserve Fund). Each employee (including retired employees) of these enterprises, institutions, and organizations was guaranteed the right to receive a land share allocated to them. When calculating the size of each land share, agricultural land that was used by state and communal agricultural enterprises, institutions, and organizations on a permanent basis was taken into account, excluding land that remained under state and communal ownership. The total area of the agricultural land calculated for privatization was divided by the number of people employed by and retired from an organization.

Acquisition of the right to ownership of agricultural land plots, in accordance with the legislation in force [30] today, may be undertaken by the following:

- Citizens of Ukraine;
- Ukrainian legal entities established and registered according to Ukrainian legislation, whose participants (shareholders, members) are Ukrainian and/or state and/or local authorities;
- Territorial communities;
- The state.

An important feature of the current stage of introduction of the agricultural land market in Ukraine is that, in accordance with the law [30], until 1 January 2024, the total area of agricultural land in the ownership of one Ukrainian citizen cannot exceed 100 hectares. Moreover, until this date, it is prohibited to buy privately owned land plots classified as land for commercial agricultural production by legal entities. Exceptions to this include the transfer of land plot ownership rights to banks as collateral or to individuals as inheritance, the exchange of one land plot for another with the same normative monetary value or an estimated difference no higher than 10%, and the alienation of land plots for public needs.

From 1 January 2024, according to the law [30], the next stage of the agricultural land market reform begins. In this stage, the total area of agricultural land in the possession

of one citizen of Ukraine is limited not to 100 hectares, but to 10,000 hectares. The total area of agricultural land owned by legal entities (except banks) also cannot exceed the total area of 10,000 hectares, which includes agricultural land owned by all of their participants (members, shareholders).

The normative monetary value of land plots in Ukraine is a value used to determine land tax; the duty of the state regarding the exchange, inheritance, and donation of land plots; rent for land plots of state and communal property; losses to forestry production; and the value of land plots with an area of more than 50 hectares for the placement of open sports, physical culture, and health facilities, as well as in the development of indicators and mechanisms for the economic stimulation of rational use and protection of land. The normative monetary value of a land plot takes into account, inter alia, the norm of capitalized rental income per unit of area according to the category of the land plot's main purpose [34].

The normative monetary value (NMV) of a land plot is determined using the following formula [34]:

$$NMV = S \times Sri \times Cm1 \times Cm2 \times Cm3 \times Cm4 \times Cdp \times Cmp \times Cni \quad (1)$$

where

S = area of the land plot, in square meters;

Sci = standard capitalized rental income per area unit;

Cm1 = a coefficient that takes into account the location of the territory of the territorial community within the zone of influence of large cities;

Cm2 = a coefficient that takes into account the resort and recreational value of settlements;

Cm3 = a coefficient that takes into account the location of the territory of the territorial community within radiation contamination zones;

Cm4 = a coefficient characterizing the zonal factors of the land plot location;

Cdp = a coefficient that takes into account the designated purpose of the land plot in accordance with the information of the State Land Cadaster;

Cmp = a coefficient that takes into account the peculiarities of land use within the category of the land's main purpose;

Cni = the result of indexation coefficients of the normative monetary valuation of land for the period from the approval of the norm of capitalized rental income to the date of valuation. The normative monetary value of an agricultural land plot takes into account soil bonification data, which form the basis for the economic evaluation of agricultural land and are taken into account when determining the ecological suitability of soils for the cultivation of agricultural crops [34,35]. The normative monetary value of an agricultural land plot is established for purposes other than selling; it is not based on the supply and demand of such plots. Moreover, this is a new calculation method, so there are still few facts and conclusions regarding the objectivity of such an assessment [36].

3.3. Agricultural Land Structure

The 2001 Land Code of Ukraine [32] determines that lands of agricultural purpose are those meant for the production of agricultural products, the implementation of agricultural research and educational activities, and the placement of relevant production infrastructure, including infrastructure of wholesale markets of agricultural products. Such lands include the following (Table 2):

- Agricultural land (arable land, perennial plantations, hayfields, pastures, and fallow land);
- Non-agricultural land (agricultural roads and paths; shelterbelts and other protective plantations, unless they are part of other categories; land under agricultural buildings and yards; land under the infrastructure of wholesale markets of agricultural products; land under bio-methane production facilities that are part of complexes for the production, processing, and storage of agricultural products; land for temporary conservation; etc.).

Table 2. Agricultural land in Ukraine as of 1 January 2016.

Regions	Total Land Area (Thousand ha)	Land of Agricultural Purpose (Thousand ha)		
		Total	Of Which Utilized Agricultural Area	
			Total	Of Which Arable Land
Autonomous Republic of Crimea	2608.1	1853.3	1792.5	1271.5
Vinnytsya	2649.2	2063.6	2014.2	1725.5
Volyn	2014.4	1079.8	1047.6	672.6
Dnipropetrovsk	3192.3	2581.5	2513.0	2127.4
Donetsk	2651.7	2094.2	2041.1	1652.7
Zhytomyr	2982.7	1582.2	1510.1	1112.7
Zakarpattya	1275.3	469.2	451.0	200.2
Zaporizhzhya	2718.3	2297.9	2241.7	1903.6
Ivano-Frankivsk	1392.7	645.0	630.5	397.2
Kyiv	2812.1	1793.4	1664.2	1355.5
Kirovohrad	2458.8	2079.3	2032.2	1764.6
Luhansk	2668.3	1955.7	1908.6	1276.6
Lviv	2183.1	1290.1	1261.5	794.1
Mykolayiv	2458.5	2054.1	2006.0	1699.2
Odesa	3331.4	2659.2	2591.8	2075.5
Poltava	2875.0	2223.3	2165.5	1774.7
Rivne	2005.1	958.0	926.2	656.8
Sumy	2383.2	1738.3	1698.0	1226.3
Ternopil	1382.4	1073.3	1046.2	856.4
Kharkiv	3141.8	2473.8	2411.5	1933.2
Kherson	2846.1	2032.5	1969.4	1777.9
Khmelnytskiy	2062.9	1603.6	1566.2	1252.7
Cherkasy	2091.6	1487.0	1451.0	1272.0
Chernivtsi	809.6	481.7	469.7	330.8
Chernihiv	3190.3	2124.0	2067.5	1419.2
Kyiv city	83.6	4.7	4.5	0.6
Sevastopol city	86.4	27.7	26.2	11.8
Ukraine	60,354.9	42,726.4	41,507.9	32,541.3

Source: The state statistical reporting on land accounting (form No. 6—land).

According to the statistics (as of 1 January 2016), the main owners and users of agricultural land in Ukraine were citizens; their share of the land was 48.5%, of which 48.7% was arable land (Table 3).

3.4. Agricultural Land Market Analysis

The results of the agricultural land market assessment indicate that the data on sales contracts, particularly regarding the form of ownership, price, area, and purpose of land use, are often incorrect and of poor quality. In view of the lack of a proper database on all

of the land plots in Ukraine, the issue of data quality becomes particularly relevant. We estimate that almost 60% of price data are not entered into the register because a portion of landowners deliberately avoid doing so. Another reason may be technical difficulties. Therefore, a calculation of the median price is more appropriate for our study, as this algorithm uses average values across the entire sample. Our calculations, based on the results of the monitoring of land contracts [25], show that during the entire period of agricultural land market operations in Ukraine, the average price per unit of agricultural land for commercial agricultural production did not undergo any changes (Figure 1). The initiation of the war with Russia on 24 February 2022, and the suspension of the registers in February–May 2022, had no influence on prices. Private land plots make up almost 99% of the sold land plots, although contract prices are not always available. Failing to obtain a contract price creates a further gap in the reliability of the land market data.

Table 3. Total land area and distribution of agricultural land by landowners and land users as of 1 January 2016.

Types of Landowners and Land Users	Total Land Area (Thousand ha)	Agricultural Land		Of Which Arable Land	
		Thousand ha	%	Thousand ha	%
Agricultural enterprises (all land owned and used):	16,985.40	16,328.70	39.34	15,285.40	46.97
non-state	15,857.30	15,390.50	37.08	14,510.60	44.59
state	1118.10	937.00	2.26	773.90	2.38
inter-household	10.00	1.20	0.0020	0.90	0.0015
Citizens who have been given land for ownership and use	20,762.20	20,124.60	48.48	15,846.50	48.70
Other	22,607.30	5054.60	12.18	1409.40	4.33
Total	60,354.90	41,507.90	100.00	32,541.30	100.00

Source: The state statistical reporting on land accounting (form No. 6—land).

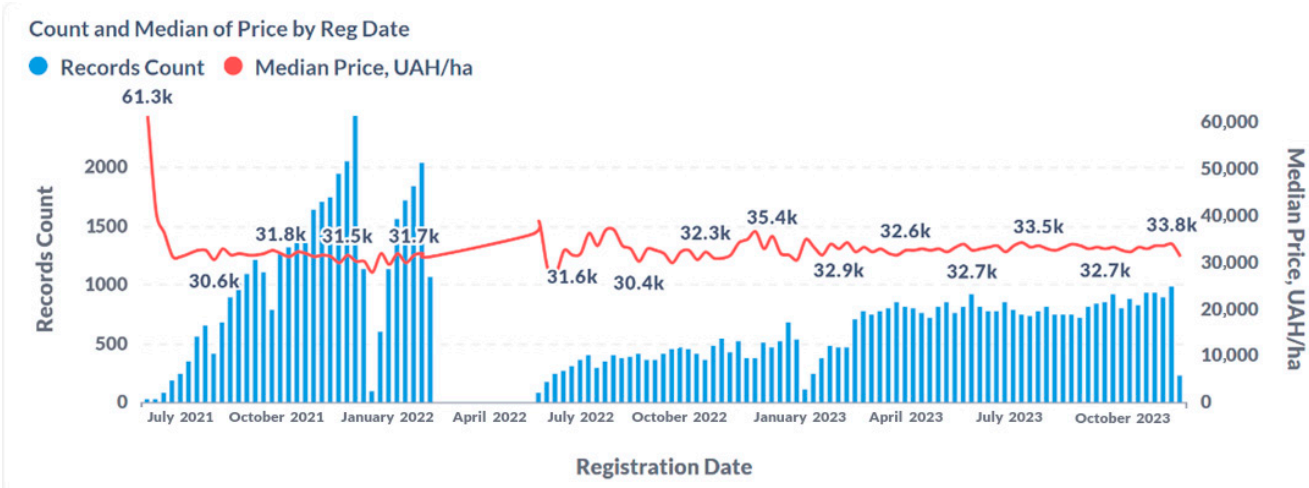


Figure 1. Quantity and median price of agricultural land according to the dates of sale registration. Source: Authors' research results.

The research and calculations here indicate that the raw data provided by the State Service of Ukraine for Geodesy, Cartography and Cadastre [25] contain numerous errors and inaccuracies. Therefore, for the data analysis, algorithms (manual and automatic) were applied to clean and process these data, bringing them to a normalized state (including

classifier codes) and providing spatial references, which represents a new contribution to data analyses of this kind.

Figure 2 shows a slight correlation existing between price and land area. In addition, the agricultural plots of land in question here are land shares: that is, the area of the plots sold is the size of the land share. The most numerous were contracts regarding land plots with an area of ca. two hectares.

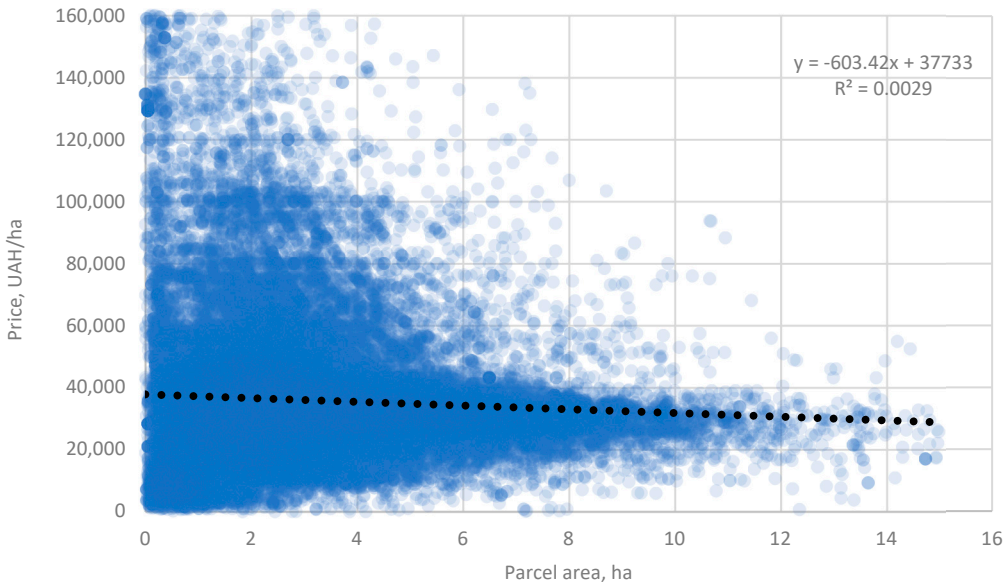


Figure 2. Dependence of the median price on the agricultural land plot (parcel) area. Source: Authors' research results.

The median price was used to assess the prices paid for agricultural land in Ukraine (Figures 2 and 3). The results of monitoring the prices for land plots intended for commercial agricultural production show that the median price is 32,316 UAH/ha. The total area of the sold land plots for this purpose amounts to 263,718.63 hectares.

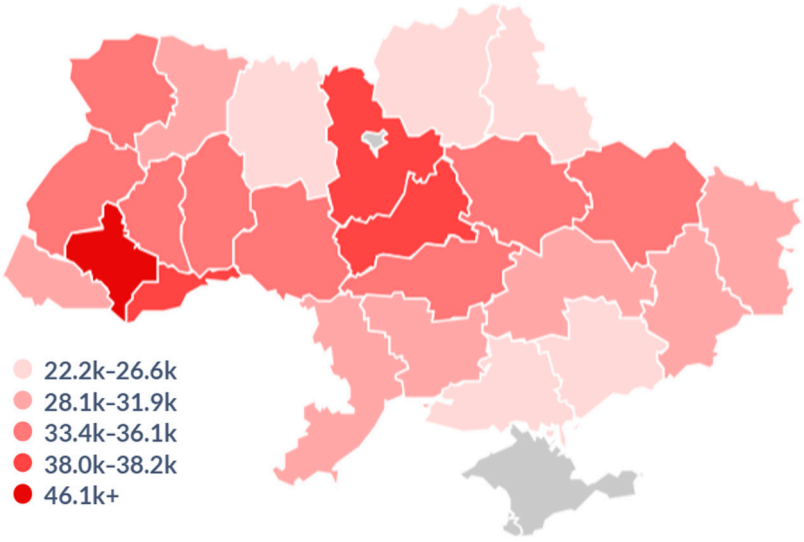


Figure 3. Median prices of agricultural land in the regions of Ukraine between 1 July 2021 and 18 November 2023, in UAH/ha. Source: Authors' calculations.

Our calculations show there is a direct correlation between the median price and the normative monetary value (Figures 4 and 5). The normative monetary value of the land plots was used as the price, which is also considered the minimum price for them in

accordance with the law until 2030 [30], despite the purpose of this type of valuation for land plots generally differing.

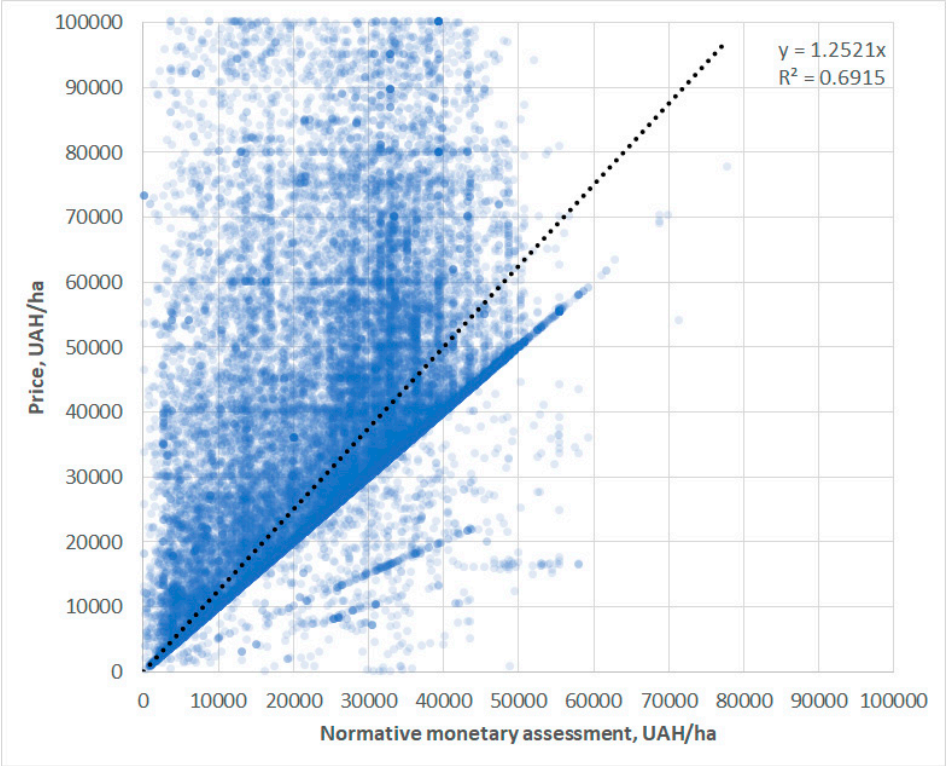


Figure 4. Interdependence between the median price of land and the normative monetary value of land. Source: Authors' research results.

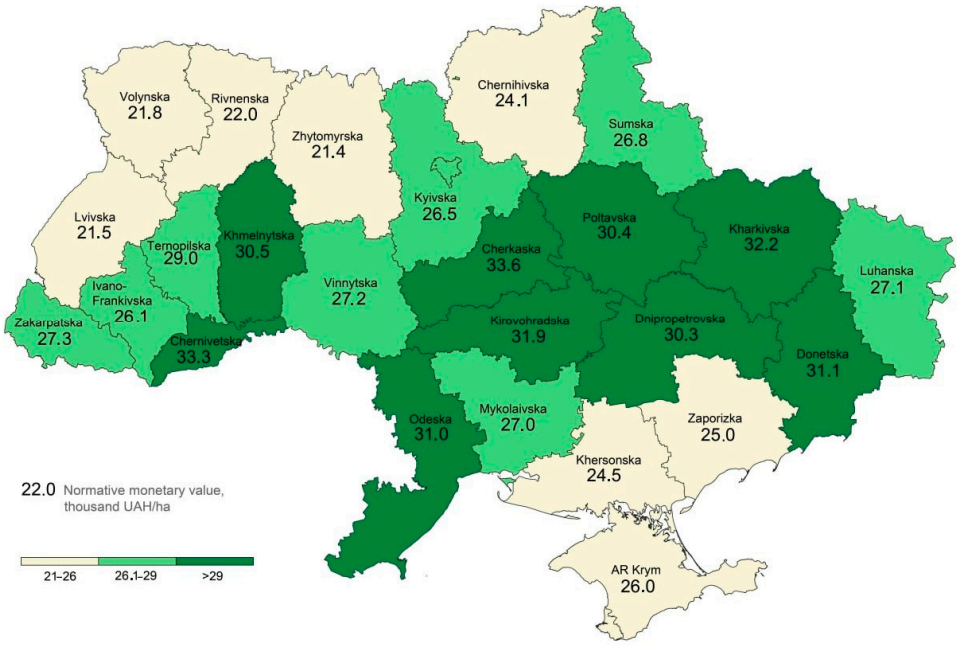


Figure 5. Normative monetary value of arable land by region as of 1 January 2022. Source: [37].

The law [30] establishes that until 1 January 2030, the selling price of agricultural land plots should not be less than their normative monetary value. The economic content of land plots' standard monetary value is different; therefore, setting this value as a benchmark for the minimum selling price is a debatable decision, which can be explained as follows.

3.5. Impact of Russian Military Aggression against Ukraine on the Agricultural Land Market

The beginning of Russia's war against Ukraine posed a serious obstacle to the agricultural land market, as access to most government registries was temporarily suspended. By the end of May 2022, access to these registers was restored and the market began to function.

The Russian–Ukrainian war has been a significant driver of changes, and it is worth considering in order to justify managerial decisions based on an understanding of the risks, financial support for economic entities located in dangerous zones, and insurance calculations. Hostilities have had a significant impact on agricultural land, including the following:

- The destruction of infrastructure, including agricultural infrastructure such as roads, bridges, storage facilities, and other technical buildings;
- Damage to the soil cover caused by explosions from artillery munitions, the movement of military equipment, and contamination with chemicals;
- Crop losses and decreased agricultural production due to military operations and destruction of equipment;
- Lack of access to fields, which makes the cultivation and harvesting of crops significantly more difficult or impossible;
- Contamination of water resources used for irrigation, which leads to insufficient water supply for agriculture purposes.

These consequences have a serious impact on agricultural land, crop production, and the livelihoods of the population located in the combat zone. The following zones (Figure 6) were identified according to the level of impact on agriculture caused by the war [38]:

- Zone 1: Hazardous areas, where agriculture is at extreme risk;
- Zone 2: Areas at high agricultural risk;
- Zone 3: Temporarily occupied areas;
- Zone 4: Conditionally safe areas.

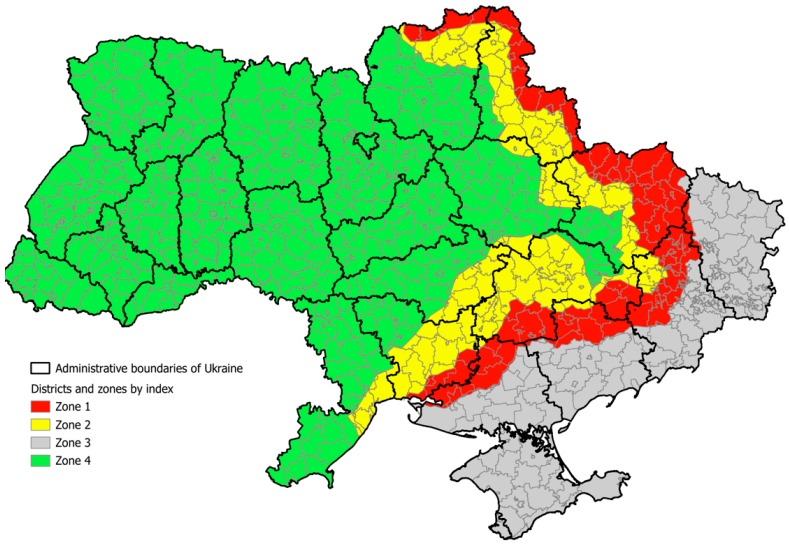


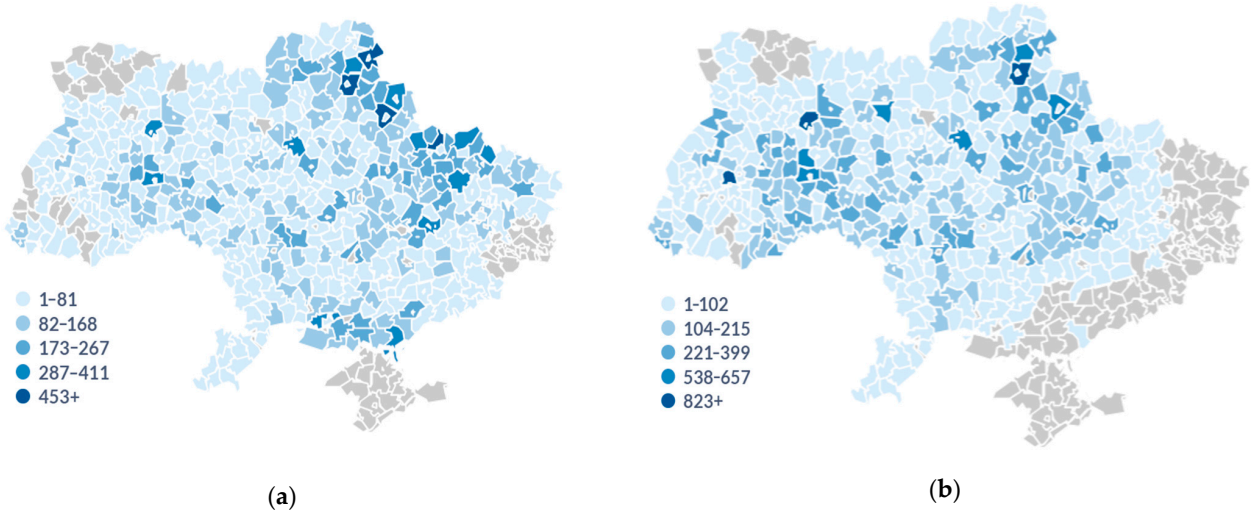
Figure 6. Zoning of Ukraine according to the level of danger. Source: [38].

The information on hazard zoning shown in Figure 6 is important for monitoring the land market because it allows us to understand the factors affecting the demand and supply of land plots.

Based on the district land statistics as of 1 January 2016, and taking into account the map created using Deepstatemap [39], according to our calculations, in December 2023, 11.3 million hectares (18.5%) were temporarily unavailable, of which 8.3 million hectares (19.4%) were agricultural land. In 2022, 4.5 million hectares (7.4%) were temporarily

unavailable, of which 3.1 million hectares (7.3%) were agricultural land (AR Crimea and ORDLO (abbreviation for occupied districts of the Donetsk and Luhansk regions)).

Considering the above factors and the data presented in Figure 1, maps of the number of land sale transactions according to the districts of Ukraine are shown in Figure 7.



(**a**) (**b**)

Figure 7. Land sale transactions according to the districts of Ukraine: (**a**) between 1 July 2021 and 23 February 2022; (**b**) between 24 February 2022 and 18 November 2023. Source: Authors' research results.

The above figure indicates that despite the war with Russia, the agricultural land market is functioning, albeit with spatial differentiation. After Russia's full-scale invasion of Ukraine, land sales in the eastern part of the country declined significantly. On the other hand, the number of sale transactions in the central and western parts of the country increased. This is the way in which the agricultural land market responds to wartime risks in agricultural activities.

4. Discussion

A previous study [40] indicated that the liberalization of the agricultural land market in Ukraine is characterized by the same trends that are inherent in this process in other countries. The experience of EU Member States shows that a period of liberalization of a land market is characterized by the following general features: the prices for land plots are low, and there are a small number of transactions, which makes the market itself ineffective for determining fair prices and protecting the rights of landowners. Some countries, such as Estonia, Lithuania, Romania, and Hungary, liberalized their land market quickly, while Bulgaria, Poland, and Croatia are making this transition at a slower pace.

Since joining the EU, the indicated countries have seen an increase in the turnover of agricultural land. For example, before joining the EU, annual sales in Bulgaria were less than 2.5% of the country's total area, but increased to 45% between 2006 and 2008. Similar trends were observed in the Czech Republic, where the turnover of land acquisition increased from 0.5% to 3.3%. In Romania, the growth of the annual turnover of their agricultural land market increased more than three times in the period of 2005–2009 [40]. The national land laws introduced in the EU Member States that regulate land transactions serve various objectives [41]. The various restrictions for agricultural land market transactions that existed in Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia, and Poland before EU accession were allowed to remain in effect during the transitional period [42].

On 1 July 2021, the longstanding moratorium on the turnover of agricultural land in Ukraine was lifted and the agricultural land market started operating according to the law of Ukraine "On Amending Certain Legislative Acts of Ukraine Concerning the Conditions

of Circulation of Agricultural Land" [30]. The results of our research indicate that in the period from 1 July 2021 to 18 November 2023, for the entire time of the operation of this market, land plots with a combined area of less than 1% of the total area of agricultural land of Ukraine were sold. This is confirmed by the data in [43], as well.

The dynamics of the average price per unit of area of land type "01.01—for commercial agricultural production" were minimal during the whole researched period. The price was not affected by factors as significant as Russia's military aggression against Ukraine (starting 24 February 2022), or the suspension of registers and the cadaster until the second half of May 2022. In addition, the median market price was in direct correlation with the normative monetary value of agricultural land plots. Due to devaluation of the Ukrainian hryvnia (UAH) in relation to the US dollar (USD) equivalent, sales contracts were concluded at a lower cost than before the war [44]. This is especially noticeable when considering, for example, exchange rate fluctuations for selected dates (based on data obtained from the National Bank of Ukraine [45]):

- 1 July 2021: 27.2275 UAH/USD;
- 24 February 2022: 29.2549 UAH/USD;
- 18 December 2023: 37.0211 UAH/USD.

Figure 1 shows the stability of the median price and its closeness to the normative monetary value, giving us reasons to disagree with the conclusions of the review conducted by Nivievskyi et al. [43], which described increased agricultural land market capitalization as well as an increase in the purchasing power of small landowners.

The results of our calculations show that the market has, nevertheless, reacted to the Russian military aggression against Ukraine and the emergence of danger zones. For example, the number of transactions in the market after 24 February 2022 was less than the number of transactions in the period of 1 July 2021 to 23 February 2022. The same market reaction is observed in the spatial distribution of transactions.

Contrary to the traditional trends of the land market regarding the dependence of the price on the area of the land, the price of the "01.01—for commercial agricultural production" land is virtually independent from the size of the sold plot. The law stipulates that until the year 2030, the sale price of agricultural land plots may not be lower than their normative monetary value. In this context, the normative monetary value of the land plots can be considered their minimum price. However, such stability of the land price in relation to the influence of various factors indicates that its value is virtual. The normative monetary valuation of land plots is a value set by a directive and is not a market price, which is set under the influence of the combination of demand and supply. It does not reflect real processes that directly or indirectly influence the market and its price. It is also necessary to consider factors such as, notably, the conditions of economic and financial activities, the general economic environment, global market trends, technical and technological aspects of agricultural activity, and the dynamics of changes in legislation, as well as natural factors, such as the climate, demographic factors (migration), the influence of wars on these processes and factors, etc.

Some researchers also associate the adequacy and objectivity of the price and normative monetary value of agricultural land plots in Ukraine with fluctuations in the exchange rate. Tretiak et al. [46] stated that the value of agricultural land is determined by the amount of added value created on it, and not by the amount of land that is bought or sold by landowners. These authors compared the level of value creation per hectare of agricultural land with the normative monetary valuation of the land until 2022 in Ukraine and EU countries, and found that the price of Ukrainian agricultural land is rather justified. Nevertheless, the normative monetary valuation of land is underestimated, meaning that the price on the market today is not comparable with the value of agricultural land in terms of added value, which is also caused by exchange rate fluctuations in Ukraine [46].

The largest number of sales contracts in the period studied in this paper concerned privately owned agricultural land plots. These are land plots with an area of two hectares. However, it is typical in Ukraine for commercial agriculture to be carried out on plots of

land from 100 to 500 hectares, depending on the region. Therefore, we would like to point out the risk of land parcelization [14], which leads to ecological and economic consequences for managing the land and requires an appropriate national land policy. Parcelization may result in diminished operational efficiency within the sphere of commercial agriculture, increased expenditures due to management and maintenance needs, as well as environmental and conservation concerns. These encompass the depletion of natural habitats, escalated soil erosion, and other ecological implications. Simultaneously, there could be a positive social outcome: for instance, the accessibility of land parcels for small-scale farms to cultivate agricultural produce for self-sufficiency, or the maintenance of land ecosystem services in rural areas (e.g., the landscape). But the probability of achieving a positive outcome in this regard remains limited. Minimizing the negative consequences of parcelization presents a need for the implementation of state regulatory mechanisms.

We can see a number of risks associated with the described trends, as well as with the possibility for legal entities and individuals to purchase up to 10,000 hectares of agricultural land starting from 1 January 2024. These risks are as follows:

- The rights of buyers and sellers of land are still undefined. The law establishes requirements for the seller, but the institutional framework of the buyer is unlimited, which will have an impact on the price and conditions of the sale (this was also noted by an expert in [14]). Medium- and small-sized farms indicate that the next stage of introducing the agricultural land market from 1 January 2024 may lead to unfair competition in the agricultural land market [47,48]. Firstly, the increase in the limit from 1 January 2024 for the purchase of 10,000 hectares by one individual/entity is considered a high risk. Medium and small farms have less purchasing power than large agricultural producers represented in Ukraine by agricultural holdings [47,48].
- Further concentration of land ownership by large agricultural producers (so-called "agriholdings") will lead to the emergence of market oligopolies or monopoly. Prior to 1 January 2024, when it was not possible for agricultural land exceeding a total area of 10,000 hectares to be owned by one individual/entity, agricultural holdings operated on leased land and the top 117 agriholdings in Ukraine cultivated 16% (or 6.45 million hectares) of the country's agricultural land [49]. Since 1 January 2024, they have been able to purchase agricultural land plots, which will lead to changes in the structure of private property: private ownership by citizens will decrease, while ownership by legal entities will increase [50].
- There may be a distortion in the price of agricultural land caused, in particular, by the directive setting of the minimum price at the level of the normative valuation, along with the insensitivity of the price to the conditions and circumstances of war. This will lead to further impoverishment of rural residents, a decrease in the efficiency of farmers' agricultural activities, and the decline of rural areas.

According to experts [43], the dynamics within the land market allow us to positively hope for further increases in the productivity of agricultural production, the capitalization of land, and the purchasing power of land plot owners in connection with the development of the market. In the conditions of the Russian–Ukrainian war, achieving the above becomes challenging. Moreover, currently, the market is incapable of properly determining the price of land, including taking into account its value as a national asset in accordance with the Constitution of Ukraine.

In Ukraine, there is a market for land lease and a market for the turnover of land plots, which each play an important role in the agricultural sector, but also compete with each other, creating alternative choices for buyers: agricultural commodity producers and landowners [46]. It is noted that renting land remains the most effective way for agricultural producers to expand cultivated areas [51], due to the liberalization of agricultural land leases and the significant decrease in real rental prices for land used for commercial agriculture since the beginning of the war in Ukraine.

Modern land markets have evolved from simple land-trading systems to complex commodity-trading systems, as discussed in [3]. The evolution of markets is not in con-

tradiction with the need for control and restrictions on land turnover. The multipurpose role of land in achieving the Sustainable Development Goals (SDGs) in this regard is the focus of many researchers, particularly in [3,4,52,53]. The SDGs encompass a range of interconnected issues. The linkages between the economic, social, and environmental objectives of sustainable agriculture contribute to many SDGs and their targets. For instance, "SDG 2: Zero hunger" aims to end hunger and malnutrition, including through increasing agricultural productivity and enhancing food security in an environmentally sound way, and through ensuring secure and equal access to land, which is among the most challenging goals to achieve [54–56].

Although it is difficult to achieve a smooth transition from simple to complex land markets in order to ensure welfare, formal land markets must pass through a number of developmental stages [2]. Land rights can exist without a market, but markets cannot exist without land rights [2,3]. Guaranteed land rights and effective land administration are necessary, but not sufficient, for a land market to develop effectively. Therefore, the land market requires public policy consolidation of the main functions of land ownership: the stabilization of land distribution, the distribution of power between landowners and capital generation, the maintenance of land information systems, and the implementation of regular land valuation approaches [2,3,52]. It is fundamentally important, as Enemark [53] pointed out, that land administration systems are based not declaratively, but realistically, from a human-rights-based perspective in the management of the rights, restrictions, and responsibilities associated with land ownership and turnover.

Finally, it includes a human rights dimension related to overall national land policies. Precisely in this context, the private sector and civil society play a distinctive role. According to Williamson [3], modern societies "are building genuine partnerships between communities and land owners, so that environmental and business controls are more mutual endeavors". The private sector may also have a significant role to play in land policy implementation [57]. It is important that information exchange, feedback, and co-creation facilitate the participation of civil society in regional planning as part of the integrated management of the economic, social, and physical resources of a spatially bound area [58]. The information exchange, feedback, and co-creation indicated in the context of our study also facilitate the participation of civil society in land administration and land management. A review of the new roles of the private sector in land administration in Latin American countries carried out by Endo, Pantoja, and Trevino [59] showed that social communication and community participation are essential components of systematic registration in land administration. In accordance with the purpose of land policy as a form of government intervention in land markets, a distinction can be made between different groups of instruments [4]:

- Instruments primarily designed to increase efficiency;
- Instruments with a focus primarily on equity issues;
- Instruments intentionally designed to pursue both purposes simultaneously.

Among the main land policy instruments related to the land market, which cover all of the above groups and which must be implemented in Ukraine in the near future, we outline the following:

- The consolidation of land should occur simultaneously with the introduction of the land market, as it is one of the priority tasks of land management at the current stage of land relation development [60]. Land consolidation is a set of land management measures that involve changing the boundaries and uses of land plots, forming new land plots, and terminating the existence of existing land plots in order to avoid overlapping and ensure sustainable land use [61].
- Despite the fact that we consider the normative monetary value of land plots to be questionable from the perspective of its value being the price of land, it is necessary to update the methodology used in the calculation of the normative monetary value of land plots in order to take into account realities such as the opening up of the land market and Russia's war with Ukraine. It should be noted that the idea of

introducing a land mass evaluation in Ukraine does exist, but so far, there remain too few transactions and the quality of the data on these transactions is not reliable enough for use as a basis for general national land turnover evaluation.

- There is a need for the introduction of rational restrictions on the purchase of land, as is customary in other parts of the world. Restrictions are made possible by establishing criteria for the purchase of land based on the location of the land plot, special education, the specifics of the activities carried out on the land plot, etc. It is advisable to once again review the restrictions on the maximum area size of land in possession of one land owner.
- It is necessary to introduce land accounting and improve data quality, and to monitor the land market. Further analysis of the impact of supply and demand on the market should be conducted, and the following factors should be taken into account that affect the price of a land plot: the costs of land improvements, the capitalized net operating or rental income from its use, the location of the plot, quality characteristics, geological parameters, and soil fertility, as well as other specific conditions [62].

The land market is an opportunity for owners of land to fulfill their property rights. We agree that it is important not only to capitalize (increase the value of) land, but also to environmentalize (e.g., reduce greenhouse gas emissions from land use and land use changes by reducing plowing) and socialize land use by increasing non-traditional land use and the number of individual farms [46]. Despite this, the necessary economic conditions, legal frameworks for the regulation of the land market, and state regulatory instruments are not yet in place.

The experience of Ukraine in the liberalization of the agricultural land market described in this paper may be useful for countries with a socialist past (especially those with a USSR background) if a decision is made to drop the typical Soviet policy of exclusive state ownership of agricultural land. The applied approach to calculations is also suitable for use in other countries for spatial mapping in land market monitoring.

5. Conclusions

The functional dynamics of the agricultural land market in Ukraine, from the moment of its introduction in July 2021 until today, show that the market does not reflect the real price and suitability of land for the cultivation of agricultural crops; the median price is consistent with the normative monetary value of the land plots and remains practically stable throughout the period of market functioning. The low number of transactions on the market, their decrease since the beginning of the Russian–Ukrainian war, and the increase in the level of danger in certain regions, along with the lack of reliable statistical data on the quantitative and qualitative characteristics of the land, the presence of errors in the registers and cadasters, and the lack of information on transactions, show that the market cannot independently resolve land problems in the interests of society, and state intervention is thus required.

The legislation of Ukraine, which, to some extent, has determined the content of the land reform, acknowledges the special value of land. In fact, the cost and value of land is determined not only by supply and demand, but also by a number of other factors, including social factors and other benefits and conflicts. In addition, the agricultural sector of Ukraine is considered by the world community to be one of the guarantors of food security in the world. This is directly related to the ownership of land and access to the land market. When buying and selling land, the land should not be considered a classical market product. In this context, in our opinion, agricultural land functions primarily as a public good.

However, in Ukraine, the government has failed to create the legal framework and conditions required for efficient market mechanisms and infrastructure before full liberalization of the agricultural land market. The authorities should have used appropriate instruments to ensure a high level of public confidence in the agricultural land market before its introduction. This is particularly relevant for the second stage of the agricultural

land market reform—opening the market for legal entities as of 1 January 2024—as well as increasing the maximum area of agricultural land owned by individuals and legal entities up to 10,000 hectares. With awareness of the importance of monitoring the agricultural land market, we note the need for further in-depth study of the factors that shape the price of agricultural land. This is also necessary for the implementation of an integrated human-rights-based approach to rural development, food security, and land policy.

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